The Empirics of Commodity Price Booms and Busts: Macroeconomic Effects and Policy Response

By
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SCHOOL OF ECONOMICS
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CERTIFICATE OF APPROVAL

This is to certify that research work presented in this thesis titled **"The Empirics of Commodity Price Booms and Busts: Macroeconomic Effects and Policy Response"** was conducted by **Mr. Irfanullah** under the supervision of **Dr. Javed Iqbal, Professor,** School of Economics, Quaid-i-Azam University, Islamabad.

No part of this thesis has been submitted anywhere else from any other degree. This thesis is sub mitted to the School of Economics, Quaid-e-Azam University, in partial fulfillment of the requirements for the Degree of Doctor of Philosophy in the field of Economics and is accepted in its present form.

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List of Abbreviation

Abbreviation	Definition
BOP	Balance of Payments
CB	Central Bank
CABALNCE	Current Account Balance
CFs	Conditional Factors
COMTRADE	United Nations Commodities Trade
COVID-19	Corona Virus Disease 2019
CSCTOT	Country Specific Commodity Terms of Trade
CPI	Consumer Price Index
CPS	Commodity Price Series
CTOT	Commodity Terms of Trade
CVs	Control Variables
DDC	Dollar Denomination of Commodities
DFEIV	Dynamic Fixed Effect Instrumental Variable
DJ-UBSCI	Dow Jones-UBS Commodity Index
DWH	Durbin-Wu-Hausman
ECNGROWTH	Economic Growth
EDMEs	Emerging and Developing Market Economies
EFs	Economic Fundamentals
ENFs	Economic Non-Fundamentals
EPU	Economic Policy Uncertainty
EU	European Union
EXTBL	External Balance
EXCRATE	Exchange Rate
FAO	Food and Agricultural Organization
FCV	Foreign Currency Value
FDI	Foreign Direct Investment
FDEVLP	Financial Development
FE	Fixed Effect
FEL	Fixed Effects Logit

FEXCRESERS	Foreign Exchange Reserves
FINC	Financialization of Commodities
FP	Fiscal Policy
FPC	Fiscal Policy Choice
FX	Foreign Exchange
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GMM	Generalized Method of Movement
GNP	Gross National Product
GOVRNANC	Governance
GOVTEXPND	Government Expenditure
GOVTDEBT	Government Debt
GOVTREVNUE	Government Revenue
GOVTSIZE	Government Size
GPRI	Geopolitical Risk Index
HP	Hodrik Prescot
HST	Hausman Specification Test
HUCPTL	Human Capital
ICAs	International Commodity Agreements
IMF	International Monetary Funds
INCINEQ	Income Inequality
INF	Inflation
INTRATE	Interest Rate
INVSTMN	Investment
INVT	Inventories/Stocks
IV	Instrumental Variable
KAOPNES	Capital Account Openness
LSDV	Least Squares Dummy Variable
MCI	Monetary Conditions Index
MLE	Maximum Likelihood Estimation
MP	Monetary Policy

MPC	Monetary Policy Choice
MS	Money Supply
MUV	Manufacturing Unit Value
MVs	Macroeconomic variables
NDCTOT	Narrow Dependent Commodity Terms of Trade
OECD	Organization of Economic Cooperation and Development
OLS	Ordinary Least Square
POLSTB	Political Stability
POPULATN	Population
PPP	Purchasing Power Parity
PRDC	Production
RBC	Real Business Cycle
RE	Random Effects
REER	Real Effective Exchange Rate
REL	Random Effects Logit
REMITTANCE	Remittances
SAVINGS	Saving
SMEs	Small and Medium Sized Enterprises
SWIID	Standard World Income Inequality Database
TRDOPNES	Trade Openness
TOT	Terms of Trade
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEMPLMNT	Unemployment
US	United States
USD	United States Dollar
VAR	Vector Auto Regressive
VAT	Value Added Tax
WDI	World Development Indicators
WGI	Worldwide Governance Indicators
WGPR	World Geopolitical Risk/Geopolitical Uncertainty

WRGDP	World Real Gross Domestic Product
WTUNC	World Trade Uncertainty
WUI	World Uncertainty Index
WUNC	World Uncertainty
Y	Output

Declaration

that no portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning

Dedication

To

The most respected and honourable

My parents & late brother

Acknowledgment

I begin with the blessed name of Allah (AJ) who gave me the ability and strength to complete my MS. I praise and glorify Him as He ought to be honored and glorified. I pray for peace and blessings on all His noble messengers, especially on the last Prophet Muhammad (PBUH) who was created as a blessing for mankind and all the universes. I am not fit to speak of his heavenly glory with narrow perceptions and low imagination.

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The Author

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Chapter #01

Commodity Market Dynamics: Who's Behind Booms and Busts?[1]

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Abstract

Existing literature has relied on economic fundamentals (EFs) to determine commodity price booms and busts. This framework has been unable to account for major economic non-fundamentals (ENFs). This study takes a broader view of major ENFs that expands beyond the traditional demand and supply indicators to evaluate the response of commodity price booms and busts at both aggregate and disaggregate levels. To obtain consistent estimates, this study utilizes the advantages of the dynamic fixed-effect within instrumental variable method as an estimator to evaluate the behavior of 37 agricultural, energy, and metal commodity prices over 1980—2020. Our results indicate that relative to EFs, ENFs are the predominant driving force of commodity price booms and bursts at aggregate levels. In the case of EFs, the demand-side stimulates commodity prices, whereas the supply-side tends to depress them; however, the former effect tends to outweigh the latter effect. However, on the ENFs front, the dollar-denominated variable is one of the most powerful factors behind commodity price soars and bursts. Meanwhile, at the disaggregate level, the impact of EFs and ENFs is in tandem with that of the aggregate-level commodities. However, world uncertainty tends to depress the prices of energy and metal commodities. Our analysis implies that global demand and supply generated booms and busts in commodity prices have macroeconomic effects on both exporting and importing economies. Along with that, policymakers may need to consider the role of the rise and fall in the value of the dollar as well as that of the financialization of commodities, which were found to have a significant effect on commodity price booms and busts. Countries thus need to devise policies that may help moderate the negative effects of world uncertainty and geopolitical risk.

1.1 Introduction

This section consists of three sub-sections. Section one deals with the background of the study, while gap in the literature is justified in section two. The objectives of the study are explained in section three.

1.1.1 Background of the Study

A frequent and irregular pattern of price fluctuations is a commonly identified phenomenon associated with commodity markets.[2] These fluctuations tend to vary within certain limits ranging from small to medium size, but at times, they fluctuate to a level where they form massive types of booms and busts.[3] Understanding the behavior of these explosions is important for the world economy as it is supposed to have micro- and macro-level economic ramifications for the overall growth and welfare of the world economy (Cashin et al., 2000). In particular, the income and welfare of both the commodity-producing and commodity-consuming economies tend to hinge on the booms and slumps of commodity prices (IMF, 2012; Bernanke, 2006). A massive burst in commodity prices affects many developing and emerging market economies (EMEs) in the form of a foreign exchange crunch as they are heavily reliant on exports of one or more tradable commodities while millions of workers depend on commodity production for their livelihoods (UNCTAD, 2005a).[4] According to Arezki et al. (2014), prices of commodities, such as oil and metals, soared to a high level by 2008, which in turn caused food prices to record high levels. As a result, turmoil and uproars erupted in many countries, while at the same time, millions of people went hungry. The sharp up-and-down swings of commodity prices have considerable implications for growth-detracting and growth-augmenting institutions, and it is the poorest segment of society that tends to suffer the most (Van der Ploeg, 2011; Bourguignon et al., 2004).

The available literature, in general, supports the idea that it is the demand and supply forces that are responsible for commodity price booms and busts (Jacks and Stuermer, 2020; Caldara et al., 2016; Baumeister and Hamilton, 2015; Kilian and Murphy, 2014; Hamilton, 2008, 2009; Kilian, 2009; Krugman, 2008a; Trostle, 2008; Garber, 1989, 1990; Kindleberger, 1978). On the demand side, the possible economic elements may be the increases in income and growth of EMEs, such as China, India,

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[2] Although the prices of most commodities and staple stayed at the uniform level between 1980 and 2000, they escalated significantly since the early 2000s. They peaked in 2008, plunged all through the global financial crisis, and began a solid reverberation at the start of 2009. However, the recent corona virus disease 2019 (COVID-19) epidemic has upended the stagnation in food prices after its sliding trend in 2015—16; as a result, the Food and Agricultural Organization's (FAO) Food Price Index soared to its peak level since 2014.

[3] For instance, the Dutch tulip mania of the 1630s, the stock market crisis of the South Sea Company in 1719—20, the eminent stock market crash of 1929—32, the boom in oil markets of 1973—74, Japan's asset price boom of 1986—91, the dot-com mania of 1999–2000, the global real estate surge and burst of 2003—08 and many more, along with the recent COVID-19 epidemic.

[4] According to South Centre (2005), 95 of the 141 developing countries are deriving at least 50% of their export earnings and especially experiencing huge revenues when prices of commodities are high.

and the world in general. Likewise, industrialization, urbanization, and the increasing world population play a leading role in demand-side factors (Stuermer, 2017). In the case of supply-side factors, increases in research and development funds and technological innovations, and a decrease in input costs, among others, are responsible factors that jointly determine fluctuations in aggregate supply.

However, other than demand and supply, many studies have identified other factors that tend to have an impact on commodity prices. These include a rise or fall in the interest rate, as well as fluctuations in the currency value in terms of the American dollar (Le Pen and Sevi, 2018; Akram, 2009; Hamilton, 2009; IMF, 2008; Krichene, 2008; Wall Street Journal, 2008; and others). According to Frankel (2006, 1986), in reaction to interest rate alterations, commodity prices overshoot, similar to that of exchange rates in Dornbusch's (1976) model of overshooting. This effect works through an adverse influence of interest rates, that is a desire to hold on to commodity inventories. Correspondingly, speculators may hold some commodities in inventory/stock form for expected future higher prices. This indicates that stockholding or inventory behavior is one of the possible factors of commodity price booms and busts (Hamilton, 2009; Epstein, 2008). Many studies have identified the role of commodity-denominated dollarization (of commodities). In this context, the rise in commodity prices is moderately, if not largely, attributed to the fall in the value of the dollar (Baffes and Dennis, 2013; De Gorter and Drabik, 2012; Kretschmer et al., 2012; Trostle, 2011; Von Witzke and Noleppa, 2011; Baffes and Haniotis, 2010; Akram, 2009; Abbott et al., 2008; IMF, 2008; Krichene, 2008).

Additionally, some studies point to the fact that the financialization of commodities (FINC) is one of the significant factors for the boom and bust of commodity prices (Belke et al., 2013; Tang and Xiong, 2012; UNCTAD, 2011). For instance, the index investment funds played a crucial role in commodity price booms and busts in 2008 (Baffes and Haniotis, 2010; Gilbert, 2010; Khan, 2009). Similarly, global uncertainty—which is both a regional and a global issue—performs a key role in commodity price determinations (Shen et al., 2018). It drives fluctuations in economic activities through decision-making behavior—of producers and consumers—in a particular economy and worldwide generally (e.g., see, Robays, 2016; Bloom et al., 2007; Litzenberger and Rabinowitz, 1995; Pindyck, 1991; Bernanke, 1983). For instance, the recent coronavirus disease 2019 (COVID-19) pandemic has impacted metal prices negatively, except the gold price that was recorded at a high level—as it is considered a "safe haven" commodity. Petroleum oil prices recorded a historic low as some benchmarks were exchanging at negative levels. Agricultural commodity prices remained almost the same, apart from rubber, which is directly connected to transportation activities (World Bank Outlook, 2020). Some studies have highlighted the important role of other economic non-fundamentals (ENFs), such as changes in policy rates, that is, monetary policy, fiscal policy, and trade policy, which tend to impact the ups-and-downs of commodity prices (Beckmann et al., 2014; Anzuini et al., 2012; De Gorter and Drabik, 2012; Kretschmer et al., 2012; Byrne et al., 2011; Von Witzke and Noleppa, 2011; Belke et al., 2010a; Belke et al., 2010b). Baffes and Haniotis (2010) suggest that considering agricultural raw materials as an asset for an investment portfolio (also called FINC) may create speculation and generate bubbles that may, in turn, increase commodity prices. Thus, some studies (Fattouh et al., 2013; De Gorter and Drabik, 2012; Frenkel and Rose, 2010; Irwin et al., 2009; Abbott et al., 2008; Krugman, 2008b)[5] have highlighted the speculative role of commodities in commodity price volatility. Moreover, some studies point to economic and political uncertainties that tend to play a key role in commodity price volatility (e.g., Asafo-Adjei et al., 2020; Bakas and Triantafyllou, 2020, 2018; Hou et al., 2020; Bilgin et al., 2018; Shen et al., 2018; Jens, 2017; Li and Lucey, 2017; Balcilar et al., 2016; Baker et al., 2016; Hong et al., 2016; Durnev, 2010; Bloom, 2009).[6]

1.1.2 Gap in the Literature

This study contributes to the existing literature in a number of ways. First, previous studies that focused on commodity price soars and collapses have the limitation that they focused on either demand or supply-side variables but ignored other important economic factors/variables as they are theoretically identified by many studies. Therefore, we suspect that the previous studies suffer from misspecification bias. Hence, this study attempts to include not only demand- and supply-side variables together but also other relevant economic variables identified by many research studies, such as inventories/stocks (INVT) of commodities (as suggested by Borensztein and Reinhart, 1994), dollar denomination of commodities (DDC; e.g., see IMF, 2008; Wall Street Journal, April 28, 2008; Frankel, 2006 and 1986; Dornbusch, 1976 model), world uncertainty (WUNC), world trade uncertainty (WTUNC), and world geopolitical risk (WGPR)/geopolitical uncertainty (Hou et al., 2020; Baker et al., 2016; Bloom, 2009), financialization of commodities/index funds (e.g., see Tang and Xiong, 2012; UNCTAD, 2011; Baffes and Haniotis, 2010; Gilbert, 2010; Hamilton, 2009; Master and White, 2008). Similarly, a rise or fall in the interest rate, as well as alterations in the value of the currency in terms of the dollar (Le Pen and Sevi, 2018; Akram, 2009; Hamilton, 2009; IMF, 2008; Krichene, 2008), are also factors identified by many studies at least theoretically and empirically in some cases. Therefore, to overcome the problem of misspecification bias, this study attempts to include not only EFs (i.e., demand- and supply variables) together but also other relevant ENF variables (such as WUNC, WTUNC, WGPR, FINC, DDC, and

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[5] Only specific to the commodities of oil and stock markets.

[6] Most of these studies are specific to the volatility in petroleum oil as a commodity and very few to the volatility in agricultural commodities.

INVT) in our model while controlling for demand- and supply-side variables. Second, previous studies used aggregate-level production (PRDC) as a proxy for supply-side variable, which tends to have an aggregation bias. Therefore, this study uses commodity-specific PRDC to capture the supply-side effects of commodity price booms and busts. Third, unlike earlier studies that focused on one or a few commodities or commodity groups such as crude oil and agricultural commodities, which were mostly country specific (e.g., the US or OECD-related countries). This study is more comprehensive in the scope and coverage of commodities as it considers the world as a single entity while treating the number of commodities as cross-sectional units. Fourth, motivated by the mixed response of different commodity prices to different ENF variables—WUNC, WGPR, and WTUNC—in general, and more recently and particularly to COVID-19, we re-investigate this issue. Finally, unlike previous studies that used traditional time-series estimation approaches, such as the vector autoregressive and structural vector autoregressive approaches, this study is innovative in the sense that it has applied the dynamic fixed-effect-instrumental variable (DFE-IV) approach to account for the endogeneity issues associated with the static and dynamic models.

1.1.3 Objectives of the Study

This study deals with the following objectives.

1. To investigate the impact of economic fundamentals and economic non-fundamentals on commodity prices at aggregate levels.
2. To investigate the impact of economic fundamentals and economic non-fundamentals on commodity prices at disaggregate levels.

Our findings—at the aggregate commodities groups panel—indicate that unlike fundamental demand- and supply factors, other economic variables trigger commodity prices more profoundly in both upward and downward directions. Of the demand and supply factors, the demand- tends to dominate the supply-side in the determination and explanation of commodity price surges and busts. Additionally, economic factors other than demand and supply such as WUNC, WTUNC, and WGPR have a positive and significant effect, whereas FINC and DDC tend to have a negative and statistically significant impact on commodity price booms and busts. At the disaggregated level, that is agriculture, energy, and metal subsample groups, our results are consistent with aggregate-level results except for the variable of world uncertainty in energy and metal groups which have negative and statistically significant effects on commodity price booms and busts, in a row with findings of past studies.

The rest of this paper is arranged as follows: section 1.2 presents and explains the origins and nature of commodity price booms and busts, whereas section 1.3 justifies the data and methodology. Section 1.4 dwells on the results and discussion. Section 1.5 concludes and summarizes the study.

1.2 Origins and Nature of Commodity Price Booms and Busts

During the past half-century, commodity markets have been continuously showing irregular price fluctuations. Fluctuations in commodity prices are widespread among commodity groups and have become more harmonized over time (see all figures in Appendix B1). Commodities in energy, metal, and agricultural markets experienced coordinated price surges in the 1970s, 1980s, and again in the 2000s. Prices peaked in 2008, plummeted during the global financial crisis, and began a solid reverberation at the beginning of 2009. However, the recent COVID-19 epidemic has upended the stagnation in food prices after its sliding trend in 2015—16. As a result, the Food and Agricultural Organization's (FAO) Food Price Index soared to its peak level since 2014, whereas energy prices plummeted to one of their historic low levels. These fluctuations vary from small to medium and large sizes, and even rose to broad and massive booms and busts (see Appendix B1). For instance, the Dutch tulip mania of the 1630s, the stock market crisis of the South Sea Company in 1719—20, the enormous stock market smash of 1929—32, the boom in oil markets of 1973—74, Japan's asset price surge of 1986—91, the dot-com mania of 1999—2000, and the global real estate expansion and shatter of 2003—08 and many more, along with COVID-19 and the Russia—Ukraine conflict. Moreover, commodity prices may fluctuate as much as 50% in a year sometimes (see Appendix B1; Kellard and Wohar, 2006, 165; Cashin and McDermott, 2002, 176; Cashin et al., 2000, 42) and are at their highest levels in decades. For instance, cocoa and coffee prices oscillated from 60-% to 170% and 40-% to 195% of the mean prices, respectively, in the years 1983—97 (ECA, 2002).

Depending on their nature and origin, commodity price surges and collapses could have a temporary or permanent impact on a specific commodity sector and could disseminate in other commodity quarters along with serious consequences for the whole economy—conditional on its exportability and importability. For instance, its implications for inflation rates (Borensztein and Reinhart, 1994), corruption, and social inequalities (Brown and Gibson, 2006) and could additionally cause riots and political unrest (Carter et al., 2011) because of the non-affordability and purchase of necessities of life, such as food and energy. Some examples of these include, the Peterloo Massacre in Manchester, England, in 1819; the Southern US bread revolts in 1863; and turbulence in Haiti, West Africa, and South Asia in 2008.

Transitory and permanent shocks in commodity prices can originate from several EFs—demand and supply—and ENFs sources—inventories and dollarization of commodities, uncertainties and geopolitical risks, financialization, speculation, etc. Barron's financial magazine considers the 2008 commodity price boom and bust to have been caused by the fundamentals of global demand and supply forces (IOSCO, 2009). As an example, global commodity prices collapsed 38% between June 2014 and February 2015 (see Appendix B1). However, this commodity price shock cannot be ascribed to any single reason or significant event as it was triggered by a host of industry- specific, macroeconomic financial factors, and the transition of China's economy to more sustainable levels of growth and the shale-energy surge in the US were the leading demand and supply-side factors governing the slump in global commodity prices (Saggu and Anukoonwattaka, 2015). Moreover, on the demand front, various channels are explained theoretically and empirically through which world commodity demand affects commodity prices for example, the industrialization of world economies. In the process of industrialization, the world as a general and the economies specifically are transforming from an agricultural base to mechanized or industry-based economies. Therefore, industrialization creates a high demand for commodities and spurs growth, which further amplifies prices. In this regard, Stuermer (2017) indicates that individual countries' period of industrialization affects world demand for metals. As an example, since the 2000s, the rapid and fast industrialization of China and India especially, as well as other emerging and developing market economies (EDMEs) generall, takes the lead to a considerable and sustainable proliferation in demand for almost all commodities. In this regard, Baffes et al. (2018) indicate that, over the past two decades, the seven major EMEs—Brazil, China, India, Indonesia, Mexico, Russia, and Turkey—account for the prolonged consumption of 92% of metals, 67% of energy, and 39% of food commodities at a global level. Economic activities, such as GDP, stimulate the demand for commodities and hence, their prices increase. Alterations in the GDP have a significant effect on future gold prices, although there is no change in future silver prices (Christie-David et al., 2000). Similarly, urbanization can influence commodity demand through numerous channels, however, the magnitude of which hinge on severely on the nature of urbanization (World Bank, 2010). For instance, urbanization affects the world and its physical environment through the number of people, their activities, and heightened demand for resources. Likewise, urbanization may drive investment infrastructure in the form of houses, buildings for education and health purposes, entertainment, and many more standard life facilities and amenities. Therefore, a policy brief of the United Nations Conference on Trade and Development (UNCTAD, 2008) argues that a high urbanization rate is tied to high food prices. Farm living has always been vulnerable to irregular environmental conditions, and in times of drought, flood, or pestilence, subsistence may become exceedingly problematic. Moreover, soil degradation (Blum, 2008) and speedy urbanization in China (Chen, 2007) are real challenges to soil security and food safety as they contribute to a shortfall of agricultural land.

Today, our planet's population is more than double what it was in 1970. Perhaps the more daunting challenge is how to extend our scarce and limited resources to fulfill the needs and wants of an exploding population. As an increase in the population indicates, the demand for each and every kind of commodity is increased, which subsequently translates into a price uptick. Simultaneously, an increased and intensifying population trims down agricultural land, which additionally puts upward pressure on the demand for subsistence food production and marketable food commodities and hence, a price hike. According to UNCTAD (2008) reports, population growth is one of the reasons of higher food prices. However, this relationship will be held only if half of the world's population does not remain poor; otherwise, the world's population of seven billion can enjoy a moderate level of commodity prices (Financial Times, October 31, 2011). Moreover, the recent increase in economic development in developing countries in general, and EMEs in particular, stimulate the demand for commodities and their prices (Jacks and Stuermer, 2020). The recent rapid growth and expansion in China and India specifically, and in the EMEs generally, generates numerous employment opportunities, which successively boost income levels and enrich the standard of living. For instance, UNCTAD's (2008) report shows that the fast-track economic development has driven the recent boom in food prices. Similarly, the rapid growth in the US, in the late 19th and early 20th centuries, engenders an abnormal expansion and surge in commodity prices. Added to this, the upswing in Europe, during the postwar reconstruction, as well as the economic emergence in Japan, led to an upsurge in commodity prices (Erten and Ocampo, 2013; Cuddington and Jerrett, 2008; Rogers, 2004). Similarly, aluminum and copper prices were at or near a 20-year high by mid-2006, and their recovery from the global recession of 2008—09 because of growing demand from EMEs, such as China and India, as well as strong consumption patterns from other economies of the world (see Appendix B1.3). As an illustration, take the unusual Chinese demand for commodities in recent years with over 15% of copper, iron, natural rubber, and soybeans of global imports, which consequently uptick prices along with the oil price surge of the mid-2000s, which was propelled mostly by the demand of EMEs. Similarly, Radetzki (2006) asserts that growth in aggregate demand played an important role in both the 1973—74 and 2007—08 commodity price booms. Demand expansion in Asia and Russia shifts export demand outward in the grains market. Similarly, Brown and Gibson (2006) and The Economist (October 28, 2010) assert that the 2007—08 event showed that, for instance, a big jump in demand was recorded in grains as they were used as feedstock to produce biofuel. However, prices plunged when the demand for food and commodities shranked with the outburst of the global financial crisis.

Commodity markets are always affected by sudden supply shocks. These shocks may include (a) harsh weather, such as droughts, floods and hurricanes; (b) labor walkouts; (c) pests and plant diseases; and (d) geopolitical conflicts such as trade and wars disputes. These types of supply shocks take over short-run volatility in several commodity markets (Brown and Gibson, 2006). For instance, El Nino (an abnormal weather condition or drought-related production shortfalls) in the past, (i.e., grains in 1995 and coffee in 1975 and 1985) caused a massive flood in an agricultural region of Central and South America, while severely affecting the wheat growing region of Australia. Along with weather patterns such as "El Nino" that dramatically decrease fish catch which increases the demand for oilseeds as the demand for protein increases. Similarly, heavy rains in Malaysia affect natural rubber and its supply negatively which in turn caused a significant jump in its international prices (Rubber Board, 2002). In addition, climate change may increase unexpected weather events which subsequently creates uncertainties and volatilities in current and future prices. For instance, the oil resources of the Gulf of Mexico are repeatedly interrupted during the hurricane spell; intense temperatures might impact energy demand for heating or cooling as it did in mid-2021; for metals, open-pit mines could shut down due to floods (Cashin, et al., 2017). Additionally, the 2019 Vale tragedy in Brazil unsettled iron ore supplies.

In the early 1970s, food supply was reduced by policy failures in poor countries; however, the overall decrease in the grain supply was fairly low which in turn led to the crisis (Cooper et al., 1975). When a large country restricts its border to limit its exporting commodity, it in turn affects world commodity prices negatively and significantly (Chisholm and Tyers, 1985; Johnson, 1975). For instance, it is argued that commodity price fluctuations in the early 1970s (Vousden, 1990) and then the 2007—08 financial crisis (Martin and Anderson, 2012; Anderson and Nelgen, 2010) were the consequences of the aforementioned policies. Agricultural policies, containing national backing measures and trade barriers (bans on exports, exports taxes, and imports subsidies) by associates of the Organization of Economic Cooperation and Development (OECD), have exercised downward pressure on global agricultural prices (Aksoy and Beghin, 2004). Therefore, it is pointed out that at minimum 30 countries restrict or ban food exports (IMF, 2008). For instance, border restrictions were increased to stabilize the domestic price level of wheat and rice, which in turn surged approximately 25% and 30%, respectively, compared to the rest of the world's prices for wheat and rice (Martin and Anderson, 2012; Slayton, 2009). Similarly, subsidies in the EU and the US generate long-term overproduction; for example, the US alone injects USD 3.9 billion in subsidies into the domestic cotton market, which is more than the total GDP of Burkina Faso. Therefore, estimates show that if these subsidies are removed, there would be a 26% rise in the prices of cotton and the market share will be redistributed to the true producers of low-cost cotton, especially in developing countries (Oxfam, 2002). Other shocks can apply a more enduring effect on commodity markets— and prices; for example, new and improved methods of farming and new cash crops increase productivity and improved seed technology improves crop yields, causing agricultural yields to rise consistently. As an example, in the past 100 years, the usual yearly productivity of rubber plantations has flourished by a factor of 10, from 250 to 2500 kg per hectare (Clay 2004, 338). Shocks can also disseminate subsequent shocks, particularly those connected with energy markets. Following the oil price downfall of 2014, food production costs dropped but the deviation of food commodities to biofuel production keep on in place. However, during 1973 oil crisis, the price of corn and wheat marched off by a multiple of three. Similarly, the oil price boom of the mid-2000s not only forced up the cost of food production but also prompted the biofuel policies stated earlier (Baffes, 2013).

The FINC has attracted a huge amount of investment in commodities markets, especially in index investment. The increasing volumes of investments in the markets of commodity derivatives have guided a concurrent boom and burst of apparently distinct commodity prices, steering commodity prices away from equilibrium levels which in turn warranted by market fundamentals, with negative impacts both on consumers and producers (UNCTAD, 2011). Along with that, Tang and Xiong (2012) and UNCTAD (2011) argue that growth in the prices of food and commodities is due to the FINC. The enormous increase in commodity index funds has headed to an unnatural boost in the demand for several commodities and hence, prices of a number of commodities have increased (Masters and White, 2008). In addition, expectation formation among various commodity market participants plays an essential role in commodity price booms and busts. It is well established that although price speculation carries high risks, it can pay fair-enough rewards. Therefore, in speculative markets, the speculative value of a trading commodity is more than the real value and hence creates false swings, which in turn increase prices for consumers. As a result, investors with no stake in the real prices of commodities have increased the price turns. For instance, in April 2006, commodities were exchanging at 50% higher prices than they would have been without speculations, which in turn created dangerous commodity price bubbles (Thornton et al., 2006) and the 2007—08 boom that formed a speculative bubble (Khan, 2009; Appendix B1). Likewise, Hamilton (2009) attributes the 2007—08 oil price rise to speculation as there existed concern over global supply and new investment instruments, that is, commodity index funds. Increased speculative investment in the future commodity market was the main contributor to the upsurge in commodity prices before the burst in 2008 (Wray, 2008). Similarly, the high oil prices in 2007—08 were due to large-scale speculative activities rather than other reasons such as high energy demand from China, the dollar weakening, and political uncertainty in various oil-rich nations (Eckaus, 2008). Additionally, extreme speculation in the commodity derivatives markets led to high oil and natural gas prices for the period 2000—10 (see Jensen, 2011; Appendix B1.2). Moreover, the US Permanent Subcommittee (2009) realized that market fundamentals and risk premium cannot account for high energy prices. Instead, high energy prices are a result of billions of dollars poured into future oil markets by hedge, investment, and pension funds along with other large financial players.

In the events of 1973—74 and 2007—08, commodity stocks have been given a critical role in the literature. Wright (2011) indicates that dynamic stockholding behavior played a substantial role in both the 1973—74 and 2007—08 events. Correspondingly, Piesse and Thirtle (2009) assert that low inventories were the single and very vital factor of fluctuations in agricultural prices. The grains and oil seeds stocks-to-utilization ratio in 1972 and 1973 dropped to a 15% low, which was not reached once again until 2008. Moreover, they also pinpoint the significance of rising prices of fertilizer and oil in 1973—74 and again in 2007—08 as the driving costs of production and transportation. Similarly, a decline in the level of the stock-to-use ratio for commodities like wheat, corn, and rice led to the commodity price boom in 2008 (Trostle, 2008). On average, when the inventory level is low, a noncompetitive market would often knock the steep portion of the total demand curve, and hence, "stock out prompt price spikes" would occur more frequently and with a larger magnitude (Williams and Wright, 1991). Similarly, the behavior of inventories is important for commodity price booms and busts. According to Park (2006), in many developing countries, sizeable amounts of grains are stored on small-scale farms and homes, making it hard for the market to determine the size of stored inventory. For instance, in 2008, inventories were not high enough and speculators could not have been gambling on price hikes and therefore, could not have add up to the present demand (Krugman, 2008a). Likewise, commodities having the characteristics of a lower level of preservability experience a sluggish price increase than housing and storable commodities (Krugman, 2008b).

Since the seminal work of Frankel (1984), both monetary conditions and rate of interest have been considered the possible driving forces of commodity prices. Exercising the "no-arbitrage condition," Frankel (1986) expands Dornbusch's theory of exchange rate overshooting to the case of commodities and derives a theoretical connection between oil prices, as a commodity, and interest rates. More recently, Frankel (2006) summarizes that a loose monetary policy may cause an increase in commodity prices by the following: (i) low interest rates manage to decrease the opportunity cost of holding inventories, escalating their demand for commodities; (ii) lower interest rates generate an inducement not to unearth today's exhaustible commodities as the cost of stocking inventories in the ground also declines; and (iii) for a certainly anticipated price pathway, a decline in interest rates decreases the holding cost of speculative positions, making it easier to gamble on assets such as commodities. Under specific circumstances, this will put mounting compression on futures prices and, by arbitrage, also on spot prices. The Wall Street Journal (2008) argues that the 2008 boom and bust were due to low interest rates and a weak US dollar and not an alteration in "relative prices" due to mounting global demand. Likewise, expansionary monetary policy has play a role to an increase in commodity prices through either elevated demand or truncated supply as this policy often leads to low real interest rates, which helped in the surge of 2008 commodity prices (Hamilton, 2009) specifically, and commodity price booms in other years generally (Torero and Von Braun, 2010). Compared to US dollar-denominated commodities, Euro-denominated commodities such as corn, rice, soybean, wheat, etc., have risen far less since 2003—04 (Defra, 2010). Barsky and Kilian (2004), among others, identify that in the 1970s, high prices of commodities like oil and others, were not exogenous; rather, they were due to expansionary monetary policy. The Federal Reserve decreased the real interest rates abruptly in 2001—04 and again in 2008—11, which led to the cost of carrying inventories decreasing and hence an increasing demand for commodities. Frankel (2014) identifies that in the 1970s, 2008, and again in 2011, commodity price spikes coincided with real interest rates, which were zero or even negative.

Uncertainty might be associated with higher commodity price volatility. One of the probable and broadly recognized channels is that uncertainty alters the decision-making behavior of economic agents (Bloom, 2009; Bloom et al., 2007; Litzenberger and Rabinowitz, 1995; Pindyck, 1991; Majd and Pindyck, 1987; Brennan and Schwartz, 1985; Bernanke, 1983; Henry, 1974; Arrow, 1968 and others). Whenever uncertainty is high and shocks, positive or negative, hit the economy, the alteration in quantities is restrained owing to a postponement in the consumption or production decision, which underpins the alteration through the price side (Favero et al., 2018; Kellogg, 2014; Elder and Serletis, 2010; Bernanke, 1983). In political uncertainty, speculators can hoard inventories in physical and futures markets for the period of uncertain time (Kilian and Murphy, 2014; Tang and Xiong, 2012). Comparatively, commodity supply may not be changed by much at time of high political uncertainty as it is more inelastic—due to the irreversibility of investment and large shutdown costs. However, continual political uncertainty and upheaval forced commodity producers to decrease on their production and discharge workers. For instance, persistent political tension in Venezuela has notably truncated its oil production in recent years. Partisan uncertainty, captured by the US presidential elections, has a substantial bearing on commodity prices globally, such that it falls by 6.4% in the quarter leading up to the US presidential elections (Hou et al., 2020). Additionally, this result is more powerful for close elections and during downturn periods as well as non-US local elections as it has trivial effects on those countries' commodity prices. Moreover, geopolitical events,[7] which refer broadly to those political, economic, and social events that may influence international relations, have significantly affected all commodity markets. For instance, conflicts in the Middle East and civil unrest in the Cote d'Ivoire have significantly affected the prices of oil frequently and cocoa seldom, respectively.[8] However, the prices were mainly influenced primarily via the commodity supply chain; for example, in the first Gulf War, when Iraq/Kuwait oil production was ceased; the closure of the Suez Canal in 1956—57 in response to the Suez crisis; the container ship that temporarily blocked traffic in the Suez Canal in early 2021; and more recently, the terrorist attacks on Saudi Arabian oil facilities in 2019 which temporarily interrupted oil exports. Following the September 11, 2001 terrorist attacks, developed economies dropped into a recession that consequently resulted in a commodity price bust around the whole world (see Appendix B1).

Moreover, pandemic-related uncertainties have added a substantial negative effect on the volatility of the petroleum commodity market in particular and agricultural and metal commodity markets in general globally and predominantly around the regions. For instance, the recent global uncertainty in the form of COVID-19 has impacted energy prices to one of their historic low levels specifically and reversed the stagnant food prices to one of their highest levels since the plunging trend from 2015—16 (see Appendix B1). Similarly, the commitment and credibility of trade policy are important to induce agents to make costly, irreversible, and large-scale investments; otherwise, uncertainty in trade policy may delay this investment and decrease supply, subsequently forcing prices in an upward direction (Handly, 2014). It is eminent that a favorable environment in international trade enables counterparties to acquire or exchange those product(s) that may benefit both parties explicitly and mass consumers largely or the other way round. On the contrary, imposing antidumping duties on imported goods creates an escalation in trade policy uncertainty, which in turn has implications for consumers in the form of commodity prices. For instance, Krugman (1991) argues that a trade war caused by imposing tariffs, quotas, etc., on each other's imported commodities, leaves each side worse off. For instance, the recent trade war

[7] Important examples comprise the US—China trade war; coeconomic sanctions against Russia; Ukraine's armed conflict; Brexit; incresing tensions between the US—Saudi Arabia—Iran; social unrest and large-scale protests in Hong Kong; political uncertainty in various nations (e.g., in Brazil, India, Nigeria and South Africa).

[8] Some prominent Middle Eastern conflicts include the United States' withdrawal from the nuclear deal with the Islamic Republic of Iran, and reimposing sanctions on Iran; conflicts between Iran, and Saudi Arabia, and between Saudi Arabia and Yemen; and tensions between Israel and Syria.

between the US—China may go forward to substantial costs and expenditures that may create further trade uncertainties and may have implications for commodity prices (see Feenstra, 1992). Similarly, and most recently, since 2017, the addendum in US tariffs—especially President Donald Trump's harsh trade rhetoric—toward Chinese import commodities especially and generally to other countries across the globe, led to a tremendous rise in overall policy uncertainty in general and trade policy uncertainty in particular (Kyriazis, 2021). Other examples are the trade war between the US and China since January 2018, which impacted products such as metals and soybeans; and grain export that was affected during the 2007 and 2011 food price spikes (World Bank, 2019).

1.3 Data and Methodology

1.3.1 Data Nature and Source

This study uses world-level trading commodity price data from a broader group of agricultural, energy, and metals as a mixed panel sample of these three groups together and subsequently subsamples for the specified groups separately. In total, we have 37 commodities, including 24 agricultural, 3 energy, and 10 metals.[9] Our data set is composed of annual frequency-based observations from 1980 to 2020. The selection of commodities among their major groups and time duration is based solely on the data availability. The data set is collected from World Development Indicators, International Monetary Fund (IMF), United States Department of Agriculture, Economic Policy Uncertainty (EPU), Ahir et al. (2018), World Uncertainty Index, (WUI), Stanford mimeo and Macrotrends Data.[10]

1.3.2 Definition and Construction of Variables

This study uses commodity price series (CPS) as a dependent variable. Following Jacks and Stuermer (2020), we take advantage of the commodity price indices of the corresponding commodity as a measure for our dependent variable. On the independent side, we have two broad categories of explanatory variables: EFs and ENFs. EFs includes conventional demand and supply variables. Therefore, following the conventional existing literature, for instance, Jacks and Stuermer (2020), we measure our demand variable as world real gross domestic product (WRGDP), whereas the supply variable is quantified with commodity production (PRDC) of the respective commodity as subsequently used by Stuermer (2018) and Knittel and Pindyck (2016).

[9] The agricultural group includes barley, cereal, cocoa beans, coffee, corn, cotton, fish meal, meat, milk, nitrogen fertilizer, palm oil, phosphate fertilizer, potash fertilizer, rapeseed oil, rice, rye, soybeans, soybean meal, soybean oil, sugar, sunflower oil, tea, vegetable oils, and wheat. The energy group contains, coal, natural gas, and petroleum oil. The metals group comprises aluminium, copper, gold, iron, lead, nickel, silver, steel, tin, and zinc.

[10] https://www.investing.com/currencies/us-dollar-index, https://ourworldindata.org/charts, "US Energy Information Administration (https://www.eia.gov/international/data/world/petroleum and other liquids/annual crude and lease condensate reserves)".

On the ENF front, WUNC is one of the enlisted factors. We capture booms and busts in WUNC by the WUI. The WUI was constructed by Ahir et al. (2018). It includes major global (natural or hominoid/social) disaster events or developments that create and tend to produce uncertainty spikes at the global level, which in turn, have economic (micro- and macro-level) consequences for both producers and consumers. Examples are the recent COVID-19 epidemic, SARS outbreaks, 9/11 attacks, Gulf War II, US 2020 presidential election, 2007—08 financial crisis, the UK's referendum vote in favor of Brexit, and many more. However, the index is constructed based on both monthly and quarterly frequencies. To achive our requirements, we convert them to annual frequency by taking simple averages of monthly or quarterly values. Relatedly, world trade uncertainty WTUNC is also one of our ENF variables. To capture the impact of WTUNC, we follow and use Ahir et al.'s (2018) quantified WUI. Although, this index seems to resemble the former, it is a different variable in that it captures and considers events and developments related to trade, that is, the trade war between the US and China, US restrictions on Iran exports, etc. (for a detailed discussion, see Ahir et al., 2018).[11] Once again, this index is based on both monthly and quarterly frequency-based observations, whereas our analyses proceed on annual data. Therefore, we simply take averages of monthly and quarterly frequency counts to convert them into annual data. In the same way, we enlist WGPR as a measure of world geopolitical uncertainty to our existing variables catalogue. Equivalently, to grasp the bearing of WGPR, we follow Caldara and Iacoviello (2021) to construct a geopolitical risk index (GPRI). This GPRI includes and counts geopolitical words and tensions appearing in 11 prominent international newspapers. For example, the Gulf War, 9/11 attacks, 2003 Iraq invasion, 2014 Russia—Ukraine crisis, and so on (see Caldara and Iacoviello, 2021 for a detailed discussion). However, the index is built on monthly observations. To carry out our analyses, we revamp them to an annual frequency by taking simple averages of the monthly observations.

Moreover, the ENF list also embraces the INVT of specified commodities and DDC. The former is measured as the left-over stock of a specified commodity at the end of a stipulated year. However, in case(s) where inventory data are reported on the first month of the next calendar year, we move them back to the preceding year (e.g., see Symeonidis et al., 2012; Dixit and Pindyck, 1994). It is obvious that when the US dollar fluctuates in its value, the value of real assets, for instance, commodities also oscillates as they carried out intrinsic value (for a detailed discussion, see Borensztein and Reinhart, 1994; Chu and Morrison, 1986 and 1984; Dornbusch, 1985). Therefore, following available literature, this study catches DDC role against commodity prices in the form of an already available computed

[11] See the correlation between WUNC and WTUNC in Appendix Table A1.2.

dollar index (see Sankararaman et al., 2018; Williams et al., 2011; Akram, 2009). Finally, we incorporate the FINC into our list of ENF. Since 2004, co-movements among numerous commodities have risen extremely fast. This may be one of the possible reasons for a significant amount of index investment influxes into commodity markets since 2003. Index investors consider and strategically allocate different commodities, along with bonds and stocks, as a new asset class to their portfolio, (e.g., see Barberis and Shleifer, 2003). As a result, the two most prominent commodity indices—the Dow Jones-UBS Commodity Index (DJ-UBSCI) and the S&P GSCI Commodity Index—were greatly affected. In harmony with Tang and Xiong (2012), we correspond to and incorporate the possible role of FIN as an independent variable on commodity price booms and busts, with the assistance of the DJ-UBSCI.

1.3.3 Model Specification and Estimation Method

1.3.3.1 Model Specification

1.3.3.1.1 Model

Based on our theoretical discussion in section 2 along with broadly following and extending the recent work of Jacks and Stuermer (2020), Akram (2009), and Borensztein and Reinhart (1994), and possibly, we investigate the impact of EFs and ENFs on commodity price booms and busts (fluctuations). In addition, we also account for the lag-dependent variable, commodity price, as Amrouk et al. (2020), Hou et al. (2020), Asness et al., (2013), Tang and Xiong (2012), Frankel (2008), Gorton and Rouwenhosrt (2006), and others show that it plays an important role in the fluctuation of commodity prices. Therefore, in light of the above directions, we construct and estimate the following econometric model:

$$\mathrm{CPS_{it}} = \alpha_0 + \alpha_1 \mathrm{CPS}_{it-1} + \alpha'_2 \mathrm{EF_{it}} + \alpha'_3 \mathrm{ENF_{it}} + \eta_\mathrm{i} + \mu_\mathrm{it} \tag{1.1}$$

More specifically we can rewrite equation (1.3.1) as

$$\begin{aligned} \mathrm{CPS_{it}} = \alpha_0 + \alpha_1 \mathrm{CPS}_{it-1} &+ \alpha_2 \mathrm{WRGDP_{it}} + \alpha_3 \mathrm{PRDC_{it}} \\ &+ \alpha_4 \mathrm{INVT}_{it} + \alpha_5 \mathrm{WUNC_{it}} + \alpha_6 \mathrm{WTUNC_{it}} + \alpha_7 \mathrm{WGPR_{it}} + \alpha_8 DDC_\mathrm{it} + \alpha_9 \mathrm{FINC_{it}} \\ &+ \epsilon_\mathrm{it} \qquad \dots\dots\dots\dots (1.2) \end{aligned}$$

Where CPS, EF, and ENF are commodity price series, economic fundamentals, and economic non-fundamentals, respectively, in the general equation (1.1). However, more specifically in equation (1.2), WRGDP shows the world's real gross domestic product and PRDC indicates the production of each commodity. INVT represents inventory stocks. WUNC, WTUNC, and WGPR indicate world uncertainty, world trade uncertainty, and world geopolitical risk, respectively. DDC and FINC show dollar-denominated commodities and financialization of commodities, respectively. ϵ_{it} indicates an error term and $\epsilon_{it} = \mu_{it} + \eta_i$ where μ_{it} is the time-variant fixed effect (FE) and η_i is an unobserved commodity price specific effect that is assumed to be the time-invariant, FE. Moreover, η_i captures the characteristics of individual CPS that are not picked up by the regressors but are assumed to be time-invariant. ϵ is a stochastic error term that varies with the individual country and time dimension. It is assumed to be independent and identically distributed, $\varepsilon it \sim iid\ (0, \sigma^2)$. i and t show CPS and the time dimension, respectively.

1.3.3.1.2 Model Selection: Random Effects or Fixed Effects

Conventionally, econometric modelling of panel data is presented typically under two principal approaches: fixed effect (FE) and random effects (RE). The former approach captures time-invariant unobservable effects for every cross-section either explicitly by dummy variables or dried out through time-detrending. The latter approach treats the time-invariant unobservable effects as part of the disturbances by assuming zero correlation with the regressors. Hence, compared to the former approach, the latter approach provides efficient and unbiased estimators, if the assumption of zero correlation is made; otherwise, the former approach is suitable in this situation. Consequently, to investigate efficient and unbiased estimators, we may employ the commonly used Hausman (1978) specification test (HST) to choose an appropriate approach between FE and RE. In the HST, RE is preferred under the null hypothesis because of higher efficiency, whereas under the alternative, that is, FE is at least as consistent and thus desirable.

Table 1.1: Results of the Hausman Specification Test

$\chi2$ - Statistics	232.80
p-Value for $\chi2$ (9)	0.0000

Note: $\chi2$ represents chi-square, whereas (9) indicates several independent variables.

However, under the dynamic panel data set, as in our case, one may also use and apply the HST.[12] Therefore, we run the dynamic RE model first and then the dynamic FE model, storing the results from each case, and subsequently, we apply the HST. So, the HST results indicate that the null hypothesis of the preferred RE is rejected at a 1% level (see Table 1.1). It indicates that our data set carries an unobservable FE; therefore, it is more appropriate to apply the dynamic fixed effects technique to

[12] For a detailed discussion, see Liu (2010).

equations (1.1) or (1.2), to obtain consistent and efficient results (keeping in mind that if there is no endogeneity otherwise, this technique will not be appropriate).

1.3.3.1.3 Test of Endogeneity

In this section, we re-examine our equation (1.1), or more specifically equation (1.2), to check whether any problem of endogeneity exists or not. In other words, are our regressors/independent variables correlated with the error term? If yes, then there is a possibility of violating one of the classical assumptions, that is, there must be zero correlation between regressors and error terms. As a result, continuing estimation through this method may result in biased and inconsistent estimators. Therefore, looking back at equation (1.2) specifically, we can ascertain that one of our explanatory variables—lag dependent—is correlated with the error term. In addition, our EF factors—demand and supply—may have theoretically endogenously originated from other factors, as shown by Jacks and Stuermer (2020). For instance, producers and consumers of goods may respond to changes in prices, business cycle fluctuations, world uncertainties, and so forth. Similarly, our ENF factors—uncertainties, inventory, FINC, and the US dollar index—may be influenced by other consequential dynamics hypothetically. For illustration, INVT of a commodity may depend on current and expected future prices (Frankel, 2006), uncertainties (see Frankel, 2006; Radetzki, 2006), and the value of the dollar. Likewise, the FINC and the US dollar index are supposed to be influenced by various considerations; for example, in the case of the former, prices of a commodity (e.g., see Reinhart, 1991), uncertainties, rate of return, etc.; and for the latter, political instability, geopolitical risks, and monetary policy responses are conceivably responsible factors for fluctuations.

Table 1.2: Results of the Durbin- Wu- Hausman Test of Endogeneity

	Test Statistics	p-Value
Durbin (score) of $\chi 2$ (9)	140.897	0.0000
Wu- Hausman F (9, 427)	21.910	0.0000

Note: $\chi 2$ represents chi-square, whereas (9, 427) indicates several independent variables and observations, respectively.

Thus, to investigate whether our independent variables are indeed correlated with the error term, we apply the well-known Durbin- Wu- Hausman (DWH; Durbin, 1954; Wu, 1973; Hausman, 1978) test of endogeneity.[13] In the DWH test, the set of variables is exogenous under the null hypothesis; however, under the alternative, that is, the set of variables is endogenous. However, based on the p-value of the

[13] Also carried out by Reinhart (1991), Leamer (1985), and others.

value of test statistics, we reject the null hypothesis of exogenous variables at a 1% level. This means that one or many of our independent variables are correlated with the error term.

1.3.3.2 Estimation Technique

Equations (1.1) and (1.2) cannot be estimated through simple ordinary least square (OLS), least squares dummy variable (LSDV), simple/conventional FE, or simple/conventional RE estimators. As the existence of the lag-dependent variable (CPS_{it-1}) in equations (1.1) and (1.2) indicates one of the explanatory variables correlates with the error term, ϵ_{it}, by its correlation with the time-invariant component of the error term, η_i, which possibly causes a simultaneity problem and hence, an endogeneity problem. Moreover, the possible feedback effects of CPS on other explanatory variables may cause endogeneity. Hence, estimating the model with a traditional estimation technique is supposed to give biased regression coefficients and estimates (Eberhardt and Teal, 2011; Judson and Owen, 1999; Nickell, 1981). Unlike conventional cross-sectional regressions, dynamic instrumental regressions use internal instruments, which are the lagged values of the instrumented variables. Equivalently, in practice, it is often challenging to find good instruments for lagged dependent variables, which can itself create problems for estimation. Therefore, Andersen and Hsiao (1981) suggested and used the dependent variable (CPS, in our case) lag(s) as an explanatory variable (CPS_{it-1}, in our case), which is further instrumented with its lagged values (CPS_{it-2}, CPS_{it-3}, etc., in our case) as these lagged terms are not correlated with the error term ϵ_{it}.[14] Consistently, the dynamic instrumental variable estimator also handles the problem of endogeneity in other lag explanatory variables as it uses various respective lagged values as an instrument for independent variables (Amin et al., 2020; Borensztein and Reinhart, 1994; and others). In this regard, the instrument validity is shown by the probability values of Hansen's (1982) J-statistic which is a general version of Sargan's (1958) test. Hence, this study takes on advantages of the DFE-IV method as an estimator, as suggested by Andersen and Hsiao (1981) and others, to find out consistent and efficient estimates of equation (1.1) in general and in (1.2) in particular.[15] The probability values of Hansen's J-statistic indicate that our exercised instruments are valid (see Tables 1.3, 1.4, 1.5, and 1.6 in the results and discussion section).

[14] For example, see Kiviet (1995), Arellano (1989), and Holtz-Eakin et al. (1988).

[15] However, in the available literature, alternative estimators exist such as the most popular and suitable estimator in our case, generalized method of movement (GMM). Therefore, before applying the DFE-IV approach, we run the GMM estimator as a priori. But unfortunately, we do not meet the prerequisite condition that the "number of instruments must be less than a number of groups/cross-sections." Therefore, we use and apply the alternative that is the DFE-IV technique.

1.4 Results and Discussion

1.4.1 Results and Discussion at Aggregate Level

To capture the dynamic effects of commodity price fluctuations, this study incorporates a one-period lag of the dependent variable, that is, CPS_{t-1}. Therefore, in this regard, we follow existing literature, such as Frimpong et al. (2021), Shen et al. (2018), Kewei et al. (2017), Kilian and Murphy (2014), Tang and Xiong (2012), Akram (2009), Hamilton (2009), Krichene (2008), and Gorton and Rouwenhosrt (2006), among others. Our results show that the coefficients of CPS_{t-1}, that is, the commodity price lag demonstrative variable, carry on the positive sign that suggests that past price has a positive association with the current price, meaning that past prices influence today's price. Our relationship is highly statistically significant with a 1% level throughout models (1— 8) (see Table 1.3).

Correspondingly, Table 1.3 shows that the coefficients of PRDC, the supply representative variable, tend to indicate the theoretically correct sign, and the relationship is statistically significant with a 1% level in models (3), (5), (7), and (8). However, model (6) is significant with a 5% level, and models (1) and (4) are significant with a 10% level. These findings reveal that an increase in PRDC, keeping all other things constant, results in a small decline in the commodity's prices. Our results are (i) consistent with the general view of the World Bank (1994), that demand for commodities is inelastic, and (ii) specific to the relationship between commodity supply and its prices (Jacks and Stuerme, 2020; Hamilton, 2009). Although the impact of commodity supply on commodity prices is weak, it nonetheless explains booms and busts in commodity prices, up to some degree. In this context, the most imminent supply-side factors of commodity price booms and busts are supposed to be increases in research and development, technological innovations, and productivity improvements in commodity-producing sectors that are expected to come up in opposite occurrence to prices (Bourguignon et al., 2004; Clay, 2004; Reinhart and Wickham, 1994; World Bank, 1994).[16] Along with that, for numerous reasons, such as member countries' disagreement, competitive pressure, and insufficient funds, several international commodity agreements (ICAs) had broken down in the 1980s and 1990s, which led to increased supply in the market, as ICAs had regulated supply over buffer stocks or quotas. As a result, prices remained slightly stable or decreased in a specific range (Adebusuyi, 2004; Reinhart and

[16] Improvement in productivity may also create structural oversupply—to raise production when prices are elevated and not to reduce production when prices are low. In fact, producers (and countries) that hinge on a single commodity may be pushed to boost production, even at low prices, to service their debts, worsening the oversupply (Gilbert, 1996). Similarly, upgraded extraction methods have expanded productivity in mining industries, which consequently boosts supply and so prices decrease. Meanwhile, demand for many commodities may not soar equivalently (e.g., see Bourguignon et al., 2004) to hold on to the enhanced effect of supply on commodity prices which in turn further worsens prices negatively.

Wickham, 1994; World Bank, 1994).[17] Moreover, the development of close substitute(s) at the time of high commodity prices may influence supply and thus prices. The development of these close substitutes for an existing commodity competitively increases the overall supply, which in turn puts downward pressure on the prices for the already available commodity to fall.[18] Furthermore, subsidies can create incentives for commodity producers to overproduce, which consequently boosts the overall supply of that subsidized commodity in the long run, as the outcome commodity price dwindles.[19]

In contrast to our PRDC variable, Table 1.3 indicates that the coefficients of WRGDP, the demand illustrative variable, take on a positive impact on commodity prices. The relationship carries theoretically accurate signs along with a high level of significance, that is, 1% and 10% throughout models (1), (3), (5—7), and (8), respectively. The coefficients of WRGDP indicate that an expansion in commodity demand creates an upsurge in its price with ceteris paribus. Our findings are coherent with other studies (Jacks and Stuerme, 2020; Hamilton, 2009; Radetzki, 2006; World Bank, 1994; and others). There are various possible economic avenues through which world commodity demand affects commodity prices; for example, first, the industrialization of world economies. In this process, the world generally and the economies specifically—where industrialization is taking place—transform from an agricultural base to mechanized or industry-based economies. In this course of action, industrialized economies require an extra diverse nature of commodities, that is, raw materials, minerals, etc., to produce and develop various and distinct kinds of infrastructure and industries, which may subsequently produce miscellaneous types of industrial goods. Therefore, industrialization creates a high demand for commodities and spurs growth, which further amplifies prices. In this regard, Stuermer (2017) indicates that individual countries' periods of industrialization affect world demand for metals. Meanwhile, industrialization and elevated growth may create new employment opportunities and conceivably uplift income and subsequently improve life standards, which, in succession, further enhance demand for new commodities. Together, all these well-connected economic channels and effects guide us to high demand for commodities and create an uptick in prices to a new equilibrium level. For instance, since 2000, the rapid industrialization of China and India especially, and other EDMEs and developing market

[17] For illustrative purposes, take the reason for firm competitiveness. The emergence of more than one firm for a single commodity has put upward pressure on the ICAs to increase the existing quota or raise the minimum threshold level for the availability of a commodity in the market. As a result, these advancements and pressures lead to the breakdown of the ICAs and hence, supply of that specific commodity enlarges and prices decline.
[18] For instance, during World War II, the development of the synthetic rubber industry, which accounts for almost 71% of the rubber market, against the natural rubber industry (Clay, 2004).
[19] According to Oxfam (2002), the United States alone injects USD 3.9 billion as a subsidy into the domestic cotton market. If this amount is removed, it will indicate a 26% rise in cotton prices. In addition, Reinhart and Wickham (1994) and the World Bank (1994) indicate that agricultural policies during the 1980s and 1990s in industrial countries significantly influenced supply conditions.

economies generally leads to a considerable and sustainable proliferation in demand for almost all commodities. In this regard, Baffes et al. (2018) indicate that, over the past two decades, the seven major EMEs—Brazil, China, India, Indonesia, Mexico, Russia, and Turkey—account for the prolonged consumption of 92% of metals, 67% of energy, and 39% of food commodities at the global level.

The second most important economic channel is urbanization (Jacks and Stuermer, 2020). According to the policy brief of UNCTAD (2008), a high urbanization rate is linked to high food prices. Verily, in pursuit of a better standard of living and level of comfort, many people migrate from rural areas to towns and cities. Therefore, urbanization affects the world and its physical environment through the number of people, their activities, and heightened demand for resources.[20] Collectively, all these economic happenings enhance demand for different varieties of commodities, such as raw materials, energy, metals, etc., which in turn put mounting pressure on their prices. In the interim, urbanization generates new employment opportunities and spurs the economic growth of a country specifically, and the world generally. As a result, income level improves, and demand-driven expenditure rise for life standard enhancement commodities that subsequently upsurge commodity prices to a new level. Similarly, and more specifically, urbanization affects food prices in the equivalent direction — positively. At the same time, urbanization pulls down agricultural land which in turn creates greater dependence of the general masses —due to improved living standards— on commercially processed food provision instead of their private cultivating production. In tandem with that, certain time-consumers are starting to stock or hoard commodities, if they scared that prices may increase in the future. As a result, the current price of those commodities starts to rise (Posner, 2010).

Third, our planet's population today is more than double what it was in 1970. Perhaps the more daunting challenge is how to extend our scarce and limited resources to fulfill the needs and wants of an exploding population. As an increase in the population indicates, the demand for each and every kind of commodity is increased, which subsequently translates into a price uptick. Simultaneously, increased and intensifying population trim down agricultural land, which additionally puts upward pressure on the demand for subsistence food and marketable food commodities and hence, a price hike. According to UNCTAD (2008), reports population growth is one of the causes of higher food prices.[21]

[20] For instance, urbanization may drive investment infrastructure in the form of houses, buildings for education and health purposes, entertainment, and many more standard life facilities and amenities.

[21] However, this relationship will be held only if half of the world's population does not remain poor; otherwise, the world population of seven billion can enjoy a moderate level of commodity prices (Financial Times, October 31, 2011).

Fourth, the recent increase in economic development, or as we call it "constant rising in income level and improving life standard" in developing countries in general, and in EMEs in particular, stimulates the demand for commodities and its prices (Jacks and Stuermer, 2020). Thence, rapid economic growth emerges,[22] which generates numerous employment opportunities and successive boosts in income levels and thus enriches the standard of living. As a result, derived demand for plentiful commodities surges, which successively causes prices to rise. For instance, UNCTAD's (2008) report shows that the fast-track economic development has driven the recent boom in food prices. Similarly, in the US, during the late 19th and early 20th centuries, it engenders an abnormal expansion and surge in commodity prices. Along with that, the upswing in Europe, during the postwar reconstruction, as well as the economic emergence in Japan, led to an upsurge in commodity prices (Erten and Ocampo, 2013; Cuddington and Jerrett, 2008; Rogers, 2004).

Last but not the least, the prices of goods may move together if they are related to each other, such that they are substitutes or complements in consumption or production.[23] Therefore, both substitutability and complementarity effects create cross-commodity linkages, and hence, the effect of a price surge or burst in one market may have implications for another market. In this regard, Tang and Xiong (2012) provide evidence of rising co-movements among commodity prices. As a result, distinctive demand or supply shocks in a particular commodity market may be conveyed to another interrelated commodity market. As an example, Pindyck and Rotemberg (1990) suggest that individual commodity prices—demand is driven in nature—may move together with a strong positive correlation. Equivalently, the FAO, as well as others, establishes that commodities are now more tightly associated than they have ever been.[24] However, substitutability and complementarity—in both demand and supply—depend on the nature of the commodity; for example, rather than mineral and energy commodities, supply substitutability is more relevant to agricultural commodities, because they are planted on a fixed acreage base, whereas the former is not. Likewise, complementarity in commodities is an important feature of agriculture.

However, EFs—demand and supply— are not the only factors responsible for equilibrium price determination (Le Pen and Sevi, 2018; Hamilton, 2009). Therefore, we incorporate and investigate other possible factors that are supposed to play a key and considerable role in the determination of commodity

[22] In China and India specifically, and the emerging market economies in general.
[23] This last economic channel "Price of related goods" explanation is related to both demand and supply variables.
[24] This particularly implies that agricultural commodity prices are now moving up and down with the prices of fossil-based fuels (Mallory, 2010).

prices (Shen et al., 2018; Kilian and Murphy, 2014; Akram, 2009; IMF, 2008; Gorton and Rouwenhosrt, 2006; Borensztein and Reinhart, 1994).

Table 1.3: Empirical Results Based on Dynamic Fixed Effect-Instrumental Variable Method (Aggregate-Level Commodity Price Booms and Busts)

Independent Variables	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)
CPS_{t-1}	0.757***	0.328***	0.670***	0.616***	0.735***	0.820***	0.333***	0.523***
	(0.028)	(0.104)	(0.066)	(0.085)	(0.051)	(0.089)	(0.076)	(0.070)
PRDC	-0.051*		-0.117***	-0.069*	-0.137***	-0.098**	-0.148***	-0.123***
	(0.027)		(0.043)	(0.038)	(0.044)	(0.043)	(0.054)	(0.048)
WRGDP	0.251***		1.133***		0.903***	0.561***	0.834***	0.171*
	(0.039)		(0.189)		(0.161)	(0.174)	(0.202)	(0.096)
INVT		0.012	0.004	0.006		-0.001	-0.001	0.009
		(0.026)	(0.014)	(0.018)		(0.013)	(0.026)	(0.019)
WUNC		0.155***	-0.075***	0.083**	-0.156***		-0.063*	0.082**
		(0.052)	(0.027)	(0.040)	(0.036)		(0.034)	(0.038)
WGPR		0.092***	0.076***	0.094***	0.115***	0.074***		0.0615**
		(0.030)	(0.026)	(0.028)	(0.018)	(0.023)		(0.028)
WTUNC		0.024***	0.037***	0.013**	0.030***	0.033***		0.008*
		(0.007)	(0.005)	(0.006)	(0.007)	(0.007)		(0.008)
FINC		-0.068**	-0.486***	-0.027	-0.311***	-0.313***	-0.103***	
		(0.028)	(0.069)	(0.037)	(0.051)	(0.073)	(0.059)	
DDC		-2.736***	-0.815***	-1.639***	-0.853***	-0.679***	-1.690***	-1.751***
		(0.381)	(0.150)	(0.245)	(0.145)	(0.232)	(0.272)	(0.219)
Constant	-6.009***	14.408***	-24.846***	8.838***	-17.774***	-10.448**	-14.107**	4.658**
	(1.028)	(1.806)	(5.047)	(1.276)	(4.149)	(4.795)	(5.801)	(2.833)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Obs.	1239	465	465	465	893	465	539	465
No. of Groups	37	19	19	19	37	19	19	19
R-squared	0.924	0.742	0.734	0.844	0.655	0.811	0.503	0.666
p-Values for Hansen's J. Statistic	0.584	0.347	0.475	0.221	0.561	0.390	0.128	0.448

Notes: The dependent variable is the CPS index at the aggregate commodity level. CPS_{t-1} is the lag of CPS. Independent variables are PRDC, WRGDP, INVT, DDC, WUNC, WGPR, WTUNC, and FINC. All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Model (1) shows results of EF factors whereas model (2) indicates results of ENF factors. However, model (3) indicates the results of a complete set of factors—EFs and ENFs. Results with different variable combinations are shown in models (4—8). As in model (5), we drop the INVT variable, because we have INVT data only on agricultural commodities and not on metal and energy commodities. Therefore, we want to know whether that drop leads to any significant variation in models (3) and (5) results? In models (4) and (8), we drop WRGDP and FINC variables, respectively, as they both have a high level of correlation (0.891), which is shown in Appendix Table A1.2. In model (6), we drop the WRDUNC and retain the WTUNC and WGPR and we come across the exact opposite in model (7).

The DDC coefficients reflect the impact of the appreciation of the dollar. An increase in the value of the dollar indicates appreciation, which in turn tends to have a negative impact on commodity prices. This result conforms with the theoretical expectations. The findings can be justified or interpreted in many ways. Appreciation in the dollar value means more purchasing power in terms of dollars; hence, we expect the commodity prices to be lower than the value of the dollar. Moreover, the commodities are held as an asset; hence, appreciation of dollars means lower demand for commodities; thus the price of a commodity is supposed to be lower. According to UNCTAD (2008), one of the major causes of recent food prices is the fall in the value of the dollar. It is important to mention that a depreciated/weaker dollar may carry good news for foreign consumers, as demand for commodities grows through an increase in purchasing power. Yet a weaker dollar may also carry bad news as the returns for commodity holding tend to subside. Therefore, the demand and supply effects would be large enough if the commodity prices are relatively inelastic, which is generally accepted for many commodities and especially for crude oil (e.g., see Hamilton, 2008).

These findings indicate that an increase in WUNC affects commodity prices positively, with statistical significance of 1% in models (2) and (4), and 5% in model (8). However, in models (3) and (5), the impact is negative and significant at 1% and in model (7) at 10% levels. The negative sign may be due to the simultaneous incorporation of both highly correlated variables, that is, WRGDP and FINC.[25] The inclusion of both these variables tends to result in the problem of multicollinearity, which can cause the coefficients to switch signs.[26] However, by dropping the FINC variable, we end up with the results where the coefficient of WRGDP is positive and according to expectations (see models (4) and (8) of Table 1.3). Moreover, in model (7), we investigate the impact of WUNC along with other variables on commodity prices, whereas we drop the two uncertainty-related variables, that is, WGPR and WTUNC, as both may look alike as sub-components of the WUNC and may result in a possible problem of multicollinearity, even though our correlation matrix-shows that they do not have a high correlation to cause multicollinearity (see Appendix A1.2). Thus, model (7) shows that the coefficient of WUNC tends to become negative and significant at a 10% level. Moreover, our positive results indicate that an escalation in WUNC leads to an uptick in commodity prices, keeping all other things equal. In a broader perspective, our results are consistent with previous findings of Frimpong et al. (2021), Bakas and Triantafyllou (2020, 2018), Van Robays (2016), and others.[27]

By looking at the relationship between uncertainties and real activities, it is evident that uncertainty is more a global matter. Hence, in certain economies, global uncertainty performs an important role—through demand and supply—in business cycle fluctuations and thereafter, in the determination of

[25] For details, see Appendix Table A1.2.
[26] See any basic econometrics book on "consequences of multicollinearity".
[27] However, these studies employ a more dimension-specific and confined uncertainty index such as economic/macroeconomic uncertainty, political uncertainty, and pandemic uncertainty, whereas we apply and use a broad world-level uncertainty index, already defined in the data and methodology section.

commodity prices (Shen et al., 2018).[28] Many empirical studies show that uncertainties affect the decision-making behavior to invest and consume (Favero et al., 2018; Van Robays, 2016; Kellogg, 2014; Elder and Serletis, 2010). Similarly, Bloom (2014) asserts that economic policy uncertainty is also one of the key factors that affects real activities and hence oil prices. Additionally, geopolitical risk/political uncertainty may also affect economic activities—of producers and consumers—and commodity prices due to fluctuations in demand and supply forces. For instance, firms may reduce investment expenditure until political uncertainty is resolved (see Jens, 2017; Julio and Yook, 2012). However, these effects may work in both optimistic and pessimistic directions. Foremost, during periods of high political instability, there is the possibility that firms may retard their production which subsequently shrinks their demand for raw materials. Equally, household consumption expenditure and demand may decline—in preference of a stable future—for various commodities (Baker et al., 2016). In marked contrast, fear of commodity shortages—during political uncertainty—stimulates firms and households more likely to hoard and hold inventories in advance (Hong et al., 2016). Meanwhile, speculators are also keen to hoard inventories for capital gains (Kilian and Murphy, 2014; Tang and Xiong, 2012). Therefore, these economic activities jointly spur the demand for various commodities, which subsequently produce price hikes. However, commodity producers may not be flexible sufficient to alter their production in dealing with temporary uncertainty.[29] Notwithstanding, whenever producers of a commodity realize that uncertainty prevails persistently, they will cut back production and lay off workers. For instance, during persistent political uncertainty, Venezuela significantly cut back its oil production in the recent past. In simple, uncertainties staggers and so the possible fluctuations in economic activities jointly affect commodity prices in both directions, —upward and downward. However, the ultimate aftermath on prices would be determined by the strength of demand and supply forces.

Similarly, Table 1.1 demonstrates that the coefficients of WTUNC tend to have a more profound impact on commodity prices. WTUNC indicates a positive impact on commodity prices, throughout models (2—6) and (8). Our results are coherent with the findings of Karabulut et al. (2020). In a broader perspective, evidence shows that trade policy uncertainty/trade uncertainty steers toward non-optimal allocation of resources, less willingness to participate in international trade, and subsequently,

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[28] However, commodity demand and supply, reduced or heightened because of uncertainties, may also depend on the nature of commodities. For those commodities that have been considered a "haven," their demand may increase and so also their prices; however, for those commodities that do not have this property, their demand may decrease and hence prices (see Bakas and Triantafyllou, 2020; Baur and McDermott, 2010). Therefore, we take up this issue—the nature of commodities and the impact of world uncertainty—in the next section in detail, by splitting our sample into subsamples, i.e., panels of agricultural, energy, and metal commodities.

[29] These may be due to (i) the nature of inelastic supply, (ii) irreversibility of investment, and (iii) large shutdown costs.

retardation of supply in the international market and therefore, expensive products. Therefore, in this regard, Handly (2014) indicates that commitment and credibility of trade policy are important to induce agents to make costly, irreversible, and hefty investments; otherwise, uncertainty in trade policy may delay this investment and decrease supply which subsequently forces prices in an upward direction. It is eminent that a favorable environment in international trade enables counterparties—two or more countries/firms—to acquire or exchange those product(s) that may benefit both parties specifically and mass consumers in general or vice versa. On the contrary, imposing anti-dumping duties on imported goods creates an escalation in trade policy uncertainty which in turn has implications for consumers in the form of commodity prices. Linde and Pescatori (2019) and Krugman (1991) argue that a trade war, which results from imposing tariffs, quotas, etc., on each othe's imported commodities, leaves each side worse off. The recent trade war between US- and China may escalate to substantial costs and expenditures that may create further trade uncertainties and may have implications for commodity prices (see Feenstra, 1992). Similarly, and most recently, since 2017, the addition of US tariffs, especially President Donald Trump's harsh trade rhetoric toward China import commodities especially, and generally to other countries across the globe, led to a tremendous rise in overall policy uncertainty in general and trade policy uncertainty in particular (Kyriazis, 2021).[30]

Moreover, the coefficient of WGPR indicates that geopolitical risk tends to have a positive and significant effect on commodity prices. The affirmative and significant results show that heightened geopolitical risk/instability may increase commodity prices. Our results are compatible with the hypothesis that demand for commodities tends to rise during times of excessive political uncertainty, causing prices to soar (Hong et al., 2016; Kilian and Murphy 2014; Tang and Xiong, 2012). The term "geopolitical risk" comes from the terms "geopolitical events" which refers broadly to those political, economic, and social events that may influence international relations.[31] This was evident during conflicts in the Middle East and civil turbulence in Cote d'Ivoire, which significantly affected the prices of oil and cocoa, respectively.[32] Therefore, with this backdrop, Eckaus (2008) argues that nothing significant has happened in the Middle East to increase oil prices; indeed, the oil price hike is due to political instability. However, the prices were influenced mainly by the commodity supply chain. In other words, unavailability or shortage of those specific commodities occurs, which may disrupt the supply line of an aforesaid commodity. Meanwhile, with the danger of commodity scarcity, firms and

[30] Since January 2018, the US did not stop there and went one step further and imposed more tariffs and quotas on various imported products such as solar panels and washing machines from China specifically and steel and aluminum from a wider set of countries generally.
[31] Ibid., 8.
[32] Ibid., 9.

households may hoard commodities in advance. In parallel, speculators and importers, who hold future contracts of those commodities, also take part by holding more future contracts— for capital gain, which further gives a positive impetus to those commodity prices. In this course of action, Kilian and Murphy (2014) and Tang and Xiong (2012) pinpoint that during the period of uncertainty, speculators will probably accumulate and hoard commodities in physical and future markets.

Furthermore, the coefficient of FINC shows a negative and significant effect on commodity prices The results show that an increase in the FINC induces a decrease in commodity prices. Our results are similar the findings of Knittel and Pindyck (2016) and the general view— that "commodities have become an investment class: declines in their prices may simply reflect the whims of speculators—" (The Economist, June 23, 2012). Traded commodities are used as raw materials for direct daily life usage or indirectly passed on to manufacturing processes. Hence, it is the commodity traders who are supposed to be involved in the production, transportation, and headway of commodities from where they are produced to where they are consumed. Conversely, in the commodity market, some of the traders/investors are specifically involved to invest in commodities—called index investors—purely for speculative motives. Thus, just like bonds and stocks, commodity futures have become— attractive for portfolio investors or index investors over the past decade, creating a popular new asset class.[33] Consequently, since 2003, many investors chose to diversify their portfolios by buying commodity index funds that eventually attract large financial inflows (from about $15 billion in 2003 to a high of $200 billion in mid-2008) to this pool of investment. Thus, the FINC is regarded as one of the potential causes and sources of the substantial surge and plunge of commodity prices in the 2008 financial crisis in general and for oil commodities. In particular, FINC causes and engenders co-movements among commodity prices (e.g., see Tang and Xiong, 2012; Bank for International Settlements, 2008).

To scrutinize this issue, we look into further details. It is not the financialization or speculation of commodities that pushes commodity prices in an upward or downward direction; rather, it is the spot price, the immediate market price for delivery, which plays a crucial role in the fluctuations of commodity prices.[34] Whenever speculators or investors buy and sell future contracts of a commodity in financial markets—at the current point of time for some future expected capital gain—the expected future price of that commodity may fluctuate, which in turn leads spot prices to adjust accordingly.[35] Meanwhile, the positive developments in the financial market confer an optimistic impetus to the

[33] Index investors are a group of investors who are constantly and increasingly engaged in trading commodity futures contracts by entering derivative markets to bet on commodity price movements.
[34] The future price is the price of a future contract at some specified and delivered future point in time.
[35] To differentiate between investment and speculation, see, e.g., Knittel and Pindyck (2016).

producers of the goods market to increase production and start stockpiling inventories of those particular goods in the pursuance of an expected future price increase. The aforementioned process in return conveys a positive message to the speculators of the financial market to buy more of that particular commodity. Subsequently, the expected price of that relevant future contract/asset of commodity is bolstered to a new elevated level. Once again, the developments in financial markets give a positive message to the producers of goods markets. This process goes on between the agents of financial and goods markets, while in the meantime, these advancements lead to an increase in the value of corresponding assets/future contracts. Therefore, some or many investors/speculators of future holding contracts become enticed and enthusiastic about expected capital gain on their respective holdings during times of high prices—as the value of index investment increases—to sell some or all of their holdings of commodity assets and earn a capital gain. Subsequently, this process leads to an increased supply of those specific commodity assets in the financial market, which sequentially puts downward pressure on prices to decrease them into a new low level of equilibrium to stabilize the markets (Getu and Weersinl, 2010; Irwin et al., 2009). At the same time, in the goods market, this dreadful news and the already high stock holdings shrink the prices of those commodities to a new level. In this regard, some researchers (e.g., Turnovsky and Campbell, 1985; Turnovsky, 1983; Cox, 1976; and others) argue that index investment/speculation/financialization improves welfare by reducing and stabilizing the variability of commodity spot prices.

Finally, Table 1.3 also shows the impact of INVT on commodity prices. It shows a positive impact on commodity prices in models (2—4) and (8), but negative effects in models (6) and (7); however, both these effects are statistically insignificant across all the models. The positive but insignificant effect of the INVT variable may be due to the stronger demand-side (WRGDP) impact than the supply-side (PRDC) impact (see Table 1.3). This subsequently implies that inventory stock of commodities may not be significant enough to affect commodity prices substantially.

To summarize our findings, in comparison to demand and supply fundamentals, the role of other ENFs is crucial in affecting commodity prices in terms of both direction (positive and negative) and magnitude. Of the demand and supply factors, the demand (WRGDP) variable have a more profound effect than the supply factor. On factors other than demand and supply, the DDC variable is the dominant factor in explaining commodity price booms and busts. However, INVT is the only variable that does not have any effect on commodity prices, whereas other factors have a significant effect on commodity prices.

1.4.2 Results and Discussion at Disaggregate Level/Sensitivity Analyses

In this section, we revisit the above analyses by attempting to check the robustness of our results. We examine the role of both EFs and ENFs on commodity prices at a disaggregated level for agricultural, energy, and metal commodity groups. Furthermore, we investigate the roles of trade uncertainty and geopolitical risk at a disaggregated level.

Table 1.4: Empirical Results Based on Dynamic Fixed Effect-Instrumental Variable Method (Agricultural Commodity Subsample Price Booms and Busts)

Independent Variables	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)
Lag Dependent	0.722*** (0.037)	0.358*** (0.107)	0.661*** (0.070)	0.667*** (0.076)	0.723*** (0.085)	0.763*** (0.088)	0.424*** (0.097)	0.503*** (0.080)
PRDC	-0.053** (0.023)		-0.112*** (0.043)	-0.067* (0.037)	-0.088** (0.036)	-0.113*** (0.040)	-0.155*** (0.049)	-0.121** (0.048)
WRGDP	0.216*** (0.046)		0.759*** (0.153)		0.929*** (0.184)	1.017*** (0.187)	1.202*** (0.242)	0.237** (0.104)
INVT		0.013 (0.025)	0.004 (0.014)	0.007 (0.016)		0.001 (0.012)	-0.006 (0.022)	0.007 (0.019)
WUNC		0.161*** (0.052)	-0.001 (0.037)	0.072** (0.035)	-0.081*** (0.029)		-0.010 (0.030)	0.081** (0.039)
WGPR		0.102*** (0.032)	0.062** (0.027)	0.093*** (0.027)	0.100*** (0.033)	0.047** (0.024)		0.058** (0.027)
WTUNC		0.035*** (0.012)	0.030*** (0.007)	0.027*** (0.009)	0.028*** (0.007)	0.034*** (0.007)		0.002 (0.007)
FINC		-0.122*** (0.033)	-0.324*** (0.063)	0.074*** (0.043)	-0.426*** (0.075)	-0.510*** (0.086)	-0.256*** (0.058)	
DDC		-2.806*** (0.349)	-1.004*** (0.191)	-1.564*** (0.224)	-0.873*** (0.227)	-0.619*** (0.256)	-1.263*** (0.261)	-1.706*** (0.206)
Constant	-4.953*** (1.232)	15.064*** (1.606)	-14.145*** (4.330)	8.826*** (1.206)	-18.904*** (5.293)	-22.828*** (5.463)	-25.928*** (6.156)	2.45 (2.825)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Obs.	769	465	465	465	583	465	535	465
No. of Groups	24	19	19	19	24	19	19	19
R-squared	0.863	0.777	0.744	0.862	0.728	0.768	0.540	0.656
p-Values for Hansen's J-Statistic	0.454	0.437	0.545	0.322	0.251	0.719	0.180	0.654

Notes: The dependent variable is the CPS index of agricultural commodities. CPS_{t-1} is the lag of CPS. Independent variables are PRDC, WRGDP, INVT, DDC, WUNC, WGPR, WTUNC, and FINC. All variables are log-transformed. ***, **, and * indicate significance levels 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Model (1) shows results of fundamental factors whereas model (2) indicates results of non-fundamental factors. However, model (3) indicates the results of a complete set of factors, EF and ENF. Moreover, results with different variable combinations are shown in models (4—8). In model (5), we drop the INVT variable, whereas in models (4) and (8), we drop WRGDP and FINC variables, respectively, as they both have a high level of correlation (0.891), which is shown in Appendix A1.2. In model (6), we drop the WUNC and retain the WTUNC and WGPR and we come across the exact opposite in model (7).

Results given in Table 1.4 related to agricultural commodities are largely consistent and compatible with the results of Table 1.3. However, magnitudes of the regression coefficients and their significance levels show minor variations, which may be due to a decrease in the number of observations.

Likewise, Table 1.5 reveals that other than our two variables PRDC and WUNC, most of our results in Table 1.5 are coherent and consistent with those in Table 1.3. However, inconsistent results of our regression coefficients in terms of magnitude and significance level may vary from model to model in

Table 1.5: Empirical Results Based on Dynamic Fixed Effect-Instrumental Variable Method (Energy Commodity Subsample Price Booms and Busts)

Independent Variables	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)
Lag Dependent	0.753***	0.997***	0.190	1.002***	0.063	0.428	0.099
	(0.050)	(0.112)	(0.268)	(0.090)	(0.273)	(0.338)	(0.295)
PRDC	-0.045		-0.831	0.074	-1.019	-0.551**	-0.744
	(0.449)		(0.731)	(0.238)	(0.777)	(0.232)	(0.759)
WRGDP	0.439**		3.164***		3.080***	2.576**	1.909**
	(0.189)		(0.951)		(1.072)	(1.112)	(0.771)
WUNC		-0.389***	-0.297***	-0.399***		-0.333***	-0.219*
		(0.051)	(0.085)	(0.013)		(0.022)	(0.132)
WGPR		0.407***	0.357**	0.402***	0.296		0.282***
		(0.022)	(0.176)	(0.031)	(0.186)		(0.102)
WTUNC		0.068***	0.074***	0.067***	0.068***		-0.122***
		(0.023)	(0.011)	(0.024)	(0.016)		(0.041)
FINC		-0.273***	-1.038***	-0.290***	-1.030***	-0.374*	
		(0.095)	(0.167)	(0.047)	(0.198)	(0.216)	
DDC		-1.955***	-3.656***	-1.850***	-4.316***	-0.902	-3.284***
		(0.257)	(1.110)	(0.258)	(1.025)	(0.722)	(1.039)
INVT+	-----	-----	-----	-----	-----	-----	-----
Constant	-11.951***	13.600***	-52.510**	11.918**	-45.302	-57.424*	-34.243***
	(3.251)	(0.824)	(25.313)	(5.733)	30.914	31.370	(16.373)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Obs.	95	75	75	75	75	87	75
No. of Groups	3	3	3	3	3	3	3
R-squared	0.885	0.879	0.350	0.740	0.321	0.430	0.350
p-Values for Hansen's J-Statistic	0.645	0.484	0.559	0.153	0.358	0.271	0.768

Notes: The dependent variable is the CPS index of energy commodities. CPS_{t-1} is the lag of CPS. Independent variables are PRDC, WRGDP, INVT, DDC, WUNC, WGPR, WTUNC, and FINC. All variables are log-transformed. ***, **, and * show significance levels at 1%, 5%, and 10%, respectively. + indicates that we do not have data on this variable. Robust standard errors are reported in parentheses. Addon, Model (1) shows results of fundamental factors whereas model (2) indicates results of non-fundamental factors. However, model (3) indicates the results of a complete set of factors, EF and ENF. Moreover, results with different variable combinations are shown in models (4—7). In models (4) and (7), we drop the WRGDP and FINC variables, respectively, as both have a high level of correlation (0.891), which is shown in Appendix A1.2. In model (5), we drop the WUNC and retain the WTUNC and WGPR and we come across the exact opposite in model (6).

comparison to Table 1.3. The aforesaid fluctuations may be due to the default decrease in the number of observations in this subsample panel compared to the number of observations in the aggregate commodities panel. The PRDC (supply representative) variable carries a theoretically correct sign across all models, but it is insignificant in nearly all models except model (6), which is statistically which is statistically significant at a 5% level. This may be due to the negative impact of WUNC on commodity prices. The results may indicate that uncertainty is supposed to cause producers to cut production as a response to a plunge in commodity demand, which consequently affects energy demand. Interestingly, our results are more compatible with the recent real-world example of COVID-19, where world demand for various commodities were reduced and the resulting demand for an energy-related commodity dropped to a record low level. As an illustration, we can see similar (but opposite to Table 3.1) results from our WUNC (uncertainty indicative) variable in Table 4.3. Our results show that WUNC affects commodity prices negatively and significantly. In a broader picture, our findings are coherent with the previous results of Bakas and Triantafyllou (2020), Shen et al. (2018), Van Robays (2016), and Baumeister and Peersman (2013).[36]

In comparison to accompanying global macroeconomic factors, uncertainty shock is deemed to be one of the most dominant factors for driving energy prices (see Shen et al., 2018). As documented in the existing literature, uncertainty influences energy prices through various economic channels. First, it influences and alters the decision-making behavior of economic agents, both producers and consumers, by delaying or postponing the production and consumption of goods (Favero et al., 2018; Kellogg, 2014; Elder and Serletis, 2010; Bloom et al., 2007; Litzenberger and Rabinowitz, 1995; Pindyck, 1991; Bernanke, 1983). For instance, with COVID-19, we observed the reduction or postponement in investment/production as well as in consumption by producers and consumers, respectively. Therefore, the abovementioned economic activities are collectively linked to a fall in energy needs and requirements, which further undercut energy demand and hence dwindle energy prices. The prices decreased many fold historically, especially that of petroleum oil.

Table 1.6 indicates that except for the WUNC variable, all our other results related to metal commodities are consistent and coherent with Table 1.3. The WUNC variable is highly statistically significant; however, in marked contrast to Table 1.3, it carries a negative relationship with prices. In a wider context, our results are in line with the findings of Sappor et al. (2020) and Global Mining Leader (PwC, 2014).

Whatever the global uncertainties, may be, that is, macroeconomic, policy, political, pandemic, etc., have substantial economic implications for world economies. EPU is established as one of the crucial

[36] These studies examine commodity price volatility and uncertainty, especially oil and uncertainty; however, their uncertainty variable includes only macroeconomic, political, policy, or pandemic-related uncertainties. In contrast, this study constructs a broader energy commodity panel that includes coal, petroleum oil, and natural gas. In addition, we examine and consider a broader global uncertainty index. For more details, see the data and methodology section.

factors for the determination of real activities (e.g., Jurado et al., 2015; Bloom, 2014, 2009). Consequently, EPU alters the decision-making behavior of economic agents, which adversely affects

Table 1.6: Empirical Results Based on Dynamic Fixed Effect-Instrumental Variable Method (Metal Commodity Subsample Price Booms and Busts)

Independent Variables	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)
Lag Dependent	0.826***	0.663***	0.454***	0.627***	0.374***	0.478***	0.448***
	(0.032)	(0.070)	(0.077)	(0.055)	(0.091)	(0.055)	(0.077)
PRDC	-0.194**		-0.654***	-0.273***	-0.768***	-0.608***	-0.705***
	(0.082)		(0.118)	(0.088)	(0.139)	(0.095)	(0.118)
WRGDP	0.394***		2.213***		2.159***	2.289***	1.682***
	(0.087)		(0.274)		(0.261)	(0.190)	(0.266)
WUNC		-0.168**	-0.281***	-0.153**		-0.215***	-0.214***
		(0.076)	(0.074)	(0.083)		(0.054)	(0.075)
WGPR		0.172***	0.080**	0.201***	-0.021		0.067**
		(0.033)	(0.041)	(0.032)	(0.037)		(0.041)
WTUNC		0.031***	0.052***	0.041***	0.026*		0.029**
		(0.011)	(0.017)	(0.014)	(0.016)		(0.014)
FINC		0.145*	-0.272***	0.266***	-0.242**	-0.216***	
		(0.087)	(0.094)	(0.089)	(0.095)	(0.0595)	
DDC		-1.990***	-1.740***	-2.446***	-2.110***	-1.147***	-2.258***
		(0.384)	(0.340)	(0.339)	(0.384)	(0.235)	(0.413)
$INVT^{+}$	-----	-----	-----	-----	-----	-----	-----
Constant	-8.166***	10.800***	-43.015***	16.190***	-39.833***	-49.916***	-26.082***
	(1.560)	(1.650)	(6.649)	(1.612)	(6.468)	(4.779)	(6.910)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Obs.	365	235	235	235	235	295	235
No. of Groups	10	10	10	10	10	10	10
R-squared	0.965	0.984	0.749	0.928	0.685	0.766	0.732
p-Values for Hansen's J-Statistic	0.591	0.664	0.465	0.237	0.690	0.783	0.287

Notes: The dependent variable is the CPS index of metal commodities. CPS_{t-1} is the lag of CPS. Independent variables are PRDC, WRGDP, INVT, DDC, WUNC, WGPR, WTUNC, and FINC. All variables are log-transformed. ***, **, and * exhibit significance levels at 1%, 5%, and 10%, respectively. + indicates that we do not have data on this variable. Robust standard errors are reported in parentheses. Model (1) shows results of fundamental factors whereas model (2) indicates results of non-fundamental factors. However, model (3) indicates the results of a complete set of factors, EF and ENF. Moreover, results with different variable combinations are shown in models (4—7). In models (4) and (7), we drop the WRGDP and FINC variables, respectively, as both have a high level of correlation (0.891), which is shown in Appendix A1.2. In model (5), we drop the WUNC and retain the WTUNC and WGPR and we come across the exact opposite in model (6).

metal and mining activities and thus its prices (as explained above).[37] For instance, the recent world level uncertainty in the form of COVID-19 has negatively and considerably influenced demand and

[37] Meanwhile, reduced commodity prices may put extra pressure on companies' profits and therefore on investors to put their money elsewhere.

consumption worldwide.[38] Since January 3, metal prices dropped from 5% to 22%.[39] More specifically, COVID-19 has negative and severe implications for the US economy, as it is one of the most severely affected countries in the world, with a reduction in its GDP (1.3%) in 2020 (for details, see Sappor et al., 2020). In addition, uncertainty increases the use, by investors, of future metal and mining markets. These investors are willing and able to sacrifice the low current return, by delaying investment and production, in favor of higher future expected returns, by utilizing more available future information (this channel is explained in Table 1.5).

1.5 Conclusion and Policy Recommendations

Commodity markets reflect an uneven pattern of price fluctuations. These fluctuations sometimes appear in small and moderate magnitudes, whereas occasionally, they turn into a massive type of boom and bust. Policymakers are concerned about the volatile and uncertain behavior of commodity prices that tends to occur in the form of booms and bursts. The erratic pattern of commodity prices impacts both developing and emerging economies through inadvertent fluctuations in exports and imports as well as overall economic growth. In the recent past, researchers have explored the factors explaining the booms and busts of commodity prices. However, previous studies are limited in that they focused on either demand- or supply-side variables but ignored other ENF factors. We suspect that these previous studies suffer from misspecification bias. Hence, this study attempted to include not only demand and supply variables together, but also other relevant economic variables identified by many research studies, such as WUNC, WTUNC, WGPR, financialization, dollarization, and inventory stock. Furthermore, this study is innovative in the sense that it applied the DFE-IV approach to account for the endogeneity issues associated with the static and dynamic models.

This study utilized world-level trading commodity price data from a broad set of agricultural, energy, and metal commodities, as a mixed sample of these three commodities together and subsequently, a subsample for the specified groups separately, to determine the factors affecting the booms and busts of commodity prices. Our findings show that in the case of aggregate-level commodity prices, after controlling for demand and supply factors, other economic indicators, such as WUNC, WTUNC, WGPR financialization, and dollarization, are significant predictors that tend to affect commodity prices, the exception is the inventory stock variable, which has an insignificant effect on commodity prices. At disaggregate levels, our results remained largely consistent with previous study results, except

[38] However, safe-haven commodities, such as gold, silver, etc., may be an exception to this.
[39] Similar results can be found from the 2007—08 financial crisis and many other events in world history.

for the WUNC variable in energy and metal groups, which tends to transmit negative and significant effects on commodity price booms and busts. Of the demand and supply factors, it is the demand variable that tends to dominate the supply side effect, which is in line with previous literature. In other words, our analyses imply that compared to the global supply effect, the demand generated from the world has caused booms and busts in commodity prices, which in turn have macroeconomic effects on both exporting and importing economies. In addition, policymakers may need to consider the role of the rise and fall in the dollar value as well as that of the FINC, which were found to have a significant effect on commodity price booms and busts. Equally important is the role of geopolitical risk and WUNC. Countries thus need to devise policies that may help moderate the negative effects of WUNC. Along with that, countries that generate more demand for commodities may tame their population and economic growth.

Appendices

Appendix A1

Table A1.1: Summary Statistics at Aggregate-Level Sample

Variable	Obs	Mean	Std. Dev.	Min	Max
CPS	1,391	1013.856	3104.699	3.948	37135.840
PRDC	1,391	4.45e+08	1.22e+09	4.240	8.20e+09
WRGDP	1,517	5.23e+13	1.76e+13	2.79e+13	8.49e+13
INVT	653	1216363	3432776	0.180	3.93e+07
WUNC	1,147	17554.720	8078.669	8057.454	40648.570
WTUNC	925	0.449	0.885	0.050	4.420
FINC	1,517	9499.785	7420.547	875	28538.440
WGPR	1,332	85.955	42.933	33.117	203.403
DDC	1,517	96.551	9.216	82.410	122.730

Notes: The dependent variable is CPS and independent variables are PRDC, WRGDP, INVT, DDC, WUNC, WGPR, WTUNC, and FINC. All variables are in their original form, which means non-log transformed.

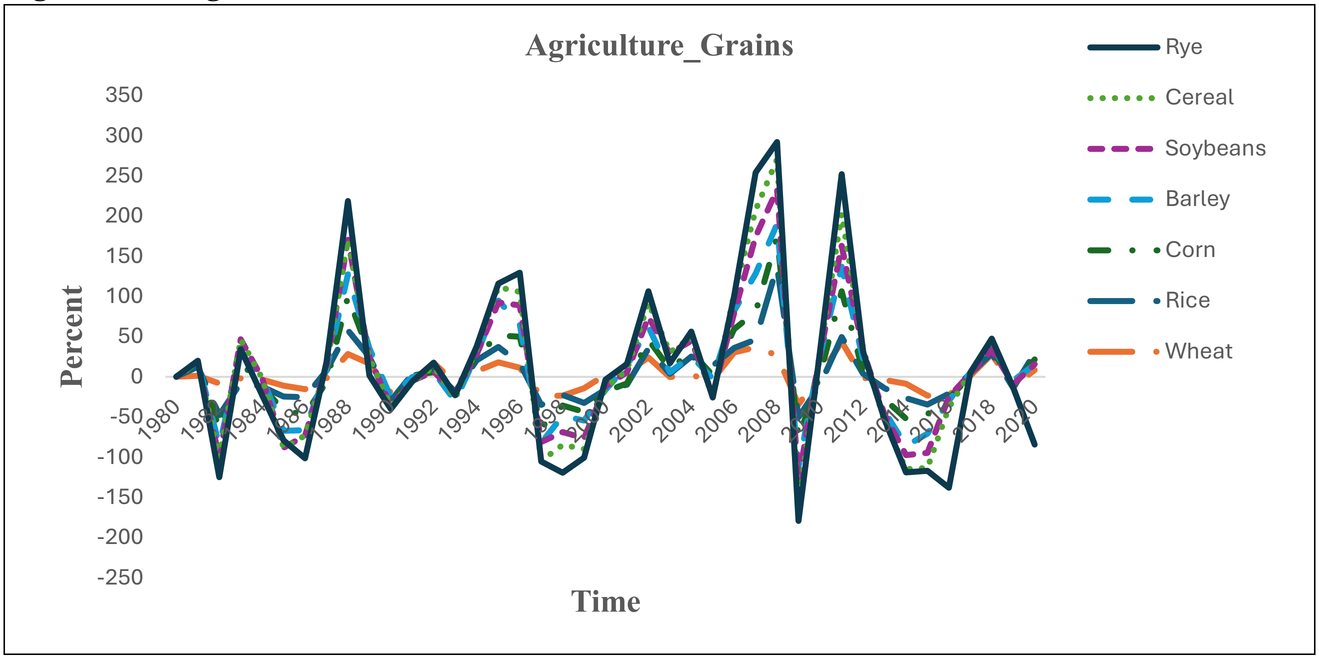
Table A1.2: Correlation Matrix at Aggregate-Level Sample

Variables	CPS	PRDC	WRGDP	INVT	WUNC	WTUNC	FINC	WGPR	DDC
CPS	1.000								
PRDC	-0.186	1.000							
WRGDP	0.186	0.041	1.000						
INVT	-0.163	0.764	0.106	1.000					
WUNC	0.105	0.027	0.756	0.077	1.000				
WTUNC	0.016	0.011	0.512	0.075	0.671	1.000			
FINC	0.092	0.031	0.891	0.118	0.752	0.707	1.000		
WGPR	-0.032	0.012	0.429	0.064	0.621	0.469	0.520	1.000	
DDC	-0.228	-0.022	-0.247	0.008	0.105	0.227	0.053	0.497	1.000

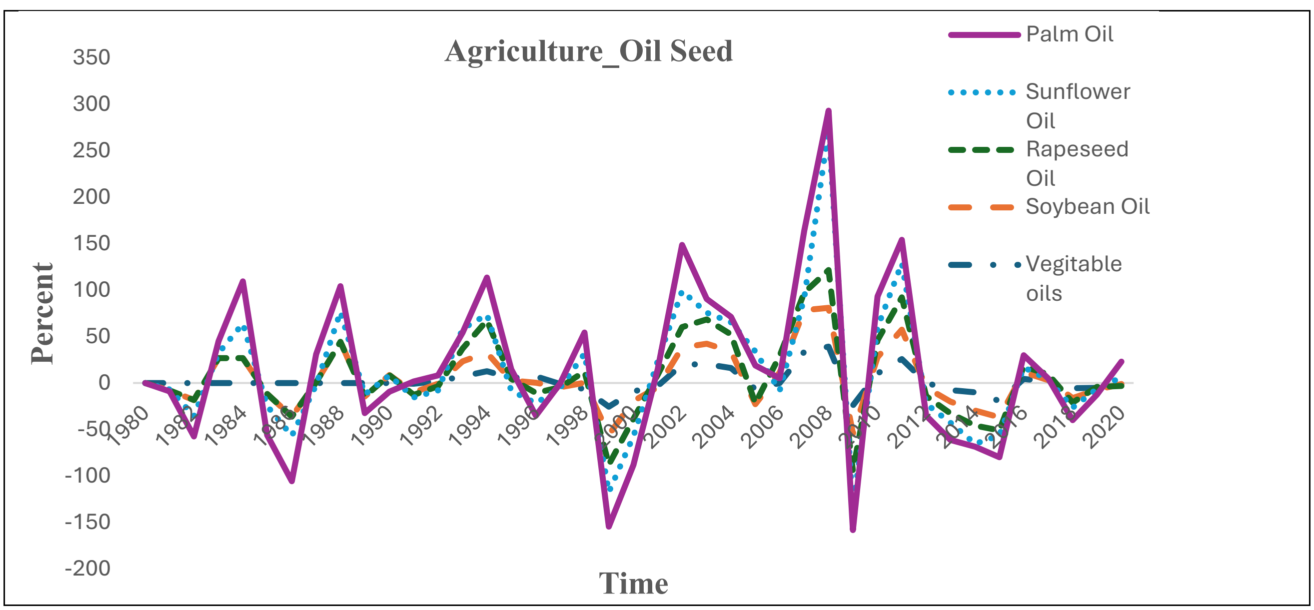
Notes: The dependent variable is CPS and independent variables are PRDC, WRGDP, INVT, DDC, WUNC, WGPR, WTUNC, and FINC. All variables are in their original form, which means non-log transformed.

Appendix B1

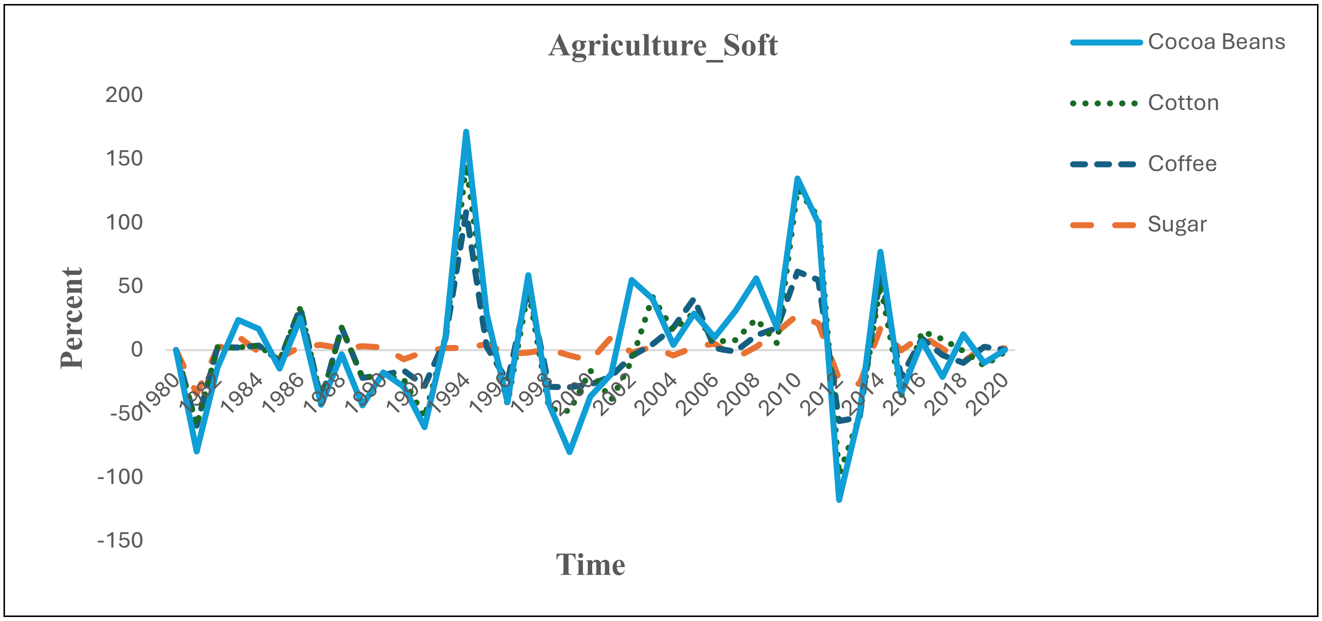
Figure B1.1: Agricultural Commodities



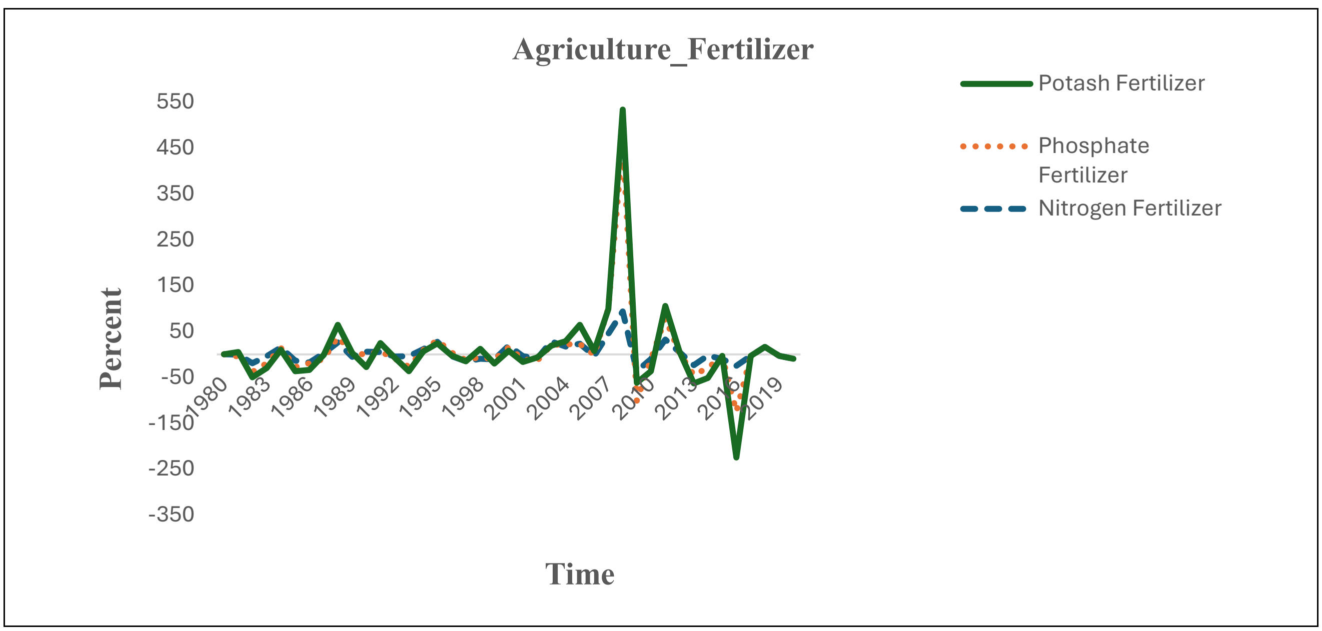
Source: Authors' calculations



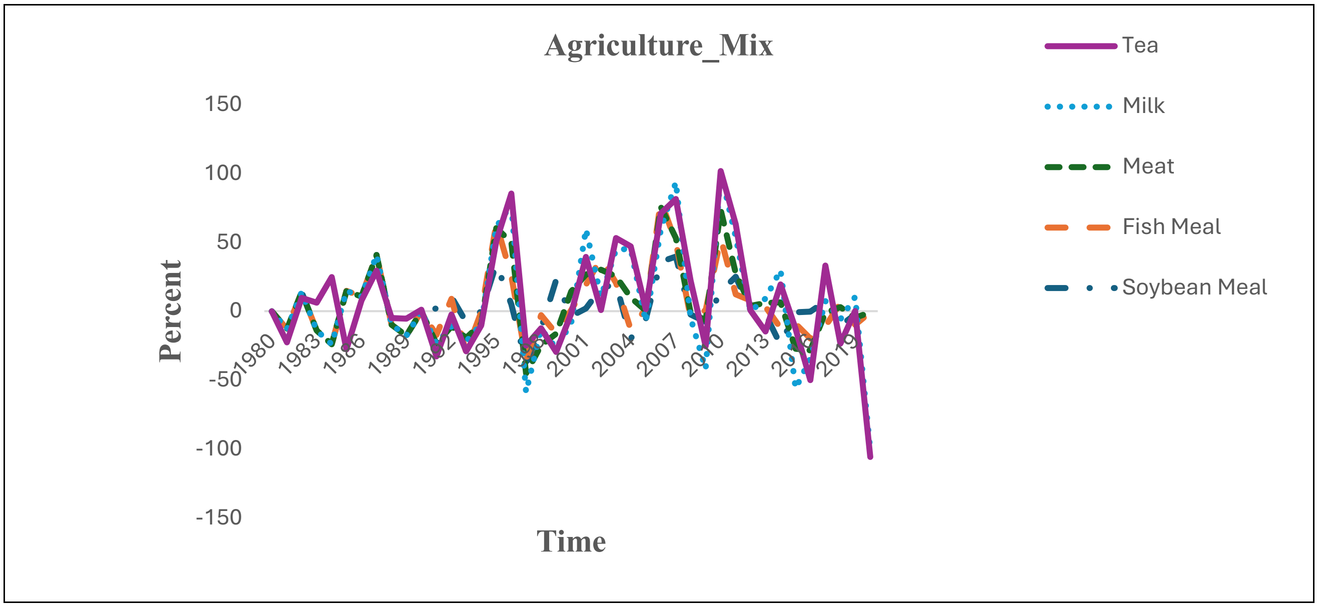
Source: Authors' calculations



Source: Authors' calculations

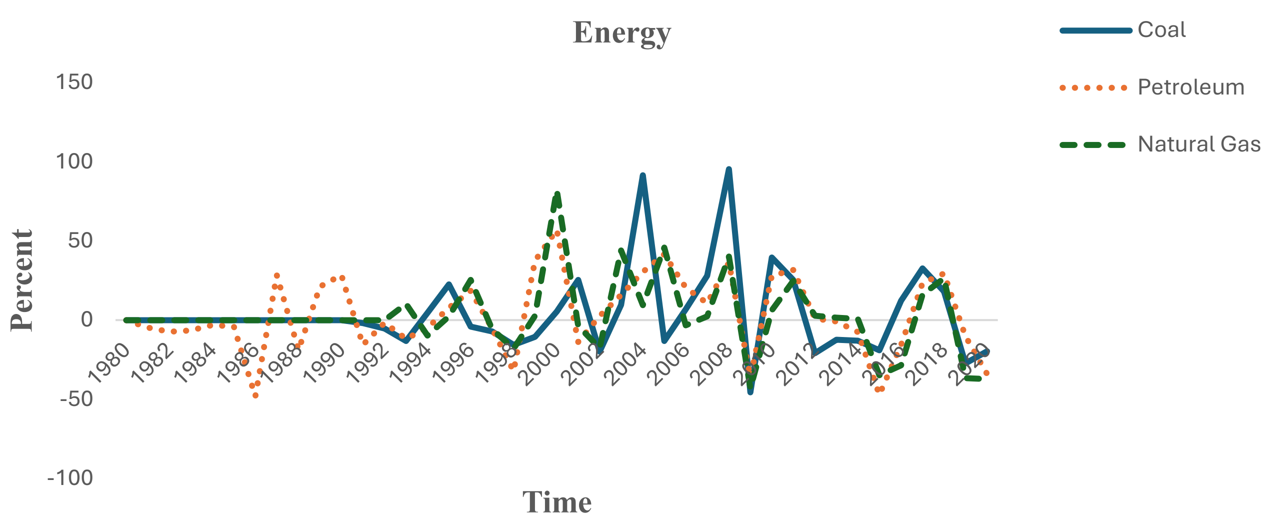


Source: Authors' calculations



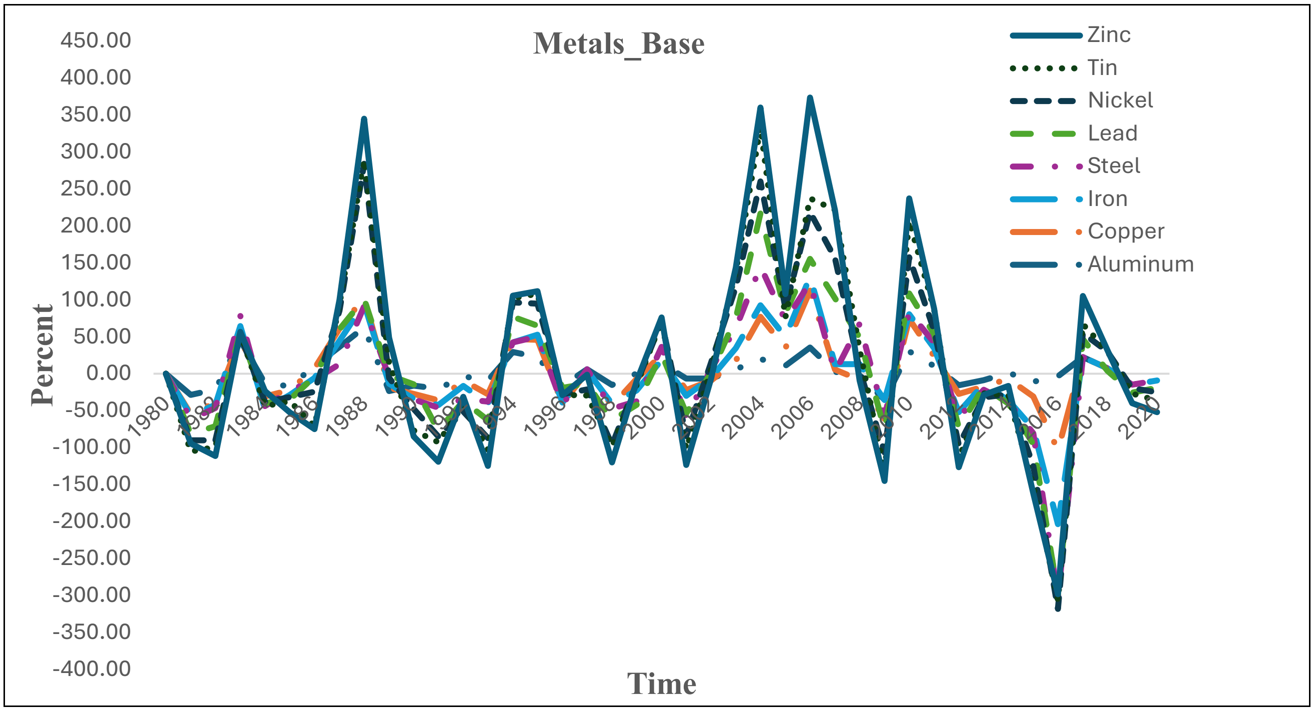
Source: Authors' calculations

Figure B1.2: Energy Commodities

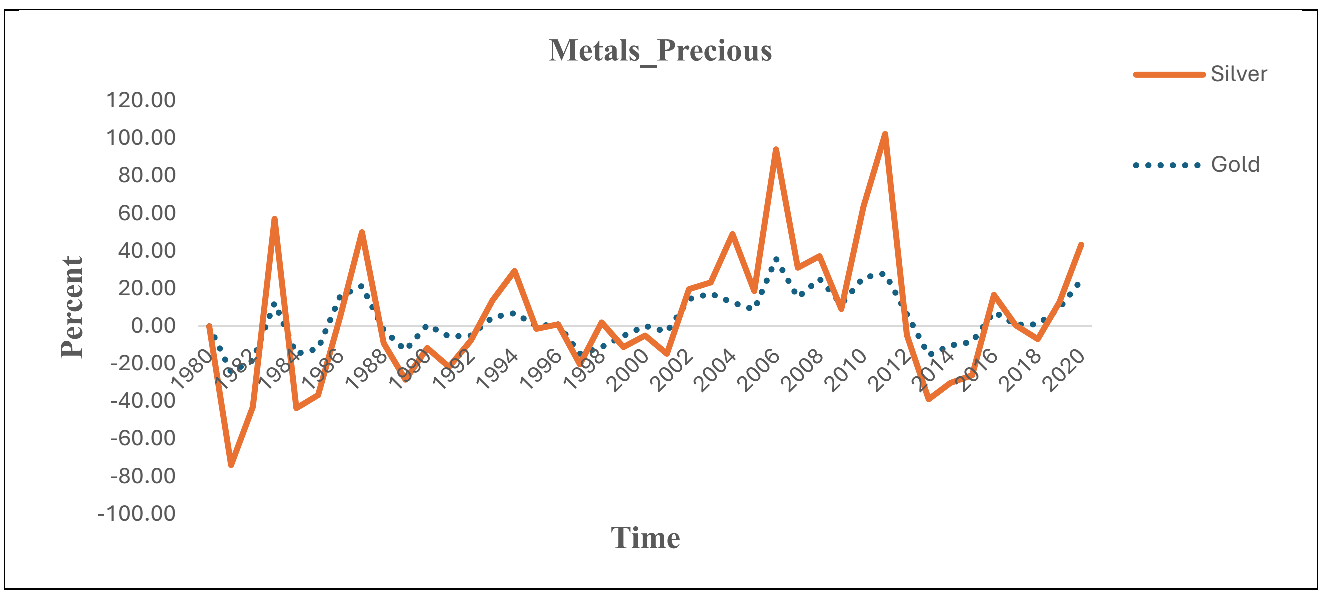


Source: Authors' calculations

Figure B1.3: Metal Commodities



Source: Authors' calculations



Source: Authors' calculations

Chapter #02

Macroeconomic Effects of Commodity Price Booms and Busts in Narrow Export-Dependent Economies

Abstract

Over the last four decades, commodity price shocks have presented intricate challenges, particularly for economies heavily reliant on commodity exports for their foreign exchange earnings, leading to macroeconomic mismanagement in export-dependent economies. Existing literature suggests that the macroeconomic evaluation of commodity price exposure hinges on whether the standard terms of trade (TOT) or the commodity terms of trade (CTOT) are utilized as an exposure metric. Instead of the more theoretically appropriate country-specific gauge of commodity price roars and surges, which is contingent on the composition of a country's commodity export and import baskets, the use of standard TOT and CTOT as indicators of commodity price exposure in an era marked by frequent commodity price fluctuations has sparked renewed interest. This is because these conventional commodity price exposure measures fail to encompass and consider the significance of commodity dependence, particularly for economies that produce and export commodities. Hence, we advocate for the utilization of the well-known CTOT index, along the lines of Spatafora and Tytell (2009) among others but factoring in and controlling for the substantial role of strong and narrowly export-dependent commodities in export-driven economies to analyze the unforeseen impacts of global trade prices on macroeconomic performance in export-dependent economies. Moreover, most of the existing empirical research concentrates on the direct effects, overlooking the influence of potential conditional factors, as certain barriers prevalent in all countries hold greater importance than others. Furthermore, we reassess the entire analysis to investigate the macroeconomic reaction in terms of severity and scale of commodity price shocks. Hence, we advocate for the utilization of the well-known CTOT index while factoring in and controlling for the substantial role of strong and narrowly export-dependent commodities in export-driven economies to analyze the unforeseen impacts of global trade prices on macroeconomic performance in export-dependent economies. To ensure reliable estimates, this study employs the dynamic fixed-effect within the instrumental variable method as an estimator to assess the macroeconomic ramifications of narrowly dependent commodity terms of trade (NDCTOT) over the period from 1995 to 2021. We present evidence indicating that enhancements in NDCTOT yield beneficial outcomes on output, unemployment, external balance, exchange rate, government expenditure, and income inequality while exerting unfavorable impacts on investment and inflation. The positive effects of NDCTOT on output, government expenditure, exchange rate, inflation, unemployment, and income inequality are further bolstered by political stability and effective governance. However, the conditional impact on external balance is positive but diminishes. Conversely, the negative impact of NDCTOT on investment decreases with improved political stability. Moreover, a heavy debt burden weakens the positive influence of NDCTOT on exchange rates, government expenditure, and income inequality. Additionally, fluctuations in exchange rates amplify both the negative and positive effects of NDCTOT on investment and inflation respectively. Foreign exchange reserves also reduce the positive impact of NDCTOT on exchange rate appreciation and external balance. Similarly, openness in the capital account diminishes the promising impact of NDCTOT on external balance, while an expansion in government size leads to a decline in income inequality. Likewise, financial advancements also mitigate the negative and positive impact of NDCTOT on investment and output. The asymmetric outcomes of NDCTOT reveal that the influence of NDCTOTBOOMS_25% on these macroeconomic factors, excluding inflation, is significantly more positive in terms of magnitude than NDCTOTBOOMS_15%. Conversely, the impact of NDCTOTBUSTS_25% is notably more unfavorable compared to NDCTOTBUSTS_15%. Regarding inflation, the effect is more adverse during NDCTOTBOOMS_25% than NDCTOTBOOMS_15%, while it is more favorable during NDCTOTBUSTS_25% than NDCTOTBUSTS_15%. Our findings suggest that the influence of external price shocks, whether positive or negative, on NDCTOT can present a significant risk of macroeconomic mismanagement, contingent upon a country's net commodity trade position. It is crucial for nations heavily reliant on commodity exports to broaden their economic base by diversifying across different commodity sectors, reducing dependency on a single commodity. Relying too heavily on NDCTOT can expose economies to vulnerabilities. Promote diversification of exports beyond limited commodities. The favorable impacts of NDCTOT are enhanced by political stability and effective governance. Emphasize transparency, anti-corruption efforts, and robust institutions to maximize benefits. Excessive debt weakens the positive effects of NDCTOT hence, it is advisable to adopt fiscal discipline and debt reduction measures. A resilient financial sector mitigates the unpleasant effects of NDCTOT on investment and output while magnifying its positive outcomes. Encourage financial inclusivity, enhance credit accessibility, and bolster financial infrastructure. Enact policies to manage exchange rate fluctuations that can amplify both positive and negative repercussions of NDCTOT. A larger government size can reduce income inequality. Therefore, explore targeted social initiatives and progressive taxation to further address income disparity, while considering the implications on government expenditure.

2.1 Introduction

This section consists of three sub-sections. Section one deals with the background of the study, while gap in the literature is justified in section two. The objectives of the study are explained in section three.

2.1.1 Background of the Study

The sharp commodities price fluctuations are seen numerously as an important source of business cycle fluctuations across the world.[40] Therefore, the role of world prices in macroeconomic activities has long received significant attention in the world economies. These fluctuations have substantial macroeconomic effects across those developed and developing countries that are strongly dependent on the exports of primary commodities—agricultural, coffees, minerals, etc.— (Collier, 2012; IMF, 2016)[41] and especially for those who are drawing down foreign exchanges from its handful of exported commodities. Therefore, a sudden exogenous small or large shock(s), may be positive or negative, to export prices in the international markets tends to increase or decrease export earnings in the domestic economy, which in turn could have serious micro and macro level consequences for the respective economy.[42] In this context, various studies have explored the significance of terms of trade and export prices for several macroeconomic indicators. For instance, economic growth[43] (Hamilton, 1983; Finn, 1991; Deaton and Miller, 1995; Dehn, 2000; Raddatz, 2007; Bruckner and Ciccone, 2010; Collier and Goderis, 2012), business cycle fluctuations (Mendoza, 1995; Kose, 2002; Aghion et al., 2010; Fernandez et al., 2017; Schmitt-Grohe and Uribe, 2018), exchange rate variations (Chen and Rogoff, 2003; Cashin et al., 2004; Ricci et al., 2013), implications for current balances (Blanchard and Milesi-Ferretti, 2009; Helbling et al., 2011; Arezki and Hasanov, 2013), inflation (Cody and Mills, 1991; Hafer, 1983; Garner, 1985; Defina, 1988; Webb, 1989; Furlong, 1989; Kugler, 1991; Bloomberg and Harris, 1995 and Garner, 1995; Trivedi and Hall, 1995), international reserves (Aizenman et al., 2012), consumption, exports and imports (Andrews and Rees, 2009) and etc.[44]

[40] For instance, some of the prominent booms and busts are 1970s oil prices, 1980s non-oil commodities, Commodity prices leap up intensely from mid-1993 into 1995, early 2000s non-oil commodities, 2008 financial crisis, 2010–2011 surge in commodity prices and 2014 oil prices, the commodity price surge and bust in covid 2019 and Russia-Ukrainian War 2022 and more recently, Israel-Palestine War 2023.

[41] In this research paper we investigate the economic implications for export dependent commodities economies, while the issue for import dependent economies will be carried out in a separate paper.

[42] Although it can be challenging to ascertain whether a shock is temporary or permanent, some countries appear to experience prolonged hardship, while others have swiftly recovered.

[43] Mendoza (1995) contended that fluctuations in terms of trade impact growth primarily through alterations in savings.

[44] However, the evidence regarding the long-term impact of natural resources, known as the "resource curse," on economic growth is inconclusive. Some researchers argue that resources are a "blessing" (Alexeev and Conrad, 2009; Brunnschweiler and Bulte, 2008; Lederman and Maloney, 2007; Sala-i-Martin et al., 2004), while others believe they are a "curse" (Sachs and Warner, 1999, 2001; Gylfason et al., 1999; Sala-i-Martin and Subramanian, 2003). For further exploration of the

Similarly, numerous studies have examined the impact of commodity terms of trade effects on macroeconomic fluctuations. Research by Spatafora and Tytell (2009), Aizenman et al. (2012), Cespedes and Velasco (2012), Collier and Goderis (2012), Gruss and Kebhaj (2019), Boakye et al. (2022), and Lee (2023) has delved into this area. Many of these studies have utilized the prices of individual commodities or composite indices reflecting movements in commodity prices, such as food, metals, oil, and agricultural raw materials. Nevertheless, evidence indicates that economies reliant on commodity exports cannot be treated as a uniform group in terms of their exposure to commodity markets. There are significant disparities in exposure levels among countries, regions, and commodity categories (Boakyea et al., 2022). This observation is in line with the premise of the small open economy real business cycle (RBC) theory, which posits that various sectors or variables within the macroeconomy react diversely to external price shocks across countries. This is especially relevant for many exporting nations that specialize in and rely heavily on a limited number of commodities for their export revenue. Consequently, these economies with narrow export bases manage their domestic industries and utilize foreign exchange reserves derived primarily from one or a few key export commodities, which serve as their primary sources of income. As highlighted by Collier (2012), the dependence on commodities is intricately linked to the role of governments in low-income countries. Such economies predominantly depend on a small set of commodities for the majority of their export earnings (UNDP, 2015). According to the IMF (2015), 17% of global GDP originates from countries where non-renewable commodities account for over 20% of exports. Developing nations, in particular, rely heavily on primary commodities for their export revenues (Brown, 2008). For these economies, particularly those whose primary source of foreign exchange earnings stems from the export of primary commodities, fluctuations in commodity prices contribute to macroeconomic instability and complicate macroeconomic management. Unpredictable price fluctuations lead to unstable export revenues, volatility in foreign exchange reserves, and are closely correlated with fluctuations in economic growth. The higher the proportion of primary goods in a country's exports, indicating a greater dependence on commodities, the more vulnerable the economy is to commodity price shocks.

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resource curse, refer to Collier and Goderis (2007) and a literature review by Van der Ploeg (2006). Furthermore, the empirical evidence for the Dutch disease is quite mixed, as evidenced by Gelb (1988), Spatafora and Warner (1995), Rajan and Subramanian (2005), and Ismail (2010. However, the theoretical literature provides several explanations for this mixed evidence. Firstly, it may be attributed to weak and corruption-prone institutions (Mehlum et al., 2006). Secondly, it may be due to a lack of government accountability (Robinson et al., 2006). In addition to these political economy factors, other adverse effects of natural resources may manifest in some countries but not in others. Examples include the Dutch disease (Corden and Neary, 1982; Torvik, 2001), a decline in governance (Baland and Francois, 2000; Tornell and Lane, 1999; Torvik, 2002), conflict (Collier and Hoeffler, 2004), excessive borrowing (Mansoorian, 1991; Manzano and Rigobon, 2007), volatility (Sala-i-Martin and Subramanian, 2003), and lower levels of education (Gylfason, 2001).

However, the macroeconomic response to exported commodity(ies) price booms and busts are not the same, rather they are heterogeneous across the countries (IMF, 2016). Therefore, the macroeconomic response to commodity price soars and bursts depends mainly on two things; i) the structural characteristics of the economy and ii) the policy framework that is in place (Cespedes and Velasco, 2012). That is why in some instances, these price explosions and busts have translated fully—one-to-one—to exporting economies, while in other occasions they are partially translated to exporting commodities-dependent countries. Mendoza (1995) shows one-half of output variation, while Kose (2002) indicates that all output variation in developing economies is justified by terms of trade shocks. As it depends on the respective economy's structural characteristics and policy framework in place. Furthermore, countries that are more open to international trade are likely to experience a greater impact of terms of trade shocks on macroeconomic volatility, as these shocks directly affect the tradable sector of an economy (Beck et al., 2006; Cespedes and Velasco, 2012). Additionally, it has been noted that countries with less open capital accounts and more stable political systems tend to exhibit a more devalued real exchange rate (Cespedes and Velasco, 2012). While openness is expected to promote growth by enabling a country to capitalize on its comparative advantages and foster faster growth, in the short term, more open economies could also be more susceptible to shocks than less exposed economies (Imam and Minoiu, 2008).

Nevertheless, the impact of shocks may vary among countries due to differences in national economic institutions (Blanchard and Wolfers 2000), including an economy's exchange rate nature and the extent of financial sector development. On one hand, a real exchange rate depreciation seems to function as a shock absorber, potentially leading to a redistribution of expenditure, decreased imports, and increased exports (Imam and Minoiu, 2008). Within this framework, Broda (2004), Edwards and Yeyati (2005), and Cespedes and Velasco (2012) ascertain that the effect of a terms of trade shock on per capita income, output, and investment hinges on the exchange rate regime. The impact is less pronounced in countries with a floating/flexible exchange rate regime, as these more adaptable regimes are likely better equipped to manage terms of trade shocks than those with a fixed exchange rate regime.[45] Likewise, the adoption of a flexible exchange rate regime contributes to stabilizing and mitigating the impact of terms of trade shocks on an economy overall, particularly in terms of output volatility. Additionally, it has the potential to amplify the effects of terms of trade shocks on inflation and their influence on productivity growth

[45] In situations where relative prices adjust more quickly through the nominal exchange rate, this adjustment tends to counterbalance the adverse impact of shocks on output by enhancing external competitiveness. However, under a fixed exchange rate, the adjustment of relative prices may be slower, contingent on the rigidity of domestic prices, as the devaluation of the exchange rate can decrease real wages at a time when labor demand is expected to be low (Meade, 1951).

(Aghion et al., 2008; Andrews and Rees, 2009). Recent findings emphasize that the level of financial development exerts a non-linear influence on economic growth (Fung, 2009; Rousseau and Wachtel, 2011), output (Cespedes and Velasco, 2012; Shousha, 2016), investment (Cespedes and Velasco, 2012; Shousha, 2016), current accounts (Chinn and Ito 2007; Habib et al., 2012; Allegret et al., 2014), and credit (Cespedes and Velasco, 2012; Shousha, 2016). For example, Bernanke (2005) highlights that oil-producing countries and emerging market economies "bypass" their inefficient financial markets by exporting their surplus capital to countries with more advanced financial markets, contributing to a global "savings glut" which is connected to the Feldstein-Horioka puzzle literature.[46] Similarly, enhanced financial market development diminishes the impact of terms of trade shocks on macroeconomic volatility, primarily through household consumption (Andrews and Rees, 2009). The accumulation and reduction of foreign exchange reserves—attributable to commodity price booms and busts—play a significant role in smoothing the external adjustment process (Adler et al., 2018), real exchange rate appreciation/depreciation (Aizenman et al., 2012), and current account surplus/deficit (Habib et al., 2012; Allegret et al., 2014).

Equally, the proactive management of foreign exchange reserves influences the transmission of commodity price shocks to real exchange rates. Reserves are proposed to be seen as a means of "leaning against the wind," serving as an effective alternative to fiscal or currency policies for countries with relatively limited trade and economies with weaker institutions or high government debt. However, their effectiveness is more pronounced when utilized to bolster vulnerable currencies rather than to impede the pace of real appreciation. Consequently, reserve holdings serve as a crucial tool for smoothing the adjustment process in the domestic economy. Countries often rely on the accumulation or reduction of reserves as a strategy to alleviate the impact of significant shifts in terms of trade, particularly during periods of deteriorating terms of trade. Although, reserve holdings on the whole may not seem to have a role in the context of terms of trade upswings, they are observed to play a crucial part in smoothing the external adjustment process during periods of terms of trade fluctuations (Adler et al., 2018). Consequently, actively managing reserves not only significantly mitigates the short-term impact of CTOT shocks but also influences the long-term adjustment of the real exchange rate, effectively reducing its volatility. For example, the pace of reserve accumulation tends to dampen the appreciation/depreciation of the real exchange rate during periods of commodity price fluctuations (Céspedes and Velasco, 2012). Latin American economies have demonstrated that even modest

[46] Countries with well-developed financial systems are expected to have a strong correlation between saving and investment, leading to lower external imbalances.

increases in average reserve holdings can serve as an effective policy tool, akin to a fixed exchange rate regime, in shielding the economy from CTOT shocks (Aizenman et al., 2012).

The extent to which a terms of trade shock impacts output and economic growth is contingent on the quality of institutions (Rodrik, 1999; Jerzmanowski, 2006; Imam and Minoiu, 2008; Collier and Goderis, 2012). Consequently, well-functioning institutions play a crucial role in mitigating the severity of terms of trade shocks and enhancing a country's long-term growth by fostering sustained periods of rapid growth. On the other hand, commodity booms can result in inefficient government redistribution in exchange for political support, but this tends to occur only in countries with deficient government accountability (Robinson et al., 2006). Similarly, Mehlum et al. (2006) contend that resource rents attract unproductive lobbying and rent-seeking in countries with weak "grabber-friendly" institutions, while this is not the case in countries with strong "producer-friendly" institutions. Furthermore, the stability of the government also plays a crucial role during negative shocks, as demonstrated by Cespedes and Velasco (2012), who indicate that more stable political systems tend to diminish the impact of commodity price shocks on the real exchange rate and government expenditure. Conversely, less stable governments are inclined to prioritize remaining in power by avoiding necessary but costly adjustments, thereby heightening long-term economic uncertainty. For instance, sub-Saharan Africa has handled negative shocks less effectively than Asia, largely due to the instability of African governments (e.g., Rodrik, 1997). In general, external debt tends to move in opposition to the cycles of international commodity price booms and busts; however, this correlation is contingent upon the political institutions—such as democracies, autocracies, and so on—that are established in the debtor country. In this context, Arezki and Bruckner (2010) demonstrate that positive commodity price shocks result in a substantial reduction in the level of external debt and the risk of default on it, with no significant increase in government expenditure in democracies. Conversely, in autocracies, there is no significant reduction in the level of external debt, and both total government expenditure and the risk of default on external debt experience substantial increases. This is primarily due to autocracies directing the additional revenues from international commodity price surges and busts toward increasing government expenditures, while democracies allocate a significant portion of the windfalls to reducing their external debt.

Furthermore, improved terms of trade boost the purchasing power and potential income growth of exporting economies, while deteriorating terms weaken their financial position. High levels of government debt in such economies increase vulnerability to economic shocks, including fluctuating commodity terms of trade. Interest payments on debt divert resources from productive activities and social welfare programs, hindering long-term economic growth and resilience. Thus, favourable commodity terms of trade, coupled with moderate debt and countercyclical spending, can benefit exporting economies by managing debt, investing in productive sectors, and expanding social programs. This approach leads to higher economic growth and improved living standards. Additionally, countercyclical government spending, involving increased expenditures during economic downturns and reductions during periods of prosperity, can help alleviate the adverse effects of fluctuating terms of trade. This approach, by stimulating domestic demand amid unfavourable trade conditions, partially counteracts the decline in export earnings. In contrast, procyclical spending, which rises during economic upswings and falls during downturns, exacerbates the impact of volatile terms of trade, potentially resulting in heightened economic fluctuations and increased debt accumulation. Therefore, in situations of unfavourable commodity terms of trade, coupled with high debt levels and procyclical spending, there is a risk of detrimental consequences, including fiscal challenges, growing debt, and potential economic instability.

Although low commodity prices present clear challenges, high prices can also pose a dilemma, compelling countries and producers to decide between short-term gains and long-term sustainability. For example, countries like Algeria, Nigeria, and Venezuela have experienced difficulties due to overly buoyant spending practices during periods of high commodity prices. They have utilized current and anticipated profits to fund socially or politically driven projects. While such initiatives may seem feasible during commodity booms, they often become unsustainable when prices decline. Politicians find it challenging to reduce funding for these programs, leading to reliance on borrowed funds and increasing the country's debt burden (Brown et al., 2008).

2.1.2 Gap in the Literature

In the context of the competition between two crucial international trade variables with macroeconomic consequences in emerging and developing markets, namely the standard terms of trade (TOT) and the commodity terms of trade (CTOT), there is a substantial body of research that has investigated the impact of these variables on macroeconomic fluctuations. This research dates back to seminal works such as those by Harberger (1950), Laursen and Metzler (1950), Ostry and Reinhart (1992), Mendoza (1995), Kose (2002), Broda (2004), Agenor and Aizenman (2004), Edwards and Yeyati (2005), Raddatz (2007), Adler et al. (2018), and Boakye et al., (2022). Similarly, numerous studies have concentrated on the role of commodity terms of trade effects on macroeconomic fluctuations, including works by Spatafora and Tytell (2009), Aizenman et al. (2012), Cespedes and Velasco (2012), Collier and Goderis

(2012), Gruss and Kebhaj (2019), Boakye et al. (2022), and Lee (2023). Moreover, Furthermore, previous research has relied on commodity prices to capture external shifts in terms of trade or the broader impact of commodity price fluctuations on macroeconomic results. Several studies have utilized prices of specific commodities or indices of overall commodity price movements, including oil, metals, food, and agricultural raw materials. However, this method may not adequately represent terms-of-trade shocks. Firstly, few countries are so specialized that concentrating solely on one commodity price is satisfactory. Secondly, although commodity prices often exhibit simultaneous movement, the correlation among unrelated commodities is much lower than commonly assumed (Cashin et al., 2002). Lastly, there exists significant diversity in price fluctuations within comprehensive commodity categories. Consequently, even if a country specializes in a specific commodity category (e.g., metals), an overall price index is likely to inadequately represent the terms-of-trade shocks it encounters. Therefore, a common empirical challenge in this field is to identify exogenous shocks to the terms of trade. Utilizing standard measures such as the overall export-to-import price ratio for identification is nearly impossible, as they fail to exclusively capture changes in world prices (Chen and Rogoff, 2003). An alternative approach frequently employed in the literature is to rely on world prices of individual commodities, broad composite indices of commodity prices, or country-specific commodity price indices, often referred to as commodity terms of trade (Spatafora and Tytell, 2009; Aizenman et al., 2012).

However, all of these recent studies indicate that the evaluation of commodity price exposure depends on whether the standard terms of trade (TOT) or the commodity terms of trade (CTOT) are utilized as an exposure variable. It seems that the conclusion regarding commodity price exposure hinges on the variable employed to measure commodity exposure. Evidence suggests that commodity-exporting economies cannot be regarded as a homogeneous group of countries in terms of commodity market exposures. There are substantial numerical disparities in exposures among countries, regions, and commodity groups (Boakyea et al., 2022). This aligns with the premise of the small open economy real business cycle (RBC) theory, which posits that different sectors/variables of the macroeconomy respond diversely to various exogenous price shocks across countries, particularly considering that many exporting countries specialize and rely on only one or a few commodities for their exports. Thus, these narrow export dependent economies run its domestic industry and draw down foreign exchange reserves from this one or few major export commodity(ies) as this/they are one of the main income streams. As Collier (2012) emphasized, the reliance on commodities is closely connected to the significance of government in low-income countries. These economies primarily rely on a small number of commodities for the majority of their export earnings (UNDP, 2015). According to the IMF (2015), 17% of the world's GDP comes from countries where over 20% of exports are from non-renewable commodities. Developing countries, in particular, heavily depend on primary commodities for export revenues (Brown, 2008). For these nations, particularly those whose primary source of foreign exchange earnings comes from exporting primary commodities, fluctuating commodity prices contribute to macroeconomic instability and complicate macroeconomic management. Unpredictable price fluctuations lead to unstable export revenue, volatility in foreign exchange reserves, and are closely associated with growth volatility. The greater an economy relies on commodities—indicating a higher proportion of primary goods in a country's exports—the more vulnerable it is to commodity price shocks. Therefore, instead of the theoretically more pertinent country-specific measure of commodity price fluctuations that is contingent on the composition of the particular country's commodity export and import baskets, using standard TOT and CTOT as a commodity price exposure indicator in the era of frequently fluctuating commodity prices have triggered renewed interest because these previous commodity price exposure indicators do not capture and account the role of commodity dependence for especially producing and exporting economy(ies) in a major and broader level. The concern is not a minor one. Therefore, we argue that using the recently well-known CTOT index, along the lines of Spatafora and Tytell (2009) among others, but accounting and controlling for the strong and narrow export-dependent commodities' role in export-dependent economies to study the unexpected effects of world trade prices on the macroeconomic performance in only export-dependent economies. [47] We anticipate that this variable more accurately encompasses the impacts of commodity price fluctuations in export-dependent economies, in contrast to the standard TOT and CTOT index.

Second, as the macroeconomic response to exported commodities price booms and busts are not the same, rather they are heterogeneous across the countries (IMF, 2016) and depend mainly on two things; i) the structural characteristics of the economy and ii) the policy framework that is in place (Cespedes and Velasco, 2012). That is why in some instances, these price explosions and busts have translated fully to exporting economies, while on other occasions they have partially translated to exporting

[47] We typically classify commodity dependence into three categories: no dependence, commodity dependence, and strong commodity dependence (Nkurunziza, 2021). According to the United Nations Conference on Trade and Development (UNCTAD 2019) report on commodity dependence, a country is deemed commodity dependent if over 60% of its total merchandise exports comprise commodities during the period 2013–2017. However, we further refined this classification to encompass only two commodities that constitute at least 35% of its total merchandise exports. For more detailed information, please refer to the data and methodology section. Commodity dependence is usually evaluated based on (a) the proportion of export earnings from the top single commodity (or top three export commodities) in GDP, in total merchandise exports, and in total agriculture exports; (b) the percentage of people involved in commodity production; or (c) the contribution to government revenue (South Centre 2005).

commodities-dependent countries. Therefore, we investigate some of the key conditioning variable's role for the macroeconomic effect of our newly developed narrow dependent commodity terms of trade (NDCTOT). It means that what will be the impact of NDCTOT on macroeconomic variables in the presence of low, average and high levels of a country's conditional variables? For example, governance or institutional quality plays a crucial role. Better-functioning institutions help mitigate the severity of terms of trade shocks and enhance a country's long-term growth by fostering more sustained periods of rapid growth. Conversely, commodity booms result in inefficient government redistribution in exchange for political support, but this is only observed in countries where government accountability is deficient (Rodrik, 1999; Jerzmanowski, 2006; Robinson et al., 2006; Imam and Minoiu, 2008; Collier and Goderis, 2012). Otherwise, resource rents attract unproductive lobbying and rent-seeking in countries with weak "grabber-friendly" institutions, but not in countries with strong "producer-friendly" institutions (Mehlum et al., 2006). Additionally, the stability of the government also plays a crucial role during negative shocks, as more stable political systems tend to mitigate the impact of commodity price shocks on the real exchange rate and government expenditure (Cespedes and Velasco, 2012). This is because less stable governments are likely driven by the desire to remain in power by avoiding necessary but costly adjustments, thereby increasing the long-term uncertainty faced by the economy. For example, sub-Saharan Africa has managed negative shocks less effectively than Asia, precisely due to the instability of African governments (e.g., Rodrik, 1997).

Likewise, enhanced financial market development diminishes the impact of terms of trade shocks on macroeconomic volatility (Andrews and Rees, 2009). For example, the extent of financial development exerts a non-linear influence on economic growth (Fung, 2009; Rousseau and Wachtel, 2011), output (Cespedes and Velasco, 2012; Shousha, 2016), investment (Cespedes and Velasco, 2012; Shousha, 2016), current accounts (Chinn and Ito 2007; Habib et al., 2012; Allegret et al., 2014), and credit (Cespedes and Velasco, 2012; Shousha, 2016). Additionally, Bernanke (2005) highlights that oil-producing countries and emerging market economies "bypass" their inefficient financial markets by exporting their surplus capital to countries with more sophisticated financial markets, contributing to a global "savings glut" which is linked to the Feldstein-Horioka puzzle literature.[48] Similarly, proactive management of foreign exchange reserves influences the transmission of commodity price shocks to real exchange rates. Reserves are considered as a form of "leaning against the wind" and serve as an effective alternative to fiscal or currency policies for relatively trade-closed countries and economies

[48] Countries with more advanced financial systems are expected to experience a strong correlation between saving and investment, leading to reduced external imbalances.

with relatively weak institutions or high government debt. Equally the accumulation and decumulation of exchange rate reserves—due to the commodity price booms and busts—play a significant role in the smoothing of external adjustment process (Adler et al., 2018), real exchange rate appreciation/depreciation (Aizenman et al., 2012), current account surplus/deficit (Habib et al., 2012; Allegret et al., 2014). Additionally, the impact of shocks can differ among countries due to variations in an economy's exchange rate (Blanchard and Wolfers 2000). For instance, adopting a flexible exchange rate can help stabilize and mitigate the effects of terms of trade shocks on an economy overall, as well as on output volatility in particular. Additionally, it has the potential to magnify the impact of terms of trade shocks on inflation and productivity growth (Aghion et al., 2008; Andrews and Rees, 2009). Moreover, the impact on per capita income, output, and investment is less pronounced in countries with a floating/flexible exchange rate regime, as they are more likely to be better equipped to manage terms of trade shocks than those with a fixed exchange rate regime (Broda, 2004; Edwards and Yeyati, 2005; Cespedes and Velasco, 2012).[49]

Moreover, nations that have a higher degree of openness to international trade are likely to be more affected by terms of trade shocks in terms of macroeconomic volatility, as these shocks have a direct impact on the tradable sector of the economy (Beck et al., 2006; Cespedes and Velasco, 2012). Additionally, countries with less open capital accounts tend to have a more devalued real exchange rate (Cespedes and Velasco, 2012). It is expected that openness promotes growth by allowing a country to capitalize on its comparative advantages. However, in the short term, more open economies could also be more vulnerable to shocks than less integrated economies (Imam and Minoiu, 2008). Moreover, government debt and expenditure also play a role in this context. In general, external debt tends to move countercyclically with international commodity price booms and busts; however, this correlation is contingent on the political institutions—such as democracies, autocracies, etc.—that are established in the debtor country. In this context, Arezki and Bruckner (2010) demonstrate that positive commodity price shocks lead to a substantial reduction in the level of external debt and the risk of default on it (external debt), with no significant increase in government expenditure in democracies. Conversely, in autocracies, there is no significant reduction in the level of external debt, and both total government expenditure and the risk of default on external debt experience substantial increases. This is primarily due to autocracies allocating the additional revenues from international commodity price surges and

[49] In situations where relative prices adjust more quickly through the nominal exchange rate, this adjustment tends to counterbalance the adverse impact of shocks on output by enhancing external competitiveness. However, under a fixed exchange rate, the adjustment of relative prices may be slower, contingent on the rigidity of domestic prices, as the depreciation of the exchange rate can decrease real wages at a time when labor demand is likely to be low (Meade 1951).

bursts toward increasing government expenditures, while democracies retain a significant portion of the windfalls to reduce their external debt.

Third, to show the true picture of macroeconomic performance in narrow dependent exporting economies, rather than using a single macroeconomic performance variable i.e., GDP in most previous studies, we broaden this set of macroeconomic performance variables to eight important variables. Fourth, rather than employing some traditional econometric methods, used in previous literature, we used an econometrics method which may account for different econometrics problems like endogeneity, and heterogeneity among others to give us consistent, efficient, and robust results. Finally, we split our NDCTOT series into two new series, namely NDCTOT booms and NDCTOT busts, to reassess the entire analysis to investigate the macroeconomic reaction in terms of severity and scale.[50] Edwards and Yeyati (2005) present evidence of an uneven response to terms of trade shocks, indicating that the output response is more significant for negative shocks compared to positive ones. To explore this phenomenon, we conduct distinct regressions for these two newly created series and compare the outcomes between booms and busts. Each of these series is then subdivided based on varying threshold magnitudes. This approach represents a unique application in the realm of commodity exposure studies, which commonly utilize relatively smooth TOT and CTOT series.

2.1.3 Objectives of the Study

This study deals with the following objectives.

1. To investigate the effect of narrow dependent commodity terms of trade on macroeconomic variables like output, investment, unemployment, external balance, inflation, exchange rate, government expenditure, and income inequality.
2. To explore the role of conditional variables like governance/institutional quality, political stability, financial development, exchange rate flexibility, foreign exchange reserves, capital account openness, and government expenditure and debt for the effects of narrow dependent commodity terms of trade on the above-mentioned macroeconomic variables.

[50] Booms and busts in narrow dependent commodity terms of trade are explained in the data and methodology section.

3. To examine the comparative effect, in terms of severity and scale, of narrow dependent commodity terms of trade booms and busts (under two different thresholds) on the above-mentioned macroeconomic variables.[51]

4. To explore the role of above-mentioned conditional variables for the comparative effects of narrow dependent commodity terms of trade booms and busts on the above-mentioned macroeconomic variables.

We provide evidence that improvements in narrow dependent commodity terms of trade (NDCTOT) have a favorable impact on output, unemployment, external balance, exchange rate, government expenditure, and income inequality, while having unfavorable effects on investment and inflation. The positive effects of NDCTOT on output, government expenditure, exchange rate, inflation, unemployment, and income inequality are further enhanced by political stability and good governance, while conditional impacts on external balance are positive but diminish. However, the negative effect of NDCTOT on investment lessens with improved political stability. Additionally, a high debt burden diminishes the positive impact of NDCTOT on exchange rate, government expenditure, and income inequality. Moreover, exchange rate variations amplify both the negative and positive effects of NDCTOT on investment and inflation, respectively. Furthermore, foreign exchange reserves reduce the positive impact of NDCTOT on exchange rate appreciation and external balance, respectively. Similarly, capital account openness reduces the promising impact of NDCTOT on external balance, while increase in government size led to decrease income inequality. Equally, financial developments also diminish the negative and positive impact of NDCTOT on investment and output. Asymmetric results of NDCTOT reveal that the impact of NDCTOTBOOMS_25%, on these macroeconomic variables, except for inflation, is more favorable in terms of magnitude when compared to NDCTOTBOOMS_15%. On the contrary, the impact of NDCTOTBUSTS_25% is more unfavorable as compared to NDCTOTBUSTS_15%. As for inflation, the impact is more adverse during NDCTOTBOOMS_25% than during NDCTOTBOOMS_15%, and the impact is more favorable during NDCTOTBUSTS_25% than NDCTOTBUSTS_15%.

The remainder of the chapter is structured in the following manner. In section 2.2, we underline the previous works in this area, while section 2.3 explains the theoretical framework of the study. In addition, section 2.4, provides information regarding data and methodology. Moreover, section 2.5,

[51] We run separate regression for each narrow dependent commodity terms of trade booms and busts as an independent variable.

analyzes results and discussions, while in the last section, we conclude and suggest some policy(s) recommendations.

2.2 Literature Review

This essay aims to examine the macroeconomic effects of commodities price booms and busts and as well as explore the role of some conditional variables for the macroeconomic effects of commodities price booms and busts. So, in these surroundings, we offer a brief but comprehensive assessment of the available literature.

The standard theory of open economy macroeconomics suggests that external shocks to commodity prices have significant effects on both commodity-exporting and importing countries at the macroeconomic level. This is supported by various studies (Aguiar and Gopinath 2007; Bidarkota and Crucini 2000; Broda 2004; Drechsel and Tenreyro 2018; Fernández et al., 2017; Fornero and Kirchner, 2016; Kose 2002; Mendoza 1995; Roch 2019; Schmitt-Grohé and Uribe 2018; Shousha 2016; Agenor and Aizenman, 2004; Raddatz, 2007; Bhar and Hamori, 2008; Tsvetanov et al., 2016). Generally, the findings appear to be dependent on the methodology used. For instance, Schmitt-Grohé and Uribe (2018) have suggested that while the findings may differ around countries, terms of trade shocks would only account for about 10% of the macroeconomic fluctuations in developing economies (see also, Fernández et al, 2017). Australia, similar to third-world commodity exporters, has experienced regular and substantial commodity export price shocks, but these price fluctuations have had a much more moderate effect on economic performance (Bhattacharyya and Williamson, 2013). Additionally, Fernandez et al. (2017) integrate a commodity sector into a multi-country business cycle model for small emerging market economies and discover that the model's estimates attribute a significant role to commodity prices in explaining overall dynamics. On average, research from developing and emerging market economies indicates that these shocks account for less than 10% of the fluctuations in macroeconomic variables (Boakyea et al., 2022). On the contrary, Zeev et al. (2017) suggest that commodity terms of trade shocks may explain nearly half of the output fluctuations in Latin American economies. Similarly, Roch (2019) reports significant impacts, with estimates from a diverse panel model indicating that commodity price shocks can clarify up to 30% of the output fluctuations among Latin American countries. However, more open economies may also be more susceptible to shocks compared to relatively protected economies (Imam and Minoiu, 2008). For instance, terms of trade shocks are likely to produce a significant indirect impact on macroeconomic volatility and direct effects on the tradable sector of an economy in countries that are more open to international trade (Beck et al., 2006).

The empirical findings regarding the long-term influence of natural resources on economic growth are inconclusive. Some research suggests that resources can be a "blessing" (Alexeev and Conrad, 2009; Brunnschweiler and Bulte, 2008; Lederman and Maloney, 2007; Sala-i-Martin et al., 2004), while others argue that they represent a "curse" (Sachs and Warner, 1999, 2001; Gylfason et al., 1999; Sala-i-Martin and Subramanian, 2003). The theoretical literature offers various explanations for these conflicting findings. Firstly, the detrimental impacts of natural resources may be present in certain countries but not in others. For instance, Mehlum et al. (2006) contend that resource rents lead to unproductive lobbying and rent-seeking in nations with weak "grabber-friendly" institutions, but not in countries with strong "producer-friendly" institutions. Another explanation is provided by Robinson et al. (2006), who propose that commodity booms lead to inefficient redistribution by governments in exchange for political support, but this occurs only in countries lacking government accountability. Apart from these political economy channels, other adverse effects of natural resources may also be evident in some countries but not in others, including Dutch disease, governance deterioration, conflict, unnecessary borrowing, and lower levels of education. The extent to which terms of trade shock impact the domestic economy in general and economic growth in particular depends critically on the quality of institutions (Jerzmanowski, 2006) and their interactions with society (Rodrik, 1999). For example, negative terms of trade shocks are better addressed by well-functioning institutions (Imam and Minoiu, 2008; Rodrik, 1999) and countries with splendid governance (Collier and Goderis, 2012). Similarly, Mehlum et al. (2006) contend that resource rents result in unproductive lobbying and rent-seeking in nations with weak "grabber-friendly" institutions, but not in countries with strong "producer-friendly" institutions. Better institutions can embody the rule of law, reduce uncertainty, and stabilize governments, which may help decrease transaction costs and thus contribute to domestic economic recovery and growth performance.

The conflicting findings regarding the long-term influence of resources on growth may also arise from methodological issues that are common in much of the literature on resources. For example, Manzano and Rigobon (2007) show that the resource curse effect identified in the cross-sectional growth regressions of Sachs and Warner (1999) vanishes when using a panel and applying a fixed effects estimator to account for unobserved country characteristics. However, even when employing fixed effects, many of the proxies used for natural resource dependence or abundance are likely to be affected by endogeneity, making it difficult to interpret the estimated effects as causal. Brunnschweiler and Bulte (2008) emphasize that the proxy used by Sachs and Warner to measure resource dependence (the share of resources in GNP) is endogenous. They demonstrate that when instrumental variables are used for measuring resource dependence, its negative impact on growth disappears, while subsoil resource wealth (abundance) positively influences growth. Although the resource literature anticipates an uncertain effect of commodity booms on long-term growth, empirical studies by Deaton and Miller (1995) for Africa and Raddatz (2007) for low-income countries utilize vector autoregressive (VAR) models and discover that higher commodity prices significantly boost income in the short term. Commodity booms produce positive short-term effects on output, but conditional negative long-term effects. The detrimental long-term effects are confined to "high rent" and non-agricultural commodities. Nevertheless, countries with sufficiently good governance can mitigate these adverse long-term effects. This finding carries significant implications for non-agricultural commodity exporters with weak institutions, many of which are located in Sub-Saharan Africa. Considering that global commodity prices continue to surpass significantly those before the post-2000 boom and are likely to lead to strongly adverse long-term effects if past patterns persist, the recent surge in growth rates of Africa's commodity-exporting economies may be particularly deceptive (Collier and Goderis, 2012).

Commodity price booms present significant challenges for macroeconomic policy in commodity-producing nations. Fluctuations in commodity prices are frequently associated with macroeconomic instability. Mendoza (1995) calculates, using a small open economy real business cycle model, that approximately half of the variation in aggregate output in a sample of the G7 and 23 developing economies can be ascribed to terms of trade shocks. Similarly, Kose (2002) employs a comparable framework and determines that terms of trade shocks can account for nearly all of the variance in output in small open developing economies. Both Mendoza (1995) and Kose (2002) investigate the impact of terms of trade shocks by estimating a process for them and integrating it into a small open economy business cycle model to compute the variance of macroeconomic variables caused by these shocks. They compare it with the actual variance of the corresponding variable and find that at least 30% of macroeconomic fluctuations should be attributed to terms of trade shocks. There is abundant evidence in the literature showing a strong connection between commodity prices and simultaneous macroeconomic indicators such as GDP growth (Gargano and Timmermann, 2014; Hess et al., 2008). Commodity price shocks are substantial contributors to business cycle fluctuations in emerging countries, accounting for over 20 percent of output movements and more than 30 percent of investment movements in these economies. Furthermore, explicitly taking into account the impact of credit frictions in small open economies helps elucidate the varying effects of commodity price shocks between advanced and emerging economies (Shousha, 2016). On the contrary, Lubik and Teo (2005) estimate a

DSGE model for five developed and developing economies and determine that world interest rate shocks are the primary drivers of business cycles in small open economies, while terms of trade shocks are not significant. However, they acknowledge that their findings may be linked to the importance of incorporating a more comprehensive production structure to accurately capture the impact of terms of trade shocks on business cycle fluctuations, an issue addressed in this paper. Akinci (2013) illustrates that shocks to global financial risk are a crucial origin of business cycle fluctuations in emerging economies. Furthermore, the inclusion of global financial risk has a negligible effect on the global risk-free interest rate, although country spread shocks still represent a significant source of fluctuations in emerging economies.

Cespedes and Velasco (2012) provide empirical evidence using episodes of commodity price booms and busts, illustrating that commodity price shocks have a significant impact on output and investment dynamics, particularly with greater effects on investment in economies with less developed financial markets. Moreover, their evidence indicates that, for episodes preceding the 2000s, the presence of more developed financial markets alleviated the impact of commodity price shocks on credit. The empirical evidence tends to support the notion that more flexible exchange rate regimes better shield the economy from terms of trade shocks. For instance, under a flexible exchange rate regime, the output response is less pronounced to commodity price booms and busts (Cespedes and Velasco, 2012). A flexible exchange rate aids in stabilizing the economy in reaction to terms-of-trade shocks by allowing the nominal exchange rate to promptly adjust to the real shock in the presence of other nominal rigidities. Empirical evidence suggests that countries with fixed exchange rate regimes undergo substantial declines in real GDP in response to negative terms-of-trade shocks, as the real exchange rate depreciates slowly (Broda, 2004; Edwards and Yeyati, 2005). The empirical evidence generally supports the idea that more flexible exchange rate regimes provide better insulation for the economy against terms of trade shocks. For instance, Broda (2002) observes that in response to negative terms of trade shocks, countries with fixed exchange rate regimes undergo substantial and noteworthy declines in real GDP, while the real exchange rate depreciates slowly. Conversely, the opposite is true for countries with flexible exchange rate regimes. Edwards and Yeyati (2005) discover evidence suggesting that terms of trade shocks are magnified in countries with more rigid exchange rate regimes. They also present evidence of an asymmetric response to terms of trade shocks, with the output response being more pronounced for negative shocks than for positive shocks. Aghion et al. (2008) offer evidence that the impact of terms of trade shocks on productivity growth also depends on the nature of the exchange rate regime. They demonstrate that the impact is greater under a fixed exchange rate regime and close to zero under a flexible rate regime. Recent observations in commodity-exporting countries in Latin America indicate that real exchange rate depreciation has resulted in increased exports and a more significant reduction in imports, reflecting a shift in spending from foreign goods to domestic goods (IMF, 2017a). Specifically, the impulse responses demonstrate how real aggregate output and private investments improve as a result of favorable price changes, providing strong support for the evidence presented in (Roch, 2019; Boakyea et al., 2022). Furthermore, Fornero and Kirchner (2016) investigate the effects of commodity price shocks in small open commodity-exporting economies using both a structural VAR and a theoretical model, identifying expansionary effects of these shocks driven by the positive responses of commodity investment that spill over to non-commodity sectors. Recent research indicates that external price volatility, particularly in terms of trade volatility, has a negative impact on long-run growth (Fatas and Mihov 2006; Blattman et al., 2007; Koren and Tenreyro 2007; Poelhekke and Van der Ploeg 2007; Williamson 2008). Moreover, Blattman et al. (2007) report that between 1870 and 1940, the adverse effect of terms of trade volatility on economic growth was notably more pronounced in commodity-dependent Latin America, Africa, and Asia than in Australia, Canada, New Zealand, and the United States. However, they do not find any evidence to support the idea that terms of trade volatility significantly reduced long-run growth in the English-speaking European offshoots during the same period. The influence of commodity price shocks on investment tends to be greater for economies with less developed financial markets, and the presence of more developed financial markets alleviates the impact of commodity price shocks on credit (Shousha, 2016; Cespedes and Velasco, 2012). However, Caballero et al. (2008) and Mendoza et al. (2009), along with others, propose that differing levels of financial development in various regions may justify the emergence of global imbalances. Financial deepening can help achieve stabilization by eliminating borrowing constraints and encouraging precautionary savings through the establishment of a sovereign fund and the accumulation of foreign reserves. Additionally, it is anticipated that openness is beneficial for economic growth as it enables an economy to capitalize on its comparative advantages and should experience faster growth. The impact of terms of trade shocks on macroeconomic volatility is mitigated by greater financial market development, particularly through household consumption (Andrews and Rees, 2009).

The initial models of balance of payments (BOP) crises were pioneered by Krugman (1979). In these models, a BOP crisis is attributed to an inconsistent fiscal and monetary policy mix under a fixed exchange rate regime. The second-generation model, developed by Obstfeld (1996), examined the self-fulfilling prophecy resulting from the interaction of international investors and the monetary authority. The third-generation models focus on various financial frictions and banking issues, encompassing firms' foreign currency-denominated debt (Nakatani, 2014, 2017c) and banks' foreign currency-denominated debt (Nakatani, 2016), liquidity problems arising from collateral constraints (Caballero & Krishnamurthy, 2001), traditional bank runs triggered by the uncertain patience of depositors (Chang & Velasco, 2001), and moral hazard problems due to explicit or implicit government guarantees (Burnside et al., 2004; McKinnon & Pill, 1999). The fourth-generation model highlights the role of commodity price shocks in triggering balance of payments (BOP) crises. The analysis emphasizes that the effects of currency depreciation depend significantly on the responsiveness of each component of the BOP to the exchange rate. If net trade, particularly on the export side, is sensitive to exchange rates, the model suggests that a depreciation of the domestic currency can improve a country's external position and result in a more favorable outcome in terms of consumer welfare. Furthermore, the model illustrates that under a fixed exchange rate policy, authorities are limited in their ability to avoid foreign exchange (FX) rationing in response to the shock, leading to a shadow exchange rate premium for consumers. Adverse commodity price shocks can trigger balance of payments crises in resource-dependent economies. Governments often respond by intervening to prevent currency depreciation, as observed in the case of Papua New Guinea following the commodity price shocks of 2014. The findings indicate that the Marshall-Lerner condition holds for this resource-rich economy, suggesting that exchange rate flexibility may be viable. Using our calibrated model, we conduct a counterfactual simulation and find that with a flexible exchange rate, foreign reserves would have been 20 percent higher three years after the shock compared to the actual policy of exchange rate stabilization. Based on this, we advocate for the advantages of greater exchange rate flexibility (Nakatani, 2018).

Beginning with Harberger (1950) and Laursen and Metzler (1950) in their influential investigations, it was demonstrated that an adverse shock to the terms of trade would negatively impact the current account. Subsequently, Ostry and Reinhart (1992) uncovered that terms of trade shocks have a significant effect on the current account. Charnavoki and Dolado (2014) employed the approach of Kilian (2009) to identify the key global shocks influencing global commodity prices through a dynamic factor model framework. Their research revealed that a rise in commodity prices consistently leads to a positive impact on external balances and commodity currency effects. However, they also observed that a Dutch disease effect in the Canadian manufacturing sector is only evident when the increase in commodity prices is linked to a negative global commodity-specific shock at business cycle frequencies. Additionally, in the case of a balance of payment crisis, exchange rate flexibility may be viable. For instance, in feedback to negative terms of trade shock, foreign reserves would have been 20% higher 3 years after the shock with a flexible exchange rate, compared to the actual policy of exchange rate stabilization Nakatani, 2018). Additionally, while reserves at large may not appear to perform a substantial role in the context of terms of trade surges, they are observed to be important in smoothing the external adjustment process during terms of trade bursts (Adler et al., 2018). It is also expected that the depth of the financial system may affect the response of the current account to internationally traded commodity price changes. While current accounts are positively impacted by commodity prices such as oil variations (Allegret et al., 2014), this outcome is nonlinear and changes significantly on the level of financial development, international financial market integration, and the management of foreign exchange rate reserves (Habib et al., 2012). Hence, a well-established financial system could alleviate the favorable effect of commodity prices on the current account (Allegret et al., 2014).

A decline in commodity prices, which affects the terms of trade, can present a challenge to the sustainability of a (de facto) fixed exchange rate regime, although the current literature has not extensively addressed such shocks. Early studies on exchange rate determination and forecasting indicated that real exchange rate dynamics are well represented by a random walk process, and the behavior of commodity prices tends to have a significant impact on the adjustment of the real effective exchange rate (RER) towards equilibrium. Several researchers have explored the implications of commodity price characteristics for the dynamics of RER in developed countries (Amano and van Norden, 1995; Chinn and Johnston, 1996; De Gregorio and Wolf, 1994; Froot and Rogoff, 1995; Mark, 1990; Ostry and Reinhart, 1992). They identified a strong connection between the real effective exchange rate (REER) and movements in commodity prices, and established that the behavior of commodity prices is a significant factor in long-term deviations from the purchasing power parity (PPP) hypothesis. These investigations contributed to the development of the commodity currencies hypothesis, which posits that commodity prices are important indicators of the currencies of commodity-exporting nations. Subsequently, the literature on the relationship between commodity prices and exchange rates can be classified into two main research streams. Frankel (2010) proposes a monetary policy framework for small countries where a single commodity constitutes a substantial portion of national production and exports, aiming to stabilize export prices in domestic currency by targeting the domestic currency price of exports. The recent decrease in global commodity prices, coupled with the increasing financialization of commodity markets, has sparked renewed interest in the influence of terms of trade and primary commodity price shocks on the REER for net commodity-exporting countries (Aizenman et al., 2012). The active management of international reserves impacts the transmission of international price shocks to real exchange rates, offering evidence that active reserve management reduces the short-term impact of terms of trade shocks on the real exchange rate and influences its long-term adjustment. Additionally, even modest increases in the average reserves held by Latin American economies could serve as a policy tool as effective as a fixed exchange rate regime in shielding the economy from terms of trade shocks (Aizenman et al., 2012). Adler and Mora (2011) observe that sterilized interventions can moderate the pace of currency appreciation, but their effectiveness diminishes rapidly as capital account openness increases. They also highlight that interventions seem to be more effective when there are indications that the currency may already be overvalued. Moreover, less open capital accounts tend to mitigate the real exchange rate appreciation or depreciation during periods of commodity price booms or busts (Céspedes and Velasco, 2012). However, the impact of negative or positive shocks may vary across countries due to changes in national economic institutions, such as exchange rate and monetary policy regimes, as well as the level of financial development and labor market flexibility (Blanchard and Wolfers, 2000).

De Gregorio and Labbé (2011) developed a dynamic stochastic general equilibrium model for a small open emerging-market economy to examine the effects of a commodity price shock on economic activity. They found that a monetary policy rule linking the interest rate to exchange rate movements during a commodity price shock tends to reduce export volatility but increases overall output and inflation volatility. They also suggest that combining a monetary policy rule targeting inflation with occasional exchange rate interventions can result in more stable inflation and output dynamics. Commodity price booms and busts present multifaceted challenges for determining the long-run adjustment of the REER to ensure macroeconomic equilibrium (Ricci et al., 2013). Recent studies have demonstrated that primary commodity markets significantly account for real exchange rate movements (Ayres et al., 2020). The literature on commodity currencies emphasizes that commodity price developments lead REER dynamics, particularly focusing on developed or emerging commodity-exporting countries (Antonakakis and Kizys, 2015; Lof and Nyberg, 2017). Firstly, it has been emphasized that the reaction of the REER to terms of trade shocks is asymmetric: long-term real appreciation is more pronounced for positive shocks than for negative ones, while negative terms of trade shocks cause the REER to depreciate in the short term. Secondly, the asymmetric responses of the REER vary across commodity subgroups and appear to be more significant for energy-exporting countries. Lastly, it has been demonstrated that energy and metal commodity-exporting subgroups are more susceptible to long-term real appreciation compared to countries exporting soft commodities such as agricultural and food and beverage commodities. As a key policy implication, there is a need to address the loss of external competitiveness associated with real appreciation by coordinating monetary and fiscal policies to effectively absorb additional foreign reserves and ensure an equilibrium exchange rate level, which will promote macroeconomic stability in primary commodity-exporting countries (Kassouri and Altıntas, 2020). Most notably, research has shown that a positive commodity price shock leads to an appreciation of the real exchange rate, making these economies more competitively priced in terms of foreign goods (Boakyea et al., 2022). Furthermore, our study reveals that the pace of international reserve accumulation tends to mitigate the appreciation of the real exchange rate during commodity price booms and busts. Despite the initial impression that less flexible exchange rate regimes must accumulate international reserves to maintain parity, our findings hold even when controlling for the flexibility of the exchange rate regime, indicating an independent role for reserve accumulation. Additionally, countries with less open capital accounts and more stable political systems tend to exhibit a more depreciated real exchange rate. Interestingly, our results indicate that the impact of commodity price shocks on the real exchange rate is diminished when the political system is more stable (Cespedes and Velasco, 2012).

Furthermore, De Gregorio et al. (2007) provide evidence of a decrease in the transmission of international oil prices to the overall price level, attributing this decline to various factors including reduced oil intensity of economies, diminished exchange rate pass-through, a more conducive inflation environment, and robust global demand. Chen (2009) examines 19 industrialized countries and identifies a notable decrease in the average pass-through, associating it with changes in monetary policy, nominal exchange rate behavior, and increased trade openness. Additionally, flexible exchange rates have the potential to alleviate the impact of terms of trade shocks on inflation (Andrews and Rees, 2009). Neely and Rapach (2011) investigate international inflation rate movements across 64 countries, discovering that global and regional factors contribute significantly to annual inflation variability. Another line of research has shifted its focus from modeling oil price shocks as exogenous to exploring the underlying shocks that drive these prices (Bodenstein et al., 2011; Charnavoki and Dolado, 2012; Kilian, 2009; Lippi and Nobili, 2012; Nakov and Pescatori, 2010). Similarly, Unalmis et al. (2012) examine the influence of a speculative storage demand shock and evaluate how various demand and supply shocks change in the presence of oil storage facilities. The analysis indicates that economies with higher food shares in the consumer price index (CPI) baskets, fuel intensities, and pre-existing inflation levels were more susceptible to sustained inflationary effects from commodity price shocks. Additionally, countries with more independent central banks and higher governance scores seem to have better contained the impact of these shocks. However, the effect of the presence of inflation-targeting regimes appears modest and was not evident during the 2008 food price shock (Gelos and Ustyugova, 2017). Commodity terms of trade resulted in increased prices of consumer goods (inflationary effects) and a significant reduction in private consumption (Boakyea et al., 2022).

The Nigerian economy heavily relies on crude oil exports, accounting for 60% of fiscal revenue and over 90% of export revenue, driving government spending to support growth-enhancing fiscal investments and expenditures (Okunoye and Hammed, 2020). Anecdotal evidence suggests that oil price shocks have dual microeconomic impacts, affecting various economic indicators through fiscal and export channels (Darma et al., 2021). Gylych et al. (2020) demonstrated that oil revenue enhances economic growth through increased budgetary expenditure in Nigeria. Okunoye and Hammed (2020) identified significant impacts of oil price shocks on inflation rates, oil revenue, and government spending, with government revenue showing less variability compared to oil revenue and interest rates. Oil price shocks have a greater effect on inflation than the monetary policy rate, leading to recommendations for complementary fiscal and monetary policies to reduce economic stabilization distortions, focusing government expenditure on non-oil revenue rather than oil exports. Omotosho (2020) highlighted the persistent and significant effects of oil prices on output, with fuel subsidies mitigating negative shocks by reducing inflation and exchange rate depreciation in the short term. However, removing fuel subsidies can lead to increased macroeconomic instability, necessitating targeted safety nets and sustainable adjustments to enhance monetary policy effectiveness. Darma et al. (2021) found a direct and substantial relationship between oil prices, government spending, and economic growth, with the exchange rate and export channels acting as intermediaries for transmitting oil price shocks. The study also confirmed the presence of the Dutch Disease in Nigeria. Given global energy decarbonization trends, experts recommend shifting focus from oil revenue dependence to implementing bold reforms that promote diversification and sustainability in fiscal and export revenues, supported by private sector initiatives.

On the flip side, Lane and Tornell (1998) and Tornell and Lane (1999) suggest that revenue windfalls resulting from favorable terms-of-trade shocks are expected to trigger a disproportionate rise in fiscal redistribution in nations with inadequate legal-political frameworks. Furthermore, Robinson et al. (2006) contend that the absence of government accountability during periods of high commodity prices could lead to inefficient revenue distribution for political purposes. Sokoloff and Engerman (2000), on the other hand, highlight how resource endowments influence inequality through institutional evolution. Institutions may require time to yield tangible outcomes (Imam and Minoiu, 2008). The effect of commodity price fluctuations on the domestic economy may vary based on the characteristics and context of political systems. More stable political systems are likely to mitigate the effects on government spending by focusing on non-traded goods more intensively (Céspedes and Velasco, 2012). Conversely, less stable governments may shy away from necessary but costly adjustments in the short term to avoid jeopardizing their hold on power, leading to economic uncertainty in the long run. For instance, compared to Asia, sub-Saharan Africa has been less adept at managing adverse shocks due to the fragility of its governments, which hampers their ability to make sound long-term economic decisions like reducing budget deficits or devaluing currencies (Rodrik, 1997). Additionally, exchange rate flexibility plays a vital role in absorbing the impact of booms by encouraging higher spending of income windfalls from terms of trade. However, its significance appears diminished during periods of trade downturns (Adler et al., 2018). Céspedes and Velasco (2012) have shown that countries with more stable political systems incline to lessen the effects of commodity price shocks on government expenditure.

The 2008 Economic Report of the President suggests that increases in imports are not directly correlated with a higher unemployment rate. It highlights that shifts in consumer preferences, domestic competition, and advancements in productivity play a notable role in shaping labor market dynamics, which can produce effects akin to those of import competition. The study "International Trade and Unemployment: Towards an Investigation of the Mohlar et al., (2018) underscores that although Switzerland's relative unemployment rate is not exceptionally high in absolute terms, the country ranks mid-way among OECD nations. The study seeks to elucidate individuals' employment statuses over time by analyzing fluctuations and levels of imports and exports while taking into account various individual traits and industry-specific factors.

Higher commodity prices can have dual effects on income inequality. On one hand, they can help reduce income inequality by boosting demand for (low-skilled) labor and consequently raising wages, leading to a more equal income distribution. Conversely, commodity price shocks can worsen inequality by creating rents that are typically captured by a select few individuals, often those who are already affluent. Previous studies have pointed out that natural resource rents can widen the wealth gap between the rich and the poor, causing a deterioration in income distribution (Ross, 1999; Kim and Lin, 2018). Research suggests that commodity price shocks do impact income inequality, with the extent of this impact varying based on the type of commodity and the existing inequality levels (Mohtadi and Castells-Quintana, 2021). Scholars in political economy argue that natural resources can significantly shape income distribution through institutional channels (Engerman and Sokoloff, 2012; Acemoglu and Robinson, 2006, 2012; Acemoglu et al., 2005). They suggest that natural resources influence the initial wealth and income distribution, there by impacting economic power. This distribution of economic power subsequently shapes future institutions and policies, potentially perpetuating income and wealth inequality in the long term. Studies employing neoclassical and growth models have demonstrated that reliance on natural resources can exacerbate inequality and hinder growth in cross-sectional data (Gylfason and Zoega, 2003; Goderis and Malone, 2011). They argue that resource booms may have a negative short-term effect but no lasting impact. Conversely, other research outlines strategies to mitigate inequality in resource-rich nations (Ross, 2007). Bhattacharyya and Williamson (2013) suggest that a sustained rise in renewable resource prices (like wool) decreases inequality, whereas a similar increase in non-renewable resources heightens inequality. This asymmetric outcome is believed to be explained by the primary allocation of land and mineral resources.

2.3 Theoretical Framework of the Study

This section builds on the reliance of those developed and developing countries that are vulnerable and heavily dependent on very few commodities for production and export along with the problems associated with such a narrow and heavy reliance, especially at the time of positive and negative export commodity price shock(s) or booms and busts.

Understanding how these fluctuations in major export commodities affect domestic macroeconomic variables is crucial for designing and implementing macroeconomic policies in both industrialized and developing countries. Therefore, the transmission mechanism of export price shock(s) to the domestic economy at the micro-level can be examined in terms of i) firms or the private sector, ii) the household sector, iii) the financial sector, and iv) the public sector. However, at the macro level the transmission mechanism is explained in three main sectors that are i) fiscal ii) monetary and exchange, and iii) financial. For an economy to recover from these commodity price shocks, it needs to be adaptable, with resources swiftly reallocated to manifest the new relative prices. Challenges inside the private sector, banking system, and public sector, along with suboptimal responses from economic agents and the government, be able to help describe part of this puzzle. In most economies reliant on primary products, public sector finances often depend to some extent on the performance of the natural resources sector. In these countries, a significant portion of total government revenue can come from royalties paid by foreign firms for exploiting domestic natural resources, taxes on profits from such exploitation, or directly from profits generated by publicly owned enterprises in the natural resources sector. Therefore, given the above situation, in the real world, we are facing three types of situations regarding the production and exportation of commodity(es) to the international market, that is commodities are produced by i) the private sector as a whole, ii) the wholly solely by government/public sector and iii) produced by a public-private partnership. Compared to the last two cases the first one is most often prevailing as a real-world example; therefore, we analyzed it, and the remaining two cases are left aside as they are found very negligible in the practical world.

The transformed positive/negative commodity price shock to the domestic economy can lead to increased/decreased overall public and private investment (Van der Ploeg and Poelhekke, 2009). The subsequent sustained increase/reduction in the quantity and quality of investments can have a positive/negative effect on a country's development by boosting/dampening the trend in economic growth. That is, a positive/negative export price shock led to better-off/worse-off the past investments, which may or may not no longer be profitable—particularly in the export sector—as the ratio of export prices to import prices rises/declines and so the real returns of producers—relative to consumer prices—for a predetermined level of inputs—as the marginal product of factors in the exportable sector grows/diminishes. Hence, the firm's revenue and profits increase/contracted in that period as the value of currency increase/decline—because real exchange rate increased/fell. Thereby, the investor may have a stimulus to increase/reduce the capital stock. In addition to that the rising/declining ratio of export prices to imports prices create a spending effect and a resource-movement effect (Cordon, 1984) which may in turn, increase/decrease in countrywide wealth and henceforth high/lesser demand for both tradables and non-tradables. As a result, both these effects increase/dampen investment, employment, and hence output. However, the net effect is depending on the spending effect and a resource-movement effect as well as on the consumption-investment assessments of economic agents, both domestically and abroad, coupled with the nature of shock(s)—temporary or permanent. Meanwhile, the exogenous positive/negative export price shock may create and produce stability/uncertainty and safety/risk regarding the tradable as compared to non-tradable in such an extent that investment becomes attractive/unattractive—as the former are often considered to be less/more productive than the latter as a long-term income growth—for a given level of risk. Therefore, industry-specific capital and skills associated with a particular industry will only increase when uncertainty decreases.

On a household level, farmers and laborers rely on commodity production for the cash incomes they need to meet expenses like food, school fees, and healthcare. Therefore, unexpected, say, negative commodity price shocks can significantly sacrifice millions of jobs loss and can cause farmers' crops almost worthless in all at once (Brown et al., 2008). The non-stop fall of commodity price lead producers' incomes diminish day by day. Consequently, the subsistence and small scale producers are vulnerable and they are affected the most by fall into the group of poverty, since they have scarce resources and social protection programmes. Therefore, existing employed household individuals in the concerned industry may face layoff problem i) if firm shut down some of its unit(s) and ii) decline in real wage—due to uptick in the general price level. They may possibly meet to the difficulty of increased level of inflation due to decline in currency value—if flexible exchange rate regime—which in turn eat away the purchasing power of currency. Consequently, household's real income and savings drain off which in turn lead to decline in consumer welfare. So, some or all of the household may alter the composition of consumption bundles due to adjustments in relative price of domestic and foreign goods production—a spending effect and a resource-movement effect (Cordon, 1984). However, the effects on household sector depends on the nature of shock(s) whether it is perceived or anticipated as a permanent or temporary shock(s).

Furthermore, commodity export price shocks can directly impact the public sector, either because the government directly owns the commodity or indirectly through changes in tax revenue due to shifts in economic activity. For example, many commodity-dependent countries exhibit pro-cyclical patterns of fiscal spending (Cuddington, 1989; Talvi and Vegh, 2005; Humphreys et al. 2007; Sinnott, 2009; among others). This amplifies the effects on investment, consumption, employment, output, and economic growth (Gangelhoff, 2015). Governments tend to save little or even dissave during economic booms, leading to pronounced procyclicality, particularly in Latin America (Gavin et al., 1996; Gavin and Perotti, 1997; Stein et al., 1999), OECD countries (Arreaza et al., 1999; Lane, 1998, 2003; Talvi and Vegh, 2005), and developing countries (Ilzetski and Vegh, 2008). However, conventional economic theory suggests that fiscal spending should be countercyclical. According to Barro's neoclassical smoothing model (1979), governments should ideally run surpluses in good times and deficits in bad times.[52] One major reason for such procyclicality is the significant reduction or increase in public revenue resulting directly or indirectly from lower or higher commodity prices. Direct effects often manifest through reductions or increases in royalties and other direct taxes, as well as declines or rises in the revenues of public firms exporting such commodities. Indirect effects occur through reduced or increased taxes on economic activity, such as value-added tax (VAT) or income tax, especially concerning firms, as personal income tax collection tends to be low in many developing countries. Therefore, the narrowly commodity-dependent exportable countries are very exposed to volatile commodity prices that may fluctuates fiscal revenues and so imbalances in government spending capacity (Nkurunziza et al., 2017). The negative or positive revenue effects create and generate further effects for the governments. That is in a negative price shock, governments are often to cut back on spending as they are unable to borrow the requisite funds. For instance, number of commodity

[52] If, of course, the fluctuations are expected to be temporary, not permanent.

dependent developing countries also experienced a worsening of their public finances, since the correspondence of fall out in commodity prices after 2011, which in turn increase their public debt. As export commodity dependent countries are extremely exposed and susceptible to debt unsustainability (UNCTAD 2002) may lead to enlarge external borrowing cycles (Brown et al., 2008). Similarly, A more persistent and perpetual decrease in commodity prices threatens the debt sustainability positions and escalate the debt service to export earnings ratio. Hence, in export commodity-dependent countries without well-established domestic public debt markets, and where the private sector often cannot directly access international capital markets, such a surge in public debt leads to upsurge in their external debt. However, in contrary situation, there always exist pressure on governments to spend the windfall gains, although ideally, they should save it. However, the interactions and effects are dependent on the nature of commodity exports price shock(s)—temporary or permanent.

Similarly, commodity price booms and slumps generate fluctuation in real exchange rates (Ocampo, 2017). For instance, in a context of commodity price burst foreign exchange currency decline due to fall in exports revenue and so government revenues swell to finance fiscal deficits. As a result, exchange rate depreciates abruptly and concomitantly capital outflows and there follows high inflation, due to exchange rate pass-through (Pinshi and Sungani, 2018). In response the volatility in real exchange rates lead to damaging physical investment and the accumulation of human capital and the effects from learning by doing (Gylfason et al., 1999).[53] These interactions and behaviour of exchange rate may produce negative effects on the balance of payments and hence on the current account. Therefore, there exists pressure on current account to deteriorate from one state to another. In tandem, low level of foreign exchange reserves in government bags in turns put downward pressure on exchange rate to depreciate if flexible exchange rate regime is applied. While on the fixed exchange rate regime, as government must need to maintain its currency—on some pre-specified level of exchange—through putting foreign exchange reserves—US dollar—into the market which further decrease foreign exchange reserves and put more pressure on the current account to further deteriorate. However, in a broader context the net impact on current account is dependent on the nature of commodity's exports price shock(s) i.e., temporary, or permanent. Moreover, in response to adverse shock(s), rational agents will borrow from abroad to smooth out its consumption pattern which may further worsening the current account. More specifically, on the agents' consumption-saving decision (Harberger, 1950; Laursen and Metzler, 1950), nature of capital mobility, price flexibility or rigidity and market structure i.e.,

[53] May be called as Dutch disease or "the failure of commodity-abundant economies to promote a competitive manufacturing sector" (Sarraf and Jiwanji 2001, p. 3).

competitive or imperfect (Svensson and Razin, 1983; Obstfeld and Rogoff, 1995; Chia and Alba, 2005). However, during commodity price surge, exports revenues and capital inflows lead to increase foreign exchange reserves and hence exchange rate appreciations which creates two effects simultaneously; that is making of non-primary exports less competitive while make imports cheaper as a result decline in the former and a rise in the latter (for detail discussion, see the model by Corden and Neary,1982), and as a result it creates implications for balance of payments. Meanwhile, increases in foreign currency led to increase money supply and money demand and hence uptick in inflation. The fall in commodity prices also deteriorate external position and the broading of the budget deficit.

Moreover, the commodity price bursts dwindle the financial sector by upsurging the probability of a financial system crisis (Kinda et al., 2016). On the one hand, the decrease in output of commodity-exporting firms has impacted banks and companies, that have taken off bank loans, to find themselves struggling to meet the time of the contract as the real returns of financial institutions dropped. As a result, there was an accrual of defaults, a swell in obligations, and a decline in the profitability conditions of banks. The deterioration of bank liquidity led to credit rationing by banks. Additionally, banks experienced a decrease in deposits due to the unexpected loss of government revenues and a decline in corporate profits, which compelled banks to draw down their deposits and loans (Christensen, 2016). Furthermore, the depreciation of the exchange rate and the escalation in prices prompted households to extract their bank deposits to meet their needs, further reducing bank credits and leading to an increased interest rate, thus deteriorating the health of the financial system (Agarwal et al., 2017). Overall, these activities collectively led to less fund's savings and fewer investment funds available in parallel with high rate of interest. Therefore, output will decline further, and hence economic growth and economic development will also go down. Meantime, as compared to foreign assets holding, real return on domestic assets holding also fall. Therefore, assets holding household investors may start to purchase and hold foreign assets which in turn transfer domestic savings to foreign exchange markets on the one end, while on the other end foreign direct investment may divert to more profitable and to well-paid rate of returned providing economies. As a result, credit availability for investment falls further which in turn lead employment to decreases and so consequently output decline which have consequences for balance of payment and so for current account.

Role of Conditional/Moderating/Extraneous Variables at the time of Transmission of Export Commodity Price Shock to Export Dependent Economy

How rigorously terms of trade shocks alter the domestic economy in general and economic growth in specific is critically dependent on institutions' quality (Jerzmanowski, 2006) and their interactions with society (Rodrik, 1999). For instance, negative terms of trade shocks are better addressed by well-functioning institutions (Imam and Minoiu, 2008; Rodrik, 1999) and good governance countries (Collier and Goderis, 2012). Likewise, Mehlum et al. (2006) contend that resource rents attract unproductive lobbying and rent-seeking in nations with weak "grabber-friendly" institutions, but not in countries with strong "producer-friendly" institutions. As better institutions fully materialize the rule of law, reduce uncertainty, and stabilize governments which may help to decrease transaction costs and hence help in domestic economic revivals and growth performance. Nevertheless, it is anticipated that revenue windfalls resulting from favorable terms-of-trade shocks will result in a disproportionately higher increase in fiscal redistribution in countries with delicate legal-political institutions (Lane and Tornell, 1998; Tornell and Lane, 1999). Additionally, the lack of government accountability and commodity price booms guide the government to redistribute revenues inefficiently for political gains (Robinson et al., 2006). Sokoloff and Engerman (2000) rather emphasize how resource endowments impact inequality through the development of institutions (Goderis and Malone, 2011). Although, institutions may take some time to solely materialize their results (Imam and Minoiu, 2008).

In response to commodity price shock, the cyclicality of external debt is conditional on the placed political institutions of the debtor country. That is, external debt went countercyclically in democracies while a cyclically in autocracies. For example, commodity price booms significantly reduce the level of external debt in democracies as hefty share of windfalls are used to diminish external debts as a result government expenditure do not increase in this period, however, in autocracies there has no substantial decrease in the level of external debt due to sizable spent of windfall revenues which in turn increase total government expenditure. Moreover, in democracies, the windfall gains from commodity price booms lead to decrease the risk of default on external debt but increased significantly in autocracies. This is because political leaders in democracies are more easily held accountable to the public and are more responsive to the demands of the majority compared to autocratic leaders (Bruckner and Arezki, 2010). Autocratic leaders, being less accountable to citizens, allocate a significant portion of the windfalls to government expenditures, thereby creating discretionary space for abusing public office for private purposes. Similarly, in the autocratic setup the government expenditure may not be administered transparently as reducing external debt is not a clear-cut policy, while in the democratic system plunging external debt is a vibrant and obvious policy that will be linked to lower taxes on future investment projects. Therefore, rather than spending the windfall revenues to increase the government expenditure, it is used to reduce external debt, should be the desired strategy of most citizens, and thus by the median voter (Collier and Goderis, 2012).

Similarly, the entrance of commodity price booms and busts and their effects on domestic economy may depend on the nature and environment of political systems. That is, more stable political systems tend to exhibit and reduce, for example, the real exchange rate appreciation and depreciation in episodes of commodity price booms and busts, respectively (Céspedes and Velasco, 2012), along with a reduced impact on government expenditure in a more intensive non-traded goods (Céspedes and Velasco, 2012). However, less stable governments are more likely to avoid necessary costly adjustment events in fear of losing government in the short run, that in turn creates economic uncertainty in the long run. For example, in fear of being ousted from the government sub-Saharan Africa has managed shocks less well in comparison to Asia due to the uncertainty of African governments, which in turn they were impotent to make accurate long-term economic decisions, whether that might be slicing the budget deficit or undervaluing the exchange rate (Rodrik, 1997).

Theoretical and empirical studies have highlighted the significance of exchange rate regimes. In theory, a flexible exchange rate regime can mitigate the impact of terms of trade shocks by allowing the nominal exchange rate to adjust immediately to real shocks, especially in the presence of nominal rigidities. This implies that during an unfavorable terms of trade shock, a country with a flexible exchange rate can adjust through currency depreciation, thereby improving external competitiveness and offsetting the shock's negative effects on output. While under a fixed exchange rate regime, the economy tends to experience prolonged periods of instability as it waits for nominal wages and goods' prices to adjust. In countries with fixed exchange rates, the adjustment of relative prices may be sluggish, particularly depending on the stickiness of domestic prices. Moreover, if nominal wages are rigid, a depreciation of the exchange rate can lead to a decrease in real wages, especially when labor demand is weak (Meade 1951). Empirical evidence generally indicates that more flexible exchange rate regimes tend to better protect economies from terms of trade shocks. For instance, Cespedes and Velasco (2012) found that under a flexible exchange rate regime, the output response is smaller during commodity price booms and busts. Moreover, studies by Edwards and Yeyati (2005) and Broda (2004) suggest that compared to a flexible exchange rate regime, a fixed exchange rate regime leads to a much larger cumulative reduction in real GDP following an adverse terms of trade shock. Aghion et al. (2008) also demonstrate that the impact of terms of trade shocks on productivity growth is greater under a fixed exchange rate regime, while it is close to zero under a flexible exchange rate regime. Flexible exchange rates also have the potential to mitigate the impact of terms of trade shocks on inflation (Andrews and Rees, 2009). Moreover, exchange rate flexibility can be beneficial in cases of balance of payment crises. For instance, Nakatani (2018) suggests that in response to a negative terms of trade shock, foreign reserves would have been 20 percent higher three years after the shock under a flexible exchange rate regime compared to the actual policy of exchange rate stabilization. Additionally, exchange rate flexibility plays a crucial role in absorbing shocks during economic booms, as expenditure switching leads to increased spending of the income windfall from terms of trade. However, its significance appears to be lower during periods of terms of trade downturns (Adler et al., 2018).

Equally, the vigorous managing of foreign exchange reserves affected the transmission of commodity price shocks to real exchange rates. It is suggested that reserves could be viewed as "leaning against the wind" as effective substitute to fiscal or currency policies for comparatively trade-closed countries and economies with fairly poor institutions or towering government debt. However, it would be more effective to intervene in strengthening fragile currencies rather than intervening to slow down the pace of real appreciation. Therefore, reserve holdings were used as a key tool for smoothing out the adjustment process in the domestic economy. Countries often use the accumulation or reduction of reserves as a strategy to lessen the impact of significant shifts in terms of trade, particularly during periods of deteriorating terms of trade. Although, reserves holding at large, do not appear to perform a role in the perspective of terms of trade surges, but are observed to play a notable role in smoothing the external adjustment process at the time of terms of trade bursts (Adler et al., 2018). Therefore, actively managing reserves not only reduces the short-term impact of CTOT shocks significantly, but also influences the long-term adjustment of the real exchange rate, effectively decreasing its volatility. For instance, the rate of reserve accumulation tends to lessen the appreciation/depreciation of real exchange rate in periods of commodity price surges and busts (Céspedes and Velasco, 2012). For example, even modest increases in the average reserves held by Latin American economies could serve as an equally effective policy tool as a fixed exchange rate regime in protecting the economy from CTOT shocks (Aizenman et al., 2012).

Correspondingly, the commodity price booms and busts response to the domestic economy may depend on the country's financial sector development. Certainly, those countries whose financial sector is well-developed, they are comparatively self-sufficient and are likely to invest a substantial share of their savings, from the windfall gain from commodity price booms, in their domestic market. Specifically, by directing more effectively windfall revenue towards domestic investment and by curtailing the necessity for precautionary saving. This mechanism has been discussed in the literature regarding the Feldstein-Horioka puzzle, which suggests that economies with well-developed financial systems should exhibit a high saving-investment correlation and therefore have low external imbalances. A recent explanation has highlighted the tendency of emerging economies and oil producers to "bypass" their inefficient financial markets by exporting their excess capital to countries with more sophisticated financial markets. This behavior contributes to a global "savings glut" (Bernanke, 2005). Likewise, Chinn and Ito (2007) discover that the connection between net savings and financial development is non-linear, contingent on the level of financial openness and the development of the legal system. In contrast to the savings glut theory, the impact of increased financial deepening on net saving is positive in the majority of these nations. The effect of terms of trade shocks on macroeconomic volatility is reduced by greater financial market development although this effect occurs primarily through household consumption (Andrews and Rees, 2009). In greater detail, the response of output to commodity price shocks exhibits a hump-shaped pattern: it initially increases as financial development improves from a low level, but eventually decreases as financial development reaches a sufficiently high level. The effect of these shocks on investment is generally more pronounced in economies with less developed financial markets, whereas more developed financial markets tend to mitigate the impact of commodity price shocks on credit (Shousha, 2016; Cespedes and Velasco, 2012). However, Caballero et al. (2008) and Mendoza et al. (2009) among others suggested that heterogeneous levels of financial development in various regions may justify the formation of global discrepancies. As financial deepening can serve the dual purpose of easing borrowing constraints for stabilization and fostering precautionary savings through the creation of a sovereign fund and increased foreign reserves, it is expected that the depth of financial markets may impact the response of the current account to fluctuations in internationally traded commodity prices. Although current accounts are positively affected by fluctuations in commodity prices such as oil (Allegret et al., 2014), this impact is nonlinear and heavily reliant on the level of financial development, the extent of integration in international financial markets, and the management of foreign exchange reserves (Habib et al., 2012). Consequently, a well-developed financial system could reduce the positive effect of commodity prices on the current account (Allegret et al., 2014).

Moreover, it is anticipated that openness is favorable to economic growth as it allows an economy to benefit from its comparative advantages and should grow faster. Yet, economies that are more open could also face greater vulnerability to shocks compared to relatively protected economies (Imam and Minoiu, 2008). For example, terms of trade shocks are likely to have a significant indirect effect on macroeconomic volatility and direct effects on the tradable sector of an economy in countries that are more open to international trade (Beck et al., 2006). Additionally, less open capital accounts tend to dampen the appreciation (or depreciation) of the real exchange rate during episodes of commodity price booms (busts) (Céspedes and Velasco, 2012). However, the impact of negative or positive shocks may vary across countries due to changes in national economic institutions (Blanchard and Wolfers 2000), such as the exchange rate and monetary policy regime, as well as the level of financial development and labor market flexibility.

Moreover, when terms of trade improve, exporting economies benefit from increased purchasing power and potential income growth. Conversely, deteriorating terms of trade weaken their financial position. However, economies with high levels of government debt can become more vulnerable to economic shocks, including fluctuating commodity terms of trade. Interest payments on debt divert resources that could otherwise be invested in productive activities or used for social welfare programs, which can hinder long-term economic growth and resilience. Nonetheless, moderate levels of debt, especially if used prudently for productive investments, can offer temporary buffers against adverse terms of trade movements. Consequently, in the case of favorable commodity terms of trade with moderate-level debt and countercyclical spending, an exporting economy can benefit significantly. Increased export earnings can be utilized to manage debt, invest in productive sectors, and expand social programs, heading to higher economic growth and enhanced living standards. Additionally, countercyclical government spending, which involves increasing spending during downturns and reducing it during booms, can ease alleviate the negative impacts of fluctuating terms of trade. By stimulating domestic demand during adverse terms of trade shocks, such spending can partially offset the decline in export earnings. Conversely, procyclical spending, increasing spending through good times and reducing it through bad times, can amplify the influences of volatile terms of trade, exacerbating economic fluctuations and potentially leading to further debt accumulation. Therefore, in the case of unfavorable commodity terms of trade with a high level of debt and procyclical spending, detrimental outcomes such as fiscal challenges, debt accumulation, and potential economic instability can arise.

2.4 Data and Methodology

This section is divided into three sub-sections. Section one deals with data nature and sources, section two describes variables definition and construction, and finally, the last section explains model specification and estimation method in detail.

2.4.1 Data Nature and Source

This study utilizes a panel dataset of developed and developing countries that are dependent on export commodities, selected based on data availability, covering the period from 1995 to 2021. The list of selected export-dependent economies is presented in Appendix C2. The data set is collected from World Development Indicators (WDI), the International Monetary Fund (IMF), United Nations Commodities Trade (COMTRADE), the Worldwide Governance Indicators (WGI), Barro and Lee, (2018), Standard World Income Inequality Database (SWIID) version 6.1 (Solt, 2016).

2.4.2 Variables Definition and Construction

This section explains how our dependent and independent variables are defined and constructed. Whether a variable measured by taking exact values of that variable or taking proxy to measure it or measured by some index number?

2.4.2.1 Dependent Variables

Understanding the critical roles of macroeconomic indicators for policymakers, businesses, and individuals to make informed and updated decisions that contribute to a healthy and stable economy. For instance, higher output (Y) indicates a productive economy, generating more goods and services, and steering to higher living standards. Sustained growth fosters confidence and attracts investment, further fueling expansion. However, growth can lead to resource depletion, environmental damage, and inflation. Rapid growth without broad participation can exacerbate income inequality. Following empirical literature, this study uses real gross domestic product as a measure of output. Similarly, investment (INVSTMN) in infrastructure, education, and technology boosts productivity, creating jobs, and expanding productive capacity. However, misdirected investment can be unproductive, generate debt, and crowd out other beneficial spending. In contrast, volatile investments can destabilize the economy. We use gross fixed capital formation as a percentage of GDP to capture the role of investment. Additionally, high unemployment (UNEMPLMNT) implies underutilized resources, lost income, and social unrest. It dampens aggregate demand and hinders growth. However, very low unemployment can lead to labor shortages and wage pressures, fueling inflation. This study uses unemployment, total as a percent of the total labor force, to capture the effects of unemployment. Likewise, a balanced current account implies healthy trade relations and sustainable external debt. However persistent deficits can render the economy exposed to external shocks and currency depreciation. Surpluses can indicate underinvestment and missed export opportunities. This study uses external balance on goods and services as a percent of GDP, following standard literature. In the same way, moderate inflation (INF) can encourage investments and economic endeavors. Nonetheless, high inflation grind down purchasing power, discourages saving, and complicates economic planning. Equally, deflation can hinder spending and investment, leading to economic stagnation. We measure inflation as the consumer price index (CPI).

Moreover, a competitive exchange rate (EXCRATE) can enhance exports and entice foreign investment. But an uncompetitive exchange rate can hurt exports, fuel inflation, and create uncertainty for businesses. Empirical literature proxied official exchange rate as local currency unit per US dollar, period average. Furthermore, well-targeted government expenditure (GOVTEXPND) on infrastructure, education, and social safety nets can stimulate the economy, improve well-being, and encourage investment. In contrast, excessive government spending can lead to fiscal deficits, inflation, and crowding out private investment. Inefficient spending can be wasteful and unproductive. Following standard literature this study uses general government final consumption expenditure as a percent of GDP to capture its effect against commodity price fluctuations. Finally, high income inequality (INCINEQ) can dampen aggregate demand, reduce social mobility, and lead to social unrest. It can also hinder long-term growth by limiting opportunities for low-income individuals. However moderate inequality can provide incentives for innovation and hard work. Reducing inequality too quickly can have unintended consequences like disincentivizing work. Due to the scarcity of data on income inequality for many countries over extended periods, we address this limitation by employing Gini coefficients from the Standard World Income Inequality Database (SWIID) version 6.1 (Solt, 2016). The SWIID dataset is highly comprehensive, offering extensive coverage of comparable inequality data across countries (see, Parcero and Papyrakis, 2016; Kim and Lin, 2018; Gylfason, 2019; among others). However, it is important to remember that these variables are not isolated factors, but rather interact with each other in complex ways. Maintaining a stable and prosperous economy requires managing these interactions through sound policy decisions. Because there is no single magic formula for economic prosperity, so careful consideration of these interrelationships can help guide policies that promote sustainable growth, shared prosperity, and long-term stability. Each of the variables plays a complex and interconnected role in the prosperity and stability of an economy, and their impact can vary depending on the specific context.

2.4.2.2 Independent Variables

Our independent variables list consists of three types that are core/focus, control, and conditional/moderators/extraneous.

2.4.2.2.1 Core Variables

2.4.2.2.1.1 Narrow Dependent Commodity Terms of Trade Index

In order to investigate the macroeconomic effects of commodities price fluctuations we used and developed a new measure of narrow dependent commodity terms of trade (NDCTOT) index. Following

Spatafora and Tytell (2009) and Aizenman et al., (2012) subject to a little bit of modification we construct our NDCTOT as follows.

$$\mathrm{NDCTOT}_{jt} = \prod_i ({}^{P_{it}}/_{MUV_t})^{X_{ij}} / \prod_i ({}^{P_{it}}/_{MUV_t})^{M_{ij}}$$

Where NDCTOT_{jt} represents narrow dependent commodity terms of trade index at time t. $\prod i$ shows the product of commodities i. P_{it} is prices of individual commodity i at time t. MUV_t is a manufacturing unit value index at time t, used as a deflator, X_{ij} and M_{ij} are the share of exports and imports of commodity i in the country j's gross domestic product (GDP). Due to their nature, the weights X and M do not sum up to 1. This complicates the understanding of the index, but it enables us to attain the relative exposure of each economy to changes in relative commodity prices. As highlighted by Spatafora and Tytell (2009), one of the attractive features of CTOT is that, since Xij and Mij are averaged over time, the movements in CTOT remain unaffected by fluctuations in export and import volumes in response to price fluctuations, thereby isolating the effect of commodity prices on a country's terms of trade. Instead of variations in the volume of exports and imports as a response to commodities price fluctuations, we kept the weights—export and import shares—are time-averaged and set to remain constant or fixed over time, so that any changes in the NDCTOT index indicate solely changes in commodities prices (see, Deaton and Miller, 1995; Chen and Rogoff, 2003; Dehn, 2000; Cashin et al., 2004; Spatafora and Tytell, 2009; Collier and Goderis, 2012; Ricci et al., 2013).[54] Since the weights are based on GDP, this index considers variations between countries not only in the composition of their commodity export and import baskets but also in the significance of commodities to their overall economies.

However, unlike Spatafora and Tytell (2009) and others,[55] we construct our narrow dependent commodity terms of trade (NDCTOT) by considering and including the top two major export commodities of export-dependent economies whose makeup at least 35 percent share in its export basket, from different industries, at digit 4 level in SITC Revision 1. Because it is theoretically a more compatible country-specific measure of exposure to commodity price surges and bursts that hang on the importance of the composition of the specific country's commodity export. As, South Centre (2005)

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[54] Gruss (2014) creates commodity terms-of-trade indices with weights that vary over time. These weights are derived from three-year rolling averages of trade values (to smooth out fluctuations) and are lagged (to ensure that changes in the index primarily reflect variations in commodity prices rather than endogenous changes in volumes).

[55] They Specifically, construct their country specific commodity terms of trade (CSCTOT) index from the prices of 32 individual commodities: Shrimp; Beef; Lamb; Wheat; Rice; Corn (Maize); Bananas; Sugar; Coffee; Cocoa; Tea; Soybean Meal; Fish Meal; Hides; Soybeans; Natural Rubber; Hardlog; Cotton; Wool; Iron Ore; Copper; Nickel; Aluminum; Lead; Zinc; Tin; Soy Oil; Sunflower Oil; Palm Oil; Coconut Oil; Gold; Crude Oil.

defined commodity dependence is commonly gauged by either (a) the portion of export earnings contributed by the top single commodity or top three export commodities in GDP, total merchandise exports, and total agriculture exports; or (b) the percentage of the population engaged in commodity production; or (c) the portion of government revenue derived from commodities. Although, UNCTAD (2019) categorizes a country as commodity-dependent if more than 60% of its total merchandise exports comprise of commodities throughout the period 2013–2017. Therefore, following this standard literature and to get a fair number of observations with somewhat good implications for export-dependent economies we called a commodity-dependent export country if its top two export commodities represent and constitute at least 35% share of its total merchandise exports.

2.4.2.2.1.2 Booms and Busts in Narrow Dependent Commodity Terms of Trade

This study uses our narrow dependent commodity terms of trade (NDCTOT) index to identify booms and busts in our NDCTOT over the period 1995—2021. Our NDCTOT is constructed from the top two major exporting commodities prices and quantities along with their respective shares in exporting economy's GDP. However, our new variables of NDCTOT booms and NDCTOT busts are solely relying on the changes to commodity prices part of NDCTOT only because changes in prices reflect changes in income effect while the other part of NDCTOT that is commodity quantity would be kept constant as it is assumed that it takes on an average value over its entire series, as explained above. Therefore, while constructing booms and busts in NDCTOT we consider complete cycles of the price series with starting either from trough to peak to trough (may be called a boom) or from peak to trough to peak (may be called a bust) (see, Cespedes and Velasco, 2012). Thus we define our NDCTOT index boom episode corresponds to a period through which our particular commodity price attains or surpasses a level of at least 15 and 25 percent—arbitrarily taking two different threshold levels—above its trend line.[56] A country NDCTOT bust episode as a period during which our particular commodity price reaches or surpass a level of at least 15 and 25 percent—arbitrarily taking two different threshold levels—below its trend line.[57] However an episode ends when that particular commodity price comes back to a level lower (higher) than 15 and 25 percent above (below) its trend line. We take two different threshold levels purely arbitrary to get a fair number of observations as well as a good comparison across threshold level. However, as far as our trend line is concerned, we follow standard literature (like,

[56] Cespedes and Velasco, (2012), calculate a trend line by a 50-year moving average method—averaging 40 years back and 10 years ahead. However, due to limited data spanning we do not use this method.

[57] Although, Cespedes and Velasco, (2012), consider only a threshold of 25 percent and to end a boom or bust episode they considered a level of 10 percent lower or higher of its trend line. However, there is no consensus among the scholars and academicians for considering a certain specific threshold level.

Hodrik and Prescot, 1997 and among others) to calculate this line with the help of Hodrik-Prescot (HP) filter as it is widely used method in the standard literature.

2.4.2.2.2 Control Variables

First, for our output model we have a list of control variables that is human capital (HUCPTL), investment (INVSTMN), inflation (INF), foreign direct investment (FDI), trade openness (TRDOPNES), and government size (GOVTSIZE). All these variables collectively play an essential role for output determination. For instance, HUCPTL in the form of skilled and educated workforce enhances productivity, innovation, and adaptability. This leads to higher quality goods and services, increased technological advancements, and better resource utilization, all contributing to economic growth. However, low levels of education and underutilized skills can hinder productivity and limit an economy's potential. Brain drains, where skilled individuals emigrate, can further exacerbate the problem. We use average years of secondary schooling as a proxy to measure human capital. Additionally, INVSTMN in the form of infrastructure, technology, and productive capacity expands the productive base of the economy, facilitating the creation of new jobs, businesses, and economic opportunities. This leads to increased output and a higher standard of living. But misdirected INVSTMN can waste resources, generate debt, and crowd out other vital spending. Unstable investment flows can cause economic volatility and hinder growth. We use gross fixed capital formation as a percentage of GDP to capture the role of investment. Likewise, a stable, low level of CPI can encourage spending and INVSTMN, potentially stimulating economic activity. However, high CPI erodes purchasing power, creates uncertainty, and hinders long-term planning, ultimately dampening growth. Both deflation and hyperinflation can be detrimental to economic activity. Deflation reduces incentives to spend and invest, while hyperinflation creates chaos and instability. We measure inflation as the consumer price index (CPI). Similarly, FDI can bring in new capital, technology, knowledge, and management expertise. This can boost productivity, efficiency, and competitiveness, leading to higher output and growth. While unregulated FDI can lead to concerns about exploitation of resources or manipulation of markets. Ensuring sustainable and beneficial FDI requires careful policy frameworks. This study uses net inflows as a percentage of GDP to control for FDI effect. Moreover, TRDOPNES allows access to wider markets, fostering specialization, competition, and technology transfer. This can lead to increased production, better efficiency, and ultimately higher output and growth. In contrast, uncontrolled trade openness can expose domestic industries to unfair competition, leading to job losses and deindustrialization. Striking a balance between openness and protection is necessary. To capture the effect of TRDOPNES, this study uses the ratio of exports plus imports to GDP. Furthermore, well-targeted government spending on infrastructure, education, health, and research can provide essential public goods and services, improve human capital, and stimulate economic activity. But excessive government spending can lead to fiscal deficits, inflation, and crowding out private investment. Inefficient spending can be wasteful and unproductive. Following standard literature this study uses general government final consumption expenditure as a percent of GDP to capture its effect on output.

Second, for our investment INVSTMN model, we have a list of control variables that is savings (SAVINGS), interest rate (INTRATE), inflation (INF), foreign direct investment (FDI), and remittances (REMITTANCE). All these variables collectively play an important role in INVSTMN determination. For instance, higher SAVINGS create a pool of domestic capital readily available for investment. This reduces reliance on external borrowing and potentially lowers financing costs for businesses. While, low domestic savings can limit internal investment potential, forcing reliance on foreign capital which might bring additional risks and dependencies. We use gross domestic savings as a percentage of GDP to capture its effect on investment. Additionally, a higher INTRATE incentivizes individuals and businesses to save, increasing the pool of funds available for investment. It also attracts foreign capital seeking higher returns. But excessive INTRATE can discourage borrowing and investment, particularly for small and medium-sized enterprises (SMEs). Finding the right balance is crucial. This study uses real interest as a percentage to capture its impact on investment. Similarly, high CPI erodes the value of savings and future returns on investments, discouraging saving and investment activities. It also creates uncertainty and hinders long-term planning. In contrast, very low or negative inflation can discourage spending and investment due to expectations of falling prices. Moderate inflation can provide some incentive to invest without significantly eroding future returns. We measure inflation as the consumer price index (CPI). Likewise, FDI inflows can directly inject capital into the economy, stimulating investment in various sectors. Additionally, FDI can bring in new technologies, management expertise, and access to global markets, further boosting investment opportunities. Unfortunately, unregulated FDI can lead to concerns about resource exploitation, unfair competition for domestic firms, or manipulation of markets. Careful policy frameworks are necessary to maximize the benefits and minimize the risks. This study uses net inflows as a percentage of GDP to control for FDI effect. In the same way, REMITTANCES received by households can increase their disposable income, potentially leading to higher savings and investment in productive activities. They can also contribute to poverty reduction and increase overall demand in the economy, stimulating investment needs. But reliance on remittances as a primary source of income can discourage local production and entrepreneurship. Additionally, sudden fluctuations in remittance flows can create economic instability. Personal remittances received as a percent of GDP is used to control for its effect.

Third, for our unemployment (UNEMPLMNT) model we have a list of control variables that is output (OUTPUT), inflation (INF), foreign direct investment (FDI), population (POPULATN), and government debt (GOVTDEBT). All these variables are collectively play an important role for UNEMPLMNT determination. For instance, higher output or economic growth typically leads to job creation and reduced unemployment. As businesses expand and production increases, they need more workers. In contrast, unsustainable or uneven growth can lead to job losses in certain sectors or temporary unemployment before new opportunities emerge. Following the empirical literature, this study uses real gross domestic product as a measure for output. Additionally, moderate CPI can encourage hiring as businesses anticipate rising prices and wages. However, high CPI can erode purchasing power and consumer demand, leading to job losses. Moreover, in some specific situations CPI can disproportionately impact specific sectors. For example, high energy prices can hurt manufacturing industries, leading to job losses. We measure inflation as the consumer price index (CPI). Likewise, FDI can create new jobs, particularly in the sectors where it is invested. Additionally, it can transfer technology and skills, boosting productivity and potentially leading to further job creation. While FDI can also lead to job losses if it replaces domestic industries with more efficient foreign ones. The net impact on unemployment depends on the type and nature of the FDI. This study uses net inflows as a percentage of GDP to control for FDI effect. In the same fashion, a larger POPULATN can increase the labor force, potentially leading to lower unemployment. However, it can also increase competition for jobs, particularly if skills mismatch or economic growth is inadequate. Population growth rates and age structure matter. Rapid population growth can put pressure on job creation, while an aging population might face skill mismatch issues. Population, total is used to capture its impact on unemployment. Equally, moderate DEBT can be spent to finance in infrastructure and education, leading to long-term job creation. However, high debt levels can limit government spending on job-creating programs or lead to austerity measures that increase unemployment. But the sustainability of debt financing is crucial. Unsustainable debt burdens can eventually force cuts in public services or raise taxes, both of which can negatively impact employment. We exercise gross debt as a percent of GDP to measure debt and take its effect on unemployment.

Fourth, for our external balance (EXTBL) or current account balance model we have a list of control variables that is trade openness (TRDOPNES), exchange rate (EXCRATE), savings (SAVINGS), output (OUTPUT), and foreign direct investment (FDI). All these variables are collectively play an important role for external balance determination. For instance, increased TRDOPNES can lead to higher exports, improving the external balance. Greater access to foreign markets allows domestic producers to catch a broader customer base and potentially increase their sales. However, uncontrolled TRDOPNES can also lead to higher imports, deteriorating the external balance. Domestic industries could face stiff competition from cheaper foreign goods, leading to market share losses and reduced exports. To capture the effect of TRDOPNES this study uses the ratio of exports plus imports to GDP. Similarly, a weaker currency (depreciation) makes exports cheaper for foreign buyers, potentially boosting exports and improving the external balance. Conversely, imports become more expensive, discouraging consumption, and potentially improving the external balance. A stronger currency (appreciation) makes imports cheaper for domestic buyers, potentially leading to higher imports and deteriorating the external balance. However, exports become more expensive for foreign buyers, potentially reducing exports, and worsening the external balance. Empirical literature proxied official exchange rate as local currency unit per US dollar, period average. Equally, higher domestic SAVINGS provide a readily available pool of capital for investment, potentially leading to increased productivity and export competitiveness. This can ultimately improve the external balance. Conversely, low domestic SAVINGS may limit a country's ability to invest in productive capacity, potentially hindering export growth and worsening the external balance. We use gross domestic savings as a percentage of GDP to capture its effect on dependent variable. Likewise, output, or economic growth often coincides with rising exports and potentially a surplus in the external balance. Increased production capacity and domestic demand can lead to more goods and services available for export. But slower economic growth can negatively impact exports and potentially lead to a deficit in the external balance. Additionally, reduced production and demand can dampen export possibilities. Following the empirical literature, this study uses real gross domestic product as a measure for output. In the same fashion, FDI inflows can directly bring in capital and technology, potentially boosting export competitiveness and improving the external balance. Additionally, FDI can generate export earnings through profits made by foreign-owned companies. However, FDI can also lead to higher imports of intermediate goods or consumer products, potentially widening the trade deficit and worsening the external balance. This study uses net inflows as a percentage of GDP to control for FDI effect.

Fifth, for our inflation (INF) model we have a list of control variables that is unemployment (UNEMPLMNT), money supply (MS), exchange rate (EXCRATE), trade openness (TRDOPNES), government size (GOVTSIZE), and government debt (GOVTDEBT). All these variables collectively play an important role for inflation determination. For instance, generally, low UNEMPLMNT puts upward pressure on wages as businesses compete for a limited pool of workers. This can lead to increased costs for companies, which they might pass on to consumers through higher prices, causing inflation. Conversely, high UNEMPLMNT unemployment can weaken wage growth and consumer demand, potentially contributing to lower inflation or even deflation. However, if high UNEMPLMNT persists, it can lead to reduced productive capacity and ultimately hinder economic growth, causing inflation in the long run. This study uses unemployment, total as a percent of total labour force, to capture the effects of unemployment. Similarly, an increase in the MS often resulting from central bank policies like quantitative easing, can lead to more money chasing the same amount of goods and services, potentially pushing up prices and driving inflation. Conversely, a decrease in the MS can tighten credit conditions and reduce aggregate demand, potentially dampening inflation or even leading to deflation. This study uses broad money as a percent of GDP to consider its role on inflation changes. Likewise, a weaker currency (depreciation) makes imported goods more expensive, directly contributing to inflation. Additionally, it can boost exports but reduce imports, impacting domestic prices due to changes in supply and demand. Conversely, a stronger currency (appreciation) makes imported goods cheaper, potentially dampening inflation. However, it can also hurt exports and reduce domestic production, impacting prices in the long run. Empirical literature proxied official exchange rate as local currency unit per US dollar, period average. In the same way, high and increased TRDOPNES can expose domestic markets to greater competition, potentially bringing down prices and dampening inflation. However, it can also make the economy more vulnerable to external shocks and inflation in other countries. Additionally, limited TRDOPNES can reduce competition and potentially allow domestic producers to exert greater control over prices, contributing to higher inflation. To capture the effect of TRDOPNES this study uses the ratio of exports plus imports to GDP. Equally, higher government spending, particularly on goods and services, can directly increase aggregate demand and put upward pressure on prices, leading to inflation. Additionally, large government size can increase bureaucracy and inefficiencies, potentially driving up production costs and contributing to inflation. Conversely, lower government spending can decrease aggregate demand and potentially dampen inflation. However, it can also lead to cuts in essential services and infrastructure, impacting overall economic efficiency and potentially affecting inflation in the long run. Following standard literature this study uses general government final consumption expenditure as a percent of GDP to capture its effect on inflation. Correspondingly, high government DEBT can lead to fiscal pressures and potentially force governments to resort to inflationary measures like deficit spending or printing money, directly pushing up inflation. Conversely, low government DEBT can provide space for fiscal policy instruments like targeted spending or tax cuts to be used to manage inflation more effectively. This study uses gross debt as a percent of GDP to control its effect on inflation.

Sixth, for our exchange rate model we have a list of control variables that is current account balance (CABALNCE), inflation (INF), interest rate (INTRATE), foreign exchange reserves (FEXCRESERS), economic growth (ECNGROWTH), and government debt (GOVTDEBT). All these variables collectively play an important role for nominal exchange rate determination. For instance, a surplus in the CABALNCE (exports exceeding imports) can steer to heightened demand for the domestic currency, potentially causing appreciation. This is as foreign entities need to buy the domestic currency to purchase exports, pushing up its value. Conversely, a persistent deficit in the current account can put downward pressure on the exchange rate. As the demand for foreign currency to finance imports rises, the domestic currency depreciates. Current account balance as a percent of GDP is used to measure and take on its effect on exchange rate as a control variable. Similarly, generally, higher CPI in a country compared to its trading partners makes its goods and services fairly less expensive, potentially leading to depreciation. This is because foreign buyers can get more for their money when purchasing with a stronger currency. Conversely, lower CPI can make the domestic currency more attractive, leading to appreciation. This is because investors seeking higher returns might be drawn to assets denominated in the currency with lower inflation. We measure inflation as the consumer price index (CPI). Likewise, higher INTRATE can attract foreign investment seeking higher returns, leading to raised demand for the domestic currency and potential appreciation. On the contrary, lower INTRATE can make foreign investments less attractive, potentially causing depreciation as foreign investors seek higher returns elsewhere. We use real interest rate as a percent to measure this variable while following standard literature. In the same fashion, a larger stock of FEXCRESERS provides a buffer against sudden depreciatory pressures. Central banks can intervene in the foreign exchange market to sell reserves and buy the domestic currency, stabilizing its value. Conversely, depleted reserves limit the ability to interfere and steady the exchange rate, making it more vulnerable to external shocks and potential depreciation. This study uses total reserves minus gold at current US dollar to investigate the effect of foreign exchange reserves on current account balance. Correspondingly, sustained ECNGROWTH typically strengthens the domestic currency. Increased confidence in the economy and higher demand for its goods and services attract foreign investment, pushing up the exchange rate. Conversely, slow or stagnant ECNGROWTH can weaken the currency. Additionally, lower confidence and reduced demand for the country's products and investments can lead to depreciation. We use GDP growth as annual percent to consider its effect on exchange rate. Equally, high GOVTDEBT levels can raise concerns about the country's fiscal stability and future inflation risks. This can lead to investors losing confidence and selling the domestic currency, causing depreciation. Conversely, manageable GOVTDEBT levels can enhance confidence in the economy and potentially attract investment, strengthening the exchange rate. We utilize gross debt as a percent of GDP to capture the debt role on current account balance.

Seventh, for our government expenditure model we have a list of control variables that is government revenue (GOVTREVNUE), government debt (GOVTDEBT), savings (SAVINGS), inflation (INF), and political stability (POLSTB). All these variables are collectively play an important role for government expenditure determination. For instance, higher GOVTREVNUE provides more resources for spending on public goods and services. This can be achieved through taxes, fees, and other sources of income. But excessive reliance on specific revenue sources, like volatile oil prices, can create budgeting uncertainties and limit spending flexibility. Following standard literature, we use revenue as a percent of GDP to consider its impact on dependent variable. Similarly, high GOVTDEBT levels can constrain spending options due to the need to prioritize debt servicing (interest payments). This can lead to cuts in essential services or limit the government's ability to respond to crises. While, moderate debt, if managed responsibly, can be used for strategic investments in infrastructure or social programs, potentially boosting future economic growth and returns. This study uses gross debt as a percent of GDP to capture the debt role on government expenditure. Correspondingly, higher national savings rates can provide a domestic pool of capital for government borrowing at lower interest rates. This reduces the burden of debt servicing and frees up more resources for spending. Government borrowing can compete with private sector investment for the same pool of savings, potentially driving up interest rates and hindering private investment. We use gross domestic savings as a percentage of GDP to capture its effect on government expenditure. Likewise, high CPI erodes the value of government spending, reducing its real impact on public services and social programs. This can necessitate higher nominal spending just to maintain the same level of service. While moderate CPI can provide a temporary boost to government revenue through nominal tax increases. However, this should be weighed against the long-term negative impacts of inflation. We measure inflation as the consumer price index (CPI). In the same way, a stable political environment fosters confidence and long-term planning, allowing for more predictable and efficient government spending allocation. However, political instability can lead to short-term decision-making, inefficient spending practices, and disruptions in public services delivery. Political stability no violence indicator is used from world governance indicator (WGI) to measure political stability.

Eight, for our income inequality (INCINEQ) model we have a list of control variables that is unemployment (UNEMPLMNT), human capital (HUCPTL), economic growth (ECGROWTH), and government size (GOVTSIZE). All these variables are collectively play an important role for income inequality determination. For instance, high unemployment rates can exacerbate income inequality. When fewer people are employed, especially low-skilled individuals, the overall pool of income shrinks, disproportionately impacting the less wealthy. This can lead to a wider gap between the incomes of those with jobs and those without. Conversely, low unemployment can help narrow the income gap by expanding the pool of income earners and potentially pushing wages up, particularly for low-skilled jobs. This study uses unemployment, total as a percent of total labour force, to capture the effects of unemployment. Similarly, high levels of HUCPTL, in terms of education, skills, and training, can equip individuals with the tools to secure higher-paying jobs and compete effectively in the labor market. This can potentially lead to a more equitable distribution of income. While unequal access to quality education and skills training can perpetuate income inequality. If certain groups are systematically disadvantaged in terms of HUCPTL development, they are less likely to secure well-paying jobs, further widening the income gap. We use average years of secondary schooling as a proxy to measure human capital. Likewise, sustained ECGROWTH can create new jobs and opportunities, potentially lifting all income levels and narrowing the gap. A rising tide can lift all boats, as increased economic activity generally leads to higher demand for labor and potentially higher wages. However, unequal distribution of the benefits of growth can exacerbate inequality. If economic growth primarily benefits the wealthy through capital gains or asset appreciation, it can leave low-income earners behind and widen the gap. We use GDP growth as annual percent to consider its effect on income inequality. Correspondingly, well-targeted government spending on education, healthcare, and social safety nets can provide essential support to low-income individuals and families, improving their access to opportunities and resources. This can improve to decrease income inequality and advocate social mobility. But inefficient or regressive government spending can actually worsen inequality. For example, tax cuts that primarily benefit the wealthy can widen the income gap, while poorly targeted social programs can create inefficiencies and waste resources. Following standard literature this study uses general government final consumption expenditure as a percent of GDP to capture its effect on income inequality.

2.4.2.2.3 Conditional/Moderated/Extraneous Variables

It is theoretically well established in the literature that the macroeconomic effect of commodity terms of trade is conditionally depends on the economic structure, institutional quality and policy related extraneous variables. This means that the effect of narrow dependent commodity terms of trade on macroeconomic indicators changes as these moderating variable changes (for more discussion see theoretical section, above). Therefore, this study also uses some of the important conditional or moderating or extraneous variables which may affect the macroeconomic effect of narrow dependent commodity terms of trade. That are, political stability (POLSTB), and governance (GOVRNANC), measured as political stability no violence and overall governance index but excluding political stability no violence indicator from world governance indicator (WGI). Likewise, we also include financial development (FDEVLP), exchange rate (EXCRATE), foreign exchange reserves (FEXCRESERS) and capital account openness (KAOPNES), measured and proxied as financial development index, official exchange rate (LCU per US$, period average), total reserves minus gold (current US$), and kaopen, normalized between 0 and 1, respectively. Finally, we also include government debt (GOVTDEBT), and government expenditure/size (GOVTSIZE), keeping the importance, measured as gross debt as a percent of GDP and general government final consumption expenditure as a percent of GDP.

2.4.3 Model Specification and Estimation Method

This sub-section is further divided into two sub-sections. Section one describes model specification, while estimation technique is discussed in the last section.

2.4.3.1 Model Specification

2.4.3.1.1 Model

We base the theoretical motivation for our empirical approach on a small, open economy Real Business Cycle (RBC) macro model, building upon previous analyses by Boakye et al. (2022), Schmitt-Grohe and Uribe (2018), and Mendoza (1995, 1991), In line with these studies, we proceed to develop and estimate the following econometric model.

$$\begin{aligned}&\text{Macroeconomic Variables}_{it} = \alpha_0 + \alpha_1 \text{Macroeconomic Variables}_{it-1} + \\ &\alpha_2 \text{Narrow Dependent Commodity Terms of Trade}_{it} + \beta'_i \text{Conditional Factors}_{it} + \\ &\gamma_i (\text{Narrow Dependent Commodity Terms of Trade} * \text{Conditional Factors})_{it} + \\ &\delta'_i \text{Control Variables}_{it} + \text{Time Invarian Commponent of the Error Term}_i + \text{Error Term}_{it} \qquad (2.1)\end{aligned}$$

For simplicity, or more specifically we can re-write equation (2.1) as follows.

$$\text{MV}_{it} = \alpha_0 + \alpha_1 \text{MV}_{it-1} + \alpha_2 \text{NDCTOT}_{it} + \beta'_i \text{CF}_{it} + \gamma_i (\text{NDCTOT} * \text{CF})_{it} + \delta'_i \text{CV}_{it} + \eta_i + \mu_{it} \ (2.2)$$

Now, we introduce our macroeconomic variables one by one into eq. (2.2) as follows, starting from the output.

$$Y_{it} = \alpha_0 + \alpha_1 Y_{it-1} + \alpha_2 NDCTOT_{it} + \alpha_3 POLSTB_{it} + \alpha_4 GOVRNANC_{it} + \alpha_5 FDEVLP_{it} + \alpha_6 (NDCTOT * POLSTB)_{it} + \alpha_7 (NDCTOT * GOVRNANC)_{it} + \alpha_8 (NDCTOT * FDEVLP)_{it} + \alpha'_9 CV_{1it} + \varepsilon_{it} \quad (2.2a)$$

Where Y denotes output and NDCTOT represents our core independent variable, i.e. narrow dependent commodity terms of trade. Similarly, POLSTB, GOVRNANC, and FDEVLP are all conditional variables and indicate political stability, governance or institutional quality and financial development, respectively. In addition to that, (NDCTOT * POLSTB), (NDCTOT * GOVRNANC), and (NDCTOT * FDEVLP) represent interactive terms. Moreover, CV_1 includes a vector of control variables like, human capital (HUCPTL), investment (INVSTMN), inflation (INF), foreign direct investment (FDI), trade openness (TRDOPNES), and government size (GOVTSIZE). ε_{it} indicates an error term that is $\varepsilon_{it} = \mu_{it} + \eta_i$ where μ_{it} is the time-variant fixed effect (FE) and η_i is an unobserved macroeconomic variables specific effect that is assumed to be the time-invariant, FE. Moreover, η_i captures the characteristics of each individual country and economy, under observation, that are not picked up by the regressors but are assumed to be time-invariant. ε is a stochastic error term that varies with the individual country and time dimension. It is assumed to be independent and identically distributed, $\varepsilon_{it} \sim iid(0, \sigma 2)$. i and t show cross section and time dimension, respectively.

The conditional role of governance (GOVRNANC), and financial development (FDEVLP) for the effect of commodity terms of trade (NDCTOT) on output (Y) is given from the equation (2.2a). That is:

$$\frac{\partial Y_{it}}{\partial NDCTOT_{it}} = \alpha_2 + \alpha_6 POLSTB_{it} + \alpha_7 GOVRNANC_{it} + \alpha_8 FDEVLP_{it} \quad (2.2a.1)$$

Equation (2.2a.1) shows that the effect of narrow dependent commodity terms of trade (NDCTOT) on output (Y) changes as political stability (POLSTB), governance (GOVRNANC), and financial development (FDEVLP) changes.

Similarly, we have the following equation for investment.

$$INVSTMN_{it} = \beta_0 + \beta_1 NVSTMN_{it-1} + \beta_2 NDCTOT_{it} + \beta_3 FDEVLP_{it} + \beta_4 EXCRATE_{it} + \beta_5 POLSTB_{it} + \beta_6 (NDCTOT * FDEVLP)_{it} + \beta_7 (NDCTOT * EXCRATE)_{it} + \beta_8 (NDCTOT * POLSTB)_{it} + \beta_9 CV_{2it} + \varepsilon_{it} \quad (2.2b)$$

Where INVSTMN shows investment. Similarly, EXCRATE is conditional variable and indicates exchange rate along with its interactive term that is (CTOT * EXCRATE). CV_2 indicates vector of control variables like, savings (SAVINGS), interest rate (INTRATE), inflation (INF), foreign direct investment (FDI), and remittances (REMITTANCE), and ϵ is error term. All the remaining variables are defined as previously described.

The conditional role of financial development (FDEVLP), exchange rate (EXCRATE), and political stability (POLSTB) for the impact of narrow dependent commodity terms of trade (NDCTOT) on investment (INVSTMN) is given from the equation (2.2b). That is:

$$\frac{\partial \mathrm{INVSTMN_{it}}}{\partial \mathrm{NDCTOT_{it}}} = \beta_2 + \beta_6 \mathrm{FDEVLP_{it}} + \beta_7 \mathrm{EXCRATE_{it}} + \beta_8 \mathrm{POLSTB_{it}} \quad (2.2b.1)$$

Equation (2.2b.1) shows that the effect of narrow dependent commodity terms of trade (NDCTOT) on investment (INVSTMN) changes as financial development (FDEVLP), exchange rate (EXCRATE), and political stability (POLSTB) changes.

Moreover, we have the following equation for unemployment.

$$\mathrm{UNEMPLMNT_{it}} = \gamma_0 + \gamma_1 \mathrm{UNEMPLMNT_{it-1}} + \gamma_2 \mathrm{CTOT_{it}} + \gamma_3 \mathrm{GOVTDEBT_{it}} + \gamma_4 \mathrm{POLSTB_{it}} + \gamma_5 \mathrm{GOVRNANC_{it}} + \gamma_6 (\mathrm{CTOT} * \mathrm{GOVTDEBT})_{\mathrm{it}} + \gamma_7 (\mathrm{CTOT} * \mathrm{POLSTB})_{\mathrm{it}} + \gamma_8 (\mathrm{CTOT} * \mathrm{GOVRNANC})_{\mathrm{it}} + \gamma'_9 \mathrm{CV_{3it}} + \varepsilon_{\mathrm{it}} \quad (2.2c)$$

UNEMPLMNT indicates unemployment. While GOVTDEBT shows government debt and (CTOT * GOVTDEBT) its interactive term. CV_3 consists of vector of control variables that is, output (OUTPUT), inflation (INF), foreign direct investment (FDI), population (POPULATN), and government debt (GOVTDEBT) and ν is error terms. All the remaining variables are defined as previously described.

The conditional role of government debt (GOVTDEBT), political stability (POLSTB), and governance (GOVRNANC) for the consequence of narrow dependent commodity terms of trade (NDCTOT) on unemployment (UNEMPLMNT) is given from the equation (2.2c). That is:

$$\frac{\partial \mathrm{UEMPLYMNT_{it}}}{\partial \mathrm{NDCTOT_{it}}} = \gamma_2 + \gamma_6 \mathrm{GOVTDEBT_{it}} + \gamma_7 \mathrm{POLSTB_{it}} + \gamma_8 \mathrm{GOVRNANC_{it}} \quad (2.2c.1)$$

Equation (2.2c.1) shows that the influence of narrow dependent commodity terms of trade (NDCTOT) on unemployment (UNEMPLMNT) changes as government debt (GOVTDEBT), political stability (POLSTB), and governance (GOVRNANC) changes.

Likewise, we have the following equation for external balance.

$$\text{EXTBL}_{it} = \alpha_0 + \alpha_1\text{EXTBL}_{it-1} + \alpha_2\text{NDCTOT}_{it} + \alpha_3\text{FEXCRESERS}_{it} + \alpha_4\text{EXCRATE}_{it} + \alpha_5\text{POLSTB}_{it} + \alpha_6\text{KAOPNES}_{it} + \alpha_7(\text{NDCTOT} * \text{FEXCRESERS})_{it} + \alpha_8(\text{NDCTOT} * \text{EXCRATE})_{it} + \alpha_9(\text{NDCTOT} * \text{POLSTB})_{it} + \alpha_{10}(\text{NDCTOT} * \text{KAOPNES})_{it} + \alpha'_{11}\text{CV}_{4it} + \varepsilon_{it} \quad (2.2d)$$

Where EXTBL, and ε show external balances, and error term respectively. Additionally, FEXCRESERS, KAOPNES are conditional variables which represent foreign exchange reserves and capital account openness, respectively. Similarly, CV_4 is a vector of control variables like, trade openness (TRDOPNES) exchange rate (EXCRATE), savings (SAVINGS), output (OUTPUT), and foreign direct investment (FDI). All the remaining variables are defined as previously described.

The conditional role of foreign exchange reserves (FEXCRESERS), exchange rate (EXCRATE), political stability (POLSTB) and capital account openness (KAOPNES) for the effect of narrow dependent commodity terms of trade (NDCTOT) on external balance (EXTBL) is given from the equation (2.2d). That is:

$$\frac{\partial \text{EXTBL}_{it}}{\partial \text{NDCTOT}_{it}} = \alpha_2 + \alpha_7\text{FEXCRESERS}_{it} + \alpha_8\text{EXCRATE}_{it} + \alpha_9\text{POLSTB}_{it} + \alpha_{10}\text{KAOPNES}_{it} \quad (2.2d.1)$$

Equation (2.2d.1) shows that the impact of narrow dependent commodity terms of trade (NDCTOT) on external balance (EXTBL) changes as foreign exchange reserves (FEXCRESERS), exchange rate (EXCRATE), political stability (POLSTB) and capital account openness (KAOPNES) changes.

Similarly, we have the following equation for inflation.

$$\text{INF}_{it} = \beta_0 + \beta_1\text{CPI}_{it-1} + \beta_2\text{NDCTOT}_{it} + \beta_3\text{EXCRATE}_{it} + \beta_4\text{GOVRNANCE}_{it} + \beta_5\text{POLSTB}_{it} + \beta_6(\text{NDCTOT} * \text{EXCRATE})_{it} + \beta_7(\text{NDCTOT} * \text{GOVRNANCE})_{it} + \beta_8(\text{NDCTOT} * \text{POLSTB})_{it} + \beta'_9\text{CV}_{5it} + \varepsilon_{it} \quad (2.2e)$$

INF and ϵ represent inflation and error terms. Additionally, CV_5 indicates a vector of control variables and includes unemployment (UNEMPLMNT), money supply (MS), exchange rate (EXCRATE), trade openness (TRDOPNES), government size (GOVTSIZE), and government debt (GOVTDEBT). The remaining undefined variables are defined previously.

The conditional role of exchange rate (EXCRATE), governance (GOVRNANC), and political stability (POLSTB) for the effect of narrow dependent commodity terms of trade (NDCTOT) on inflation (INF) is given from the equation (2.2e). That is:

$$\frac{\partial \text{INF}_{it}}{\partial \text{NDCTOT}_{it}} = \beta_2 + \beta_6\text{EXCRATE}_{it} + \beta_7\text{GOVRNANC}_{it} + \beta_8\text{POLSTB}_{it} \quad (2.2e.1)$$

Equation (2.2e.1) shows that the impact of narrow dependent commodity terms of trade (NDCTOT) on inflation (INF) changes as exchange rate (EXCRATE), governance (GOVRNANC), and political stability (POLSTB) change.

Additionally, we have an equation for exchange rate as follows.

$$\mathrm{EXCRATE_{it}} = \theta_0 + \theta_1\mathrm{EXCRATE_{it-1}} + \theta_2\mathrm{NDCTOT_{it}} + \theta_3\mathrm{FEXCRESERS_{it}} + \theta_4\mathrm{GOVTDEBT_{it}} + \theta_5\mathrm{POLSTAB_{it}} + \theta_6\mathrm{GOVRNANC_{it}} + \theta_7\mathrm{(NDCTOT * FEXCRESERS)_{it}} + \theta_8\mathrm{(NDCTOT * GOVTDEBT)_{it}} + \theta_9\mathrm{(NDCTOT * POLSTAB)_{it}} + \theta_{10}\mathrm{(NDCTOT * GOVRNANC)_{it}} + \theta'_{11}\mathrm{CV_{6it}} + \varepsilon_{\mathrm{it}} \quad (2.2f)$$

EXCRATE and, ζ show exchange rate and error terms. CV_6 indicates and includes a vector of control variables that is current account balance (CABALNCE), inflation (INF), interest rate (INTRATE), foreign exchange reserves (FEXCRESERS), economic growth (ECNGROWTH) and government debt (GOVTDEBT). The rest of undefined variables are defined previously.

The conditional role of foreign exchange reserves (FEXCRESERS), government debt (GOVTDEBT), political stability (POLSTB), and governance (GOVRNANC) for the effect of narrow dependent commodity terms of trade (NDCTOT) on exchange rate (EXCRATE) is given from the equation (2.2f). That is:

$$\frac{\partial \mathrm{EXCRATE_{it}}}{\partial \mathrm{NDCTOT_{it}}} = \theta_2 + \theta_7\mathrm{FEXCRESERS_{it}} + \theta_8\mathrm{GOVTDEBT_{it}} + \theta_9\mathrm{POLSTAB_{it}} + \theta_{10}\mathrm{GOVRNANC_{it}} \quad (2.2f.1)$$

Equation (2.2f.1) shows that the impact of narrow dependent commodity terms of trade (NDCTOT) on exchange rate (EXCRATE) changes as foreign exchange reserves (FEXCRESERS), government debt (GOVTDEBT), political stability (POLSTB), and governance (GOVRNANC) changes.

Moreover, we have equation for government expenditure as follows.

$$\mathrm{GOVTEXPND_{it}} = \delta_0 + \delta_1\mathrm{GOVTEXPND_{it-1}} + \delta_2\mathrm{NDCTOT_{it}} + \delta_3\mathrm{GOVTDEBT_{it}} + \delta_4\mathrm{GOVRNANC_{it}} + \delta_5\mathrm{POLSTB_{it}} + \delta_6\mathrm{(NDCTOT * GOVTDEBT)_{it}} + \delta_7\mathrm{(NDCTOT * GOVRNANCE)_{it}} + \delta_8\mathrm{(NDCTOT * POLSTB)_{it}} + \delta_9\mathrm{CV_{7it}} + \varepsilon_{\mathrm{it}} \quad (2.2g)$$

Both GOVTEXPND and ξ show government expenditure and error term. Likewise, CV_7 indicates and includes a vector of control variables that is government revenue (GOVTREVNUE), government debt (GOVTDEBT), savings (SAVINGS), inflation (INF), and political stability (POLSTB). The rest of all undefined variables are defined before.

The conditional role of government debt (GOVTDEBT), governance (GOVRNANC), and political stability (POLSTB) for the effect of narrow dependent commodity terms of trade (NDCTOT) on government expenditure (GOVTEXPND) is given from the equation (2.2g). That is:

$$\frac{\partial \mathrm{GOVTEXPND_{it}}}{\partial \mathrm{NDCTOT_{it}}} = \delta_2 + \delta_6 \mathrm{GOVTDEBT_{it}} + \delta_7 \mathrm{GOVRNANCE_{it}} + \delta_8 \mathrm{POLSTB_{it}} \tag{2.2g.1}$$

Equation (2.2g.1) shows that the impact of narrow dependent commodity terms of trade (NDCTOT) on government expenditure (GOVTEXPND) changes as government debt (GOVTDEBT), governance (GOVRNANC), and political stability (POLSTB) changes.

Finally, we have equation for income inequality (INCINEQ) as follows.

$$\mathrm{INCINEQ_{it}} = \gamma_0 + \gamma_1 \mathrm{INCINEQ_{it-1}} + \gamma_2 \mathrm{NDCTOT_{it}} + \gamma_3 \mathrm{GOVTSIZE} + \gamma_4 \mathrm{GOVRNANCE_{it}} + \gamma_5 \mathrm{POLSTB_{it}} + \gamma_6 \mathrm{GOVTDEBT_{it}} + \gamma_7 (\mathrm{NDCTOT} * \mathrm{GOVTSIZE})_{\mathrm{it}} + \gamma_8 (\mathrm{NDCTOT} * \mathrm{GOVRNANCE})_{\mathrm{it}} + \gamma_9 (\mathrm{NDCTOT} * \mathrm{POLSTB})_{\mathrm{it}} + \gamma_{10} (\mathrm{NDCTOT} * \mathrm{GOVTDEBT})_{\mathrm{it}} + \gamma'_{11} \mathrm{CV_{8it}} + \varepsilon_{\mathrm{it}} \tag{2.2h}$$

Both INCINEQ and ν show income inequality and error term. Likewise, CV_8 indicates and includes a vector of control variables that is unemployment (UNEMPLMNT), human capital (HUCPTL), economic growth (ECGROWTH) and government size (GOVTSIZE). The rest of all undefined variables are defined before.

The conditional role of government size (GOVTSIZE), governance (GOVRNANC), political stability (POLSTB) and government debt (GOVTDEBT) for the effect of narrow dependent commodity terms of trade (NDCTOT) on income inequality (INCINEQ) is given from the equation (2.2h). That is:

$$\frac{\partial \mathrm{INCINEQ_{it}}}{\partial \mathrm{NDCTOT_{it}}} = \gamma_2 + \gamma_7 \mathrm{GOVTSIZE_{it}} + \gamma_8 \mathrm{GOVRNANC_{it}} + \gamma_9 \mathrm{POLSTB_{it}} + \gamma_9 \mathrm{GOVTDEBT_{it}} \tag{2.2h.1}$$

Equation (2.2h.1) shows that the impact of narrow dependent commodity terms of trade (NDCTOT) on income inequality (INCINEQ) changes as government size (GOVTSIZE), governance (GOVRNANC), political stability (POLSTB) and government debt (GOVTDEBT) changes.

2.4.3.1.2 Model Selection: Random Effects or Fixed Effects

Traditionally, when modelling panel data using econometrics, two main approaches are typically presented: fixed effects (FE) and random effects (RE). The FE approach captures time-invariant unobservable effects for each cross-section either explicitly through dummy variables or removed through time detrending. On the other hand, the RE approach treats the time-invariant unobservable effects as part of the disturbances by assuming zero correlation with the regressors.

Therefore, compared to the FE approach, the RE approach provides efficient and unbiased estimators if Hausman (1978) the assumption of zero correlation holds; otherwise, the FE approach is more suitable in this scenario. Thus, to investigate efficient and unbiased estimators, the commonly used specification test (HST) can be employed to choose the appropriate approach between FE and RE. In the HST, RE is preferred under the null hypothesis due to higher efficiency, while under the alternative hypothesis, FE is at least as consistent and thus desirable. Nevertheless, in the context of dynamic panel data sets, such as in our case, one could also utilize and implement the HST.[58] As a result, we initially execute the dynamic RE model followed by the dynamic FE model, preserving the-

Table 2.1: Results of the Hausman Specification Test

Macroeconomic Models	Output	$\chi2$ – Statistics	71.11
		p-Value for $\chi2$ (8)	0.0000
	Investment	$\chi2$ – Statistics	40.02
		p-Value for $\chi2$ (7)	0.0000
	Unemployment	$\chi2$ – Statistics	97.61
		p-Value for $\chi2$ (6)	0.0000
	External Balance	$\chi2$ – Statistics	17.65
		p-Value for $\chi2$ (7)	0.0136
	Inflation	$\chi2$ – Statistics	215.36
		p-Value for $\chi2$ (6)	0.0000
	Exchange Rate	$\chi2$ – Statistics	124.86
		p-Value for $\chi2$ (8)	0.0000
	Government Expenditure	$\chi2$ – Statistics	147.90
		p-Value for $\chi2$ (7)	0.0000
	Income Inequality	$\chi2$ – Statistics	24.14
		p-Value for $\chi2$ (6)	0.0000

Note: $\chi2$ represents chi-square, whereas $\chi2$ ( ) indicates several independent variables.

outcomes for each scenario, and subsequently applying the HST. The HST outcomes reveal that the null hypothesis of the preferred RE is rejected at a 1% significance level (refer to Table 2.1). This suggests that our dataset contains an unobservable FE; hence, it is more suitable to employ the dynamic fixed effects technique for Equations (2.1) or (2.2) to attain consistent and efficient results (while considering that this technique will not be suitable if there is no endogeneity present).

2.4.3.2 Estimation Technique

Equations (2.1) or (2.2) cannot be estimated using simple ordinary least squares (OLS), least squares dummy variable (LSDV), simple/conventional fixed effects (FE), or simple/conventional random

[58] For a detailed discussion, see Liu (2010).

effects (RE) estimators. The presence of the lag dependent variable (MV_{it-1}) in Eqs. (2.2) indicates that one of the explanatory variables is correlated with the error term, ε_{it}, through its correlation with the time-invariant component of the error term, η_i, potentially causing a simultaneity problem and thus an endogeneity problem. Additionally, the potential feedback effects of macroeconomic variables (MVs) on other explanatory variables may lead to endogeneity. Therefore, using traditional estimation techniques to estimate the model is likely to produce biased regression coefficients and estimates (Eberhardt and Teal, 2013; Judson and Owen, 1999; Nickell, 1981). Unlike conventional cross-sectional regressions, dynamic instrumental regressions utilize internal instruments, which are the lagged values of the instrumented variables. However, it can be difficult to find appropriate instruments for lagged dependent variables, leading to potential estimation challenges. Therefore, Anderson and Hsiao (1981) proposed using the lagged dependent variable (MVs, in our case) as an explanatory variable (MV_{it-1}, in our case), which is then instrumented with its lagged values (MV_{it-2}, MV_{it-3}, etc., in our case) as these lagged terms are uncorrelated with the error term ε_{it}. Similarly, the dynamic instrumental variable estimator also addresses endogeneity issues in other lagged explanatory variables by employing various respective lagged values as instruments for independent variables (Irfanullah and Iqbal, 2023; Amin et al., 2020; Borensztein and Reinhart, 1994; and others). In this context, the validity of the instruments is assessed by the probability values of Hansen's (1982) J-statistic, which represents a comprehensive version of Sargan's (1958) test. Consequently, this research employs the dynamic fixed effect instrumental variable (DFEIV) method as an estimator, following the recommendation of Anderson and Hsiao (1981) and others, to achieve consistent and efficient estimates for Eq. (2.1) in a broader sense and Eq. (2.2) specifically.[59] The probability values of Hansen's J-statistic demonstrate the validity of our used instruments (see Tables 2.2, 2.4, 2.6, 2.8, 2.10, 2.12, 2.14, and 2.16 in the results and discussion section).

2.4.4 Descriptive Statistics of Export Dependent Economies

The descriptive statistics that is summary statistics and correlation matrices of our macroeconomic variables are presented in Appendices of A2 and B2 in detail.

[59]Nonetheless, within the existing literature, alternative estimators are present, including the widely used and appropriate generalized method of moments (GMM) estimator in our scenario. Consequently, prior to employing the DFEIV approach, we initially utilized the GMM estimator. Unfortunately, we encountered the issue that the "number of instruments must be less than the number of groups/cross-sections," leading us to opt for the alternative approach, the DFE-IV technique.

2.5 Results and Discussion

In this section, we discuss our DFEIV and FE estimation results for both NDCTOT and NDCTOT booms and busts' impact on macroeconomic variables, respectively.

2.5.1 Macroeconomic Effects of Narrow Dependent Commodity Terms of Trade

2.5.1.1 Effects of Narrow Dependent Commodity Terms of Trade on Output

To account for the dynamic effects of output fluctuations, this study includes a one-period lag of the dependent variable, specifically output(t-1). The inclusion of this lag is well-established in the literature for various reasons (Taylor and Woodford, 1999; Barro, 1987; Samuelson, 1939). For example, firms require time to adjust their production levels in response to changes in demand or other factors. This may be due to physical lags in production processes, material ordering, and the hiring and training of personnel. As a result, current output is influenced not only by current stimuli but also by past output levels, captured by the lagged term. Additionally, economic agents base their current decisions on expectations about future conditions, and these expectations often incorporate past outcomes, such as past output levels. Therefore, lagged output can act as a proxy for expectations and can influence current production decisions. The results of our study demonstrate that the coefficients of output(t-1), the lagged output demonstrative variable, consistently exhibit a positive sign, indicating that past output has a positive association with current output, suggesting that past output influences today's output. This relationship is statistically significant at the 1% level across all models (1–4) (refer to Table 2.2).

Table 2.2 demonstrates that the coefficients of NDCTOT tend to show the expected sign, and the relationship is statistically significant at the 1% level in models (1) and (4). However, model (2) is significant at the 5% level, and model (3) is significant at the 10% level. These results indicate that a more favorable NDCTOT leads to higher output of a country while keeping all other factors constant. Our findings are in line with the economic literature on the impact of NDCTOT and output (Sachs and Warner, 1995; Edwards, 1998; Gruss and Kebhaj, 2019, among others). Although the impact of NDCTOT on output is relatively weak in magnitude, it still explains fluctuations in output to some extent. For example, external events such as the Arab oil embargo of 1973 and the Iranian Revolution in 1979 led to significant oil price spikes, benefiting major oil exporters like Saudi Arabia, Iran, and Venezuela. Their economies experienced growth due to increased revenue, resulting in a more favorable NDCTOT, but also faced challenges in managing rapid wealth influx and inflation. Similarly, the Russia-Ukraine War (2022-present) caused supply chain disruptions and sanctions on Russia, leading to a surge in oil prices in 2022, thus creating a favorable NDCTOT for oil exporters but putting pressure on energy-importing nations. Additionally, during the super cycles of commodities (2003-2008), factors such as rapid Chinese economic growth, increased global liquidity, and infrastructure spending in developing countries led to sustained increases in prices for various commodities, including oil, metals, and agricultural products. Resource-rich nations like Brazil, Chile, Australia, and Angola experienced a more favorable NDCTOT and rapid economic growth during this period. Moreover, events such as the food price crisis (2007-2008) and the 2010-2011 Drought had significant impacts on NDCTOT and output. The combination of factors like droughts, biofuel production increase, and export restrictions triggered sharp rises in food prices, affecting both net food exporters and import-dependent countries. Furthermore, the electric vehicle boom led to increased demand for battery metals like lithium and cobalt, benefiting countries like Bolivia and the Democratic Republic of Congo.

The transmission of these favorable shocks to the domestic exporting economy can be observed in several ways. Firstly, as the prices of their key exports rise, exporting countries earn more foreign exchange, which in turn increases their purchasing power, allowing them to import more goods and services, including crucial inputs for domestic production. Secondly, higher exports relative to imports lead to a surplus in the current account, boosting foreign currency reserves. This surplus can stabilize the exchange rate and attract foreign investment for productive activities, further stimulating output growth. Thirdly, increased government revenue from export taxes or royalties on extracted resources can be utilized for crucial investments in infrastructure, education, and healthcare, laying the groundwork for long-term economic expansion. Additionally, a favorable NDCTOT incentivizes exporting countries to specialize in producing and exporting their comparative advantage goods, leading to economies of scale and improved efficiency in the export sector, ultimately boosting overall output. Furthermore, resources may be reallocated from non-tradable sectors with lower productivity to the export sector, resulting in a more efficient allocation of resources and higher potential output. Moreover, higher profits and improved economic prospects can lead to increased business confidence and investment in productive activities, generating additional jobs and boosting aggregate demand. Lastly, higher export earnings can translate into higher real wages for workers in the export sector, leading to increased consumption and aggregate demand, further stimulating economic growth (Prebisch, 1950; Singer, 1950; Corden and Neary, 1982; Harrod, 1939; Domar, 1947).

On the other hand, negative shocks to the commodity export-dependent economy have resulted in a decline in the NDCTOT and a decrease in output. For example, during the Asian Financial Crisis (1997-1998), the regional financial crisis triggered a sudden drop in demand for commodities, leading to price crashes for oil, metals, and timber. This had a significant impact on countries like Indonesia, Malaysia,

Table 2.2: Direct Effects of Narrow Dependent Commodity Terms of Trade on Output_Estimation Based on DFEIV

Independent Variables	Model (1)	Model (2)	Model (3)	Model (4)
Lag Dependent	0.925*** (0.0113)	0.933*** (0.0104)	0.933*** (0.0109)	0.912*** (0.0121)
NDCTOT	0.00828*** (0.00312)	0.00660** (0.00319)	0.00572* (0.00320)	0.0119*** (0.00407)
HUCPTL	0.0120* (0.0108)	0.0105* (0.00537)	0.00790 (0.00713)	0.00861 (0.00715)
INVSTMN	0.0187*** (0.00657)	0.0176*** (0.00656)	0.0165** (0.00652)	0.0181*** (0.00652)
INF	0.00555 (0.00525)	-0.0000715 (0.0000605)	-0.0000598 (0.0000606)	0.0000782 (0.0000759)
FDI	0.00535*** (0.00175)	0.00503*** (0.00177)	0.00511*** (0.00173)	0.00521*** (0.00170)
TRDOPNES	0.0540*** (0.0107)	0.0541*** (0.0105)	0.0531*** (0.0104)	0.0519*** (0.0103)
GOVTSIZE	-0.0424*** (0.00839)	-0.0463*** (0.00860)	-0.0460*** (0.00853)	-0.0596*** (0.00914)
POLSTB		-0.0123 (0.00834)		
NDCTOT x POLSTB		0.000592* (0.000308)		
GOVRNANC			0.0865** (0.0370)	
NDCTOT x GOVRNANC			0.00273*** (0.000955)	
FDEVLP				3.100*** (1.015)
NDCTOT x FDEVLP				-0.0302*** (0.0100)
Constant	0.804** (0.347)	0.758** (0.359)	0.710* (0.370)	0.785* (0.457)
Year Dummies	Yes	Yes	Yes	Yes
No. of Observations	677	676	677	640
No. of Groups	32	32	32	31
R-squared	99.91	99.89	99.89	99.89
p-Values for Hansen's J-Statistic	0.748	0.419	0.625	0.534

Notes: This table, models (1)-(4), is estimated through dynamic fixed effect within instrumental variable (DFEIV). The dependent variable is the output and lag dependent is independent of the output lag. Other independent variables are narrow dependent commodity terms of trade (NDCTOT), human capital (HUCPTL), investment (INVSTMN), inflation (INF), foreign direct investment (FDI), trade openness (TRDOPNES), government size (GOVTSIZE), political stability (POLSTB), governance (GOVRNANC), and financial development index (FDEVLP). All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Model (1) shows results of the base model solely, whereas models (2), (3), and (4) indicate results of the base model with POLSTAB, GOVRNANC, and FDEVLP as conditional variables and (NDCTOT x POLSTB), (NDCTOT x GOVRNANC), and (NDCTOT x FDEVLP) are their interactive terms, respectively.

and Thailand, which were heavily reliant on commodity exports, resulting in economic slowdown and currency depreciation. Similarly, the Dot-com Bubble Burst (2000-2001) led to a global economic slowdown and reduced demand for industrial metals like copper and nickel, causing economic contraction and job losses in economies like Chile and Zambia, which had significant copper exports. The 2008 Financial Crisis also had a profound impact, causing a sharp decline in demand for commodities across the board and leading to plummeting prices. Oil-dependent economies like Russia and Venezuela suffered severe economic downturns, while other resource-rich countries like Australia and Canada experienced significant budget deficits. Moreover, the US Shale Boom in the 2010s contributed to a gradual decline in prices from 2014 onwards, impacting major exporters like Russia and Venezuela. The COVID-19 Pandemic in 2020 led to widespread lockdowns and plummeting economic activity, resulting in a historic oil price crash in April 2020, which had adverse effects on oil-dependent economies. Additionally, the Chinese Economic Slowdown since 2012 has led to price declines for commodities like copper and iron ore, affecting countries such as Chile and Australia. Similarly, the COVID-19 pandemic also ran to a sharp drop in the prices of many commodities, including oil and metals.

Moreover, we include some important control variables in our models to assess their influence on output (refer to Table 2.2). That is, the impact of human capital (HUCPTL) on output is positive across models (1)-(4) but significant only in models (1) and (2). It is a significant factor in economic growth because it determines the productivity of workers, which can steer to an expansion in output. After all, workers with more human capital are more productive and can yield more goods and services (Wirajing et al., 2023). Similarly, investment (INVSTMN) is associated positively with output and significant in models (1), (2), and (4) at a 1% level and in model (3) at a 5% level. It is important for economic growth because it increases the productive capacity of the economy through spending on new capital goods, such as machinery, equipment, and infrastructure. As a result, these new capital goods allow workers to produce more goods and services. Therefore, a 1 percent increase in investment can lead to an increase in output (Kim et al., (2013). However, the coefficient of inflation (INF) is positive in models (1) and (4) while negative in models (2) and (3) but unfortunately statistically insignificant across all these models. Furthermore, the effect of foreign direct investment (FDI) positively affects output and is significant across models (1)-(4) at a 1% level. FDI is important for output/economic growth because it brings in new capital, technology, and skills. As a result, businesses expand their operations and produce more goods and services. Therefore, a 1 percent increase in FDI can lead to an increase in output (Demissie, 2015). Additionally, the coefficient of trade openness (TRDOPNES) is also positively correlated with output and significant at a 1% level through models (1)-(4). Output and economic growth are crucial as they enable countries to specialize in producing goods and services at which they excel, while also importing goods and services in which they lack expertise. TRDOPNES openness allows countries to benefit from economies of scale and to open a broader range of goods and services. Therefore, a 1 percent increase in trade openness can guide to an upsurge in output (Dao and Khuc, 2023). In contrast, government expenditure (GOVTSIZE) is negatively and significantly affecting output, in models (1)-(4), at a 1% level. The effect of government expenditure on output is not straightforward and can depend on the type of expenditure. For example, public investment in infrastructure can have a positive impact on output, while public consumption expenditure can harm output. Government expenditure is the spending by the government on goods and services, such as education, healthcare, and infrastructure. It is important for economic growth because it can provide the necessary public goods and services that support private sector growth. However, government expenditure can also be harmful to economic growth if it is inefficient or if it crowds out private investment. Therefore, a 1 percent increase in government expenditure is expected to lead to a decrease in output.

The effect of NDCTOT on output is expected to be influenced by other factors like economic structure, institutional quality, and government policies in place at the time of export commodity price shock of the export-dependent economy (as explained in the theoretical section above).

Therefore, we examine the impact of certain conditional variables on the impact of NDCTOT on output, expecting that the outcome of the output to vary based on these factors. For example, the interactive term of NDCTOT and POLSTB, (NDCTOT*POLSTB) is positive and significant at a 10% level in the model (2) of Table 2.2 while the individual effect of POLSTB is negative but insignificant. The interaction term coefficient signifies that the influence of NDCTOT on output depends on the level of POLSTB. Therefore, a positive interaction term suggests that output rises with an increase in NDCTOT when the conditioning variable POLSTB also increases, while the effect of NDCTOT on output diminishes or becomes negative as the level of POLSTB decreases or instability rises (1). Model (2) in Table 2.3 shows that as the level of POLSTB increases, from low to average to high, the NDCTOT effect on output also increases with a 5% significance level throughout the low, average, and high levels of POLSTB. There are a few economic justifications for this finding. First, political stability can create a more conducive environment for investment and economic growth (Kaufmann and Kraay, 1999; Barro,1991). When businesses and investors are confident that their investments will be protected, they are more prone to invest in new projects and increase their operations in response to increased demand for exported commodity(es) at a global level. This can further lead to increased output. Additionally, political stability can reduce uncertainty and risk. When businesses and investors are uncertain about the future, they are less likely to invest and expand their investments. This can lead to lower output and economic growth. Second, political stability can improve the quality of public goods and services. When governments are not distracted by political instability, they can focus on providing essential public goods and services, such as education, healthcare, infrastructure, and investments in government's new projects and continual of the old projects. This can improve the productivity of the workforce and thus further increase in output (Knack, 2003; Acemoglu and Robinson, 2012). Overall, we can compare the results, in terms of magnitude, of the impact of NDCTOT on output without POLSTB as a conditional variable and with POLSTB as a conditional variable. It is indicated that the impact of NDCTOT on output in the presence of improved POLSTB is more profound than the impact of NDCTOT on output without POLSTB (for more details, see model (2) in Tables 2.2 and 2.3).

Table 2.3: Indirect Effects of Narrow Dependent Commodity Terms of Trade on Output through Different Conditional Variables having Different Percentile Levels

Conditional Variables and their different levels	POLSTB From Model (2)	GOVRNANC From Model (3)	FDEVLP From Model (4)
Low	0.00602**	0.00669**	0.00869**
	(0.00318)	(0 .00316)	(0.00357)
Average	0.00690**	0.00687**	0.00713**
	(0.00318)	(0.00316)	(0.00342)
High	0.00701**	0.00722**	-0.0581***
	(0.00318)	(0.00316)	(0.0212)

Note: Political stability (POLSTB), governance (GOVRNANC), and financial development (FDEVLP) are conditional variables. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Low, Average, and High mean 25th, 50th, and 75th percentile respectively.

In addition, the interactive term of NDCTOT and GOVRNANC, (NDCTOT * GOVRNANC) is positive and significant at a 1% level and the individual effect of GOVRNANC is also positive and significant at a 5% level (refer to Table 2.2). The interaction term coefficient indicates that the effect of NDCTOT on output depends on the level of GOVRNANC. A positive interaction term implies that output rises with an increase in NDCTOT when the moderating variable GOVRNANC also increases, and vice versa. Model (3) in Table 2.3 shows that as the level of GOVRNANC increases, from low to average to high, the NDCTOT effect on output also increases with a 5% significance level throughout low, average, and high levels of GOVRNANC. This means that the effect of NDCTOT on output is stronger in countries with better governance and can take advantage of the higher export prices and increase their output. There are a few economic justifications for this finding. First, governance improves the efficiency and effectiveness of government institutions which can lead to several benefits for the economy, including improved infrastructure, better education, and a more stable legal system. As a result, when businesses and investors are confident that their investments are legally and governance-wise protected, they are more likely to finance in new projects and enlarge their operations in response to increased demand for exported commodity(es) at the global level. As a result, these factors collectively contribute to increased output and economic growth. Second, governance reduces corruption and favoritism. This creates a more level playing field for businesses and encourages investment and economic growth. For example, in countries with good governance, businesses are more expected to invest in new developments and hire new workers, which leads to increased output. Additionally, countries with better governance are also better able to attract foreign investment and technology, which can further boost their output. Third, countries with better governance are less likely to experience political instability and violence, which can disrupt economic activity and reduce output. Therefore, political stability and institutional quality have a strong positive effect on economic growth (Kaufmann and Kraay, 1999; Barro, 1991).[60] Overall, we can compare the results, in terms of magnitude, of the impact of NDCTOT on output without GOVRNANC as a conditional variable and with GOVRNANC as a conditional variable. It is indicated that the impact of NDCTOT on output in the presence of improved GOVRNANC is more profound (model (3) of Table 2.3) in terms of magnitude than the impact of NDCTOT on output without GOVRNANC (model (3) in Table 2.2).

Along with that, the interactive term of NDCTOT and FDEVLP, (NDCTOT * FDEVLP), is found to be negative and significant at a 1% level in model (4) of Table 2.2. However, the individual effect of FDEVLP is positive and significant at a 1% level. The coefficient of the interaction term indicates that the impact of NDCTOT on output is contingent upon the level of FDEVLP. Therefore, the negative interaction term suggests that output decreases with an increase in NDCTOT when FDEVLP, a conditioning or moderating variable, increases, while the effect of NDCTOT on output increases as the level of FDEVLP decreases. This means that the positive effect of NDCTOT on output is weaker in countries with more financial development. This means that the negative effect of the interactive term of NDCTOT and FDEVLP on output may be due to the harmful effects of NDCTOT volatility on investment and the negative effect of financial development beyond a certain threshold on economic growth (King and Levine, 1993; Kim and Roubini, 2008). Model (4) in Table 2.3 shows that as the level of FDEVLP increases, from low to average to high, the NDCTOT effect on output decreases with a 5% significance level throughout low and average levels of FDEVLP and converts to a negative effect on

[60] For a comprehensive review of the literature on the relationship between governance and economic growth, see Acemoglu and Robinson (2012).

high level of FDEVLP at 1% significant level. There are a few economic reasons for this finding. First, when NDCTOT increases, countries with more financial development can take advantage of the higher prices for their exports and increase their output. However, the increased financial development also makes these countries more vulnerable to asset price bubbles and financial crises. When asset prices rise too quickly, they can eventually crash, which can head to a decline in investment and economic growth. Additionally, financial crises can disrupt the flow of credit to businesses and households, which can also lead to a decline in economic activity and output. Largely, the finding suggests that policymakers should be cautious about promoting financial development too rapidly, particularly in countries that are highly dependent on commodity exports. Overall, we can compare the results, in terms of magnitude, of the impact of NDCTOT on output without FDEVLP as a conditional variable and with FDEVLP as a conditional variable. It is indicated that the impact of NDCTOT on output in the presence of improved FDEVLP is more severe and adversely profound, in terms of magnitude than the impact of NDCTOT on output without FDEVLP (for more details, see model (3) in Tables 2.2 and 2.3).

2.5.1.2 Effects of Narrow Dependent Commodity Terms of Trade on Investment

In order to account for the dynamic effects of investment fluctuations, this study includes a one-period lag of the dependent variable, specifically investment(t-1). This approach is well established in literature for various reasons (Dixit and Pindyck, 1994; Gould, 1968). For example, firms base their investment decisions on their desired capital stock and the associated adjustment costs related to altering their existing capital stock. These adjustment costs could involve planning, ordering, installation, and training time for new equipment. Consequently, current investment decisions are influenced not only by current factors but also by the existing level of capital stock, represented by lagged investment. Additionally, according to the accelerator principle, a growth in output results in a disproportionate increase in investment as firms endeavor to adjust their capital stock to the new desired level. The lagged investment term can capture this delayed response of investment to changes in output or other determinants. Therefore, incorporating lagged investment allows for a more consistent and unified framework for analyzing economic dynamics. Our study's results demonstrate that the coefficients of investment(t-1), the lagged investment demonstrative variable, consistently exhibit a positive sign, indicating that past investment has a positive association with current investment, suggesting that past investment influences today's investment. This relationship is highly statistically significant at the 1% level across all models (1–4) (refer to Table 2.4).

In contrast to our output variable, Table 2.4 shows that the coefficients of NDCTOT have a negative impact on investment. This study deviates from the conventional positive sign for investment, as it carries a negative sign with high levels of significance (1% and 5%) across models (1), (2), (4), and (3) respectively. The coefficients of NDCTOT suggest that an expansion in commodity terms of trade leads to a decrease in investment, all else being equal. Our findings are consistent with other studies (Cavalcanti et al., 2015 and others). It is important to note that the impact of an improvement in the terms of trade on investment is not always clear. Empirical evidence on the relationship between the terms of trade and investment is mixed. Some studies have found a positive relationship, as an improvement in the terms of trade can lead to an increase in investment, with firms taking advantage of more favorable terms to expand production and exports. However, others have found a negative relationship, as an improvement in the terms of trade can lead to a decrease in investment. There are several possible reasons why an improvement in the terms of trade can lead to a decrease in investment. Firstly, firms may choose to distribute increased profits to shareholders rather than reinvesting them in the business, reducing the amount of money available for investment. Secondly, firms may prefer to invest in other countries with lower production costs. Thirdly, an improvement in the terms of trade can lead to an appreciation of the domestic currency, known as 'Dutch disease', making imports cheaper and exports less competitive, leading to a decline in investment in export-oriented industries. Finally, an improvement in the terms of trade can lead to uncertainty about the future of the economy, as booms in the export sector are often followed by busts, discouraging firms from investing in new projects due to uncertainty about future demand and profitability. Additionally, fluctuations in commodity prices can have a significant impact on long-term economic growth, particularly for countries that rely on commodity exports. Increased volatility in commodity prices may lead to greater instability in government finances in commodity-exporting nations, resulting in intermittent public investment that could affect both physical and human capital investment (refer to, for example, Aghion et al., 2010; Acosta et al., 2009).

In addition, we included some important control variables in our models to examine their impact on investment (see Table 2.4). The impact of savings (SAVINGS) on investment is positive across models (1)-(4), but the significance level differs, being at the 5% level in models (2) and (3) and at the 10% level in models (1) and (4). The relationship between savings and investment is one of the most important in economics. The savings-investment equilibrium states that the total amount of savings in an economy must equal the total amount of investment for the economy to be at full employment.

Table 2.4: Direct Effects of Narrow Dependent Commodity Terms of Trade on Investment_Estimations Based on DFEIV

Independent Variables	Model (1)	Model (2)	Model (3)	Model (4)
Lag Dependent	0.658*** (0.0584)	0.683*** (0.0659)	0.712*** (0.0456)	0.634*** (0.0534)
NDCTOT	-0.0482*** (0.0227)	-0.0628*** (0.0224)	-0.0425** (0.0192)	-0.0651*** (0.0201)
SAVINGS	0.0296* (0.0142)	0.0264** (0.0128)	0.0275** (0.0127)	0.0220* (0.0122)
INTRATE	-0.00277 *** (0.00103)	-0.00187* (0.00103)	-0.00183* (0.00100)	-0.00177* (0.000996)
INF	0.000649*** (0.000201)	0.000586*** (0.000227)	0.000590* (0.000332)	0.000637*** (0.000201)
FDI	0.0593*** (0.00942)	0.0224* (0.0116)	0.000248 (0.00791)	0.0550*** (0.00967)
REMITTANCES	0.0382*** (0.0124)	0.00461 (0.0131)	0.0264** (0.0124)	0.0316** (0.0127)
FDEVLP		14.22** (5.791)		
NDCTOT x FDEVLP		0.137** (0.0572)		
EXCRATE			0.0972** (0.0423)	
NDCTOT x EXCRATE			-0.000998** (0.000500)	
POLSTB				6.443* (3.491)
NDCTOT x POLSTB				0.0666* (0.0351)
Constant	5.562*** (1.762)	7.243*** (2.286)	5.038*** (1.950)	7.356*** (2.022)
Year Dummies	Yes	Yes	Yes	Yes
No. of Observations	481	470	477	481
No. of Groups	34	33	32	34
R-squared	66.53	54.87	61.28	70.59
p-Values for Hansen's J-Statistic	0.721	0.389	0.542	0.867

Notes: This table, models (1)-(4), is estimated through dynamic fixed effect within instrumental variable (DFEIV). The dependent variable is the investment, and the lag dependent is independent of the investment lag. Other independent variables are narrow dependent commodity terms of trade (NDCTOT), savings (SAVINGS), interest rate (INTRATE), inflation (INF), foreign direct investment (FDI), remittances (REMITTANCES), financial development (FDEVLP), exchange rate (EXCRATE), and political stability (POLSTB). All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Model (1) shows the results of the base model solely, whereas models (2), (3), and (4) indicate the results of the base model with FDEVLP, EXCRATE, and POLSTB as conditional variables and (NDCTOT x FDEVLP), (NDCTOT x EXCRATE), and (NDCTOT x POLSTB), and are their interactive terms, respectively.

When savings increase, the supply of loanable funds increases, leading to a decrease in the interest rate. This makes it more attractive for businesses to invest, leading to an increase in investment. Therefore, a 1% increase in savings leads to a decrease in the cost of capital, making it more attractive for businesses to invest. This makes it possible for businesses to invest in more profitable projects that they would not have been able to afford before. This could lead to increased investment in export-oriented industries, which would boost NDCTOT. Similarly, the interest rate (INTRATE) is negatively associated with investment and significant at the 1% level in model (1) and at the 10% level in models (2)-(4). Interest rates, which account for inflation, can negatively affect investment in several ways. First, when real interest rates rise, the cost of borrowing money increases for both businesses and individuals. As a result, this can discourage investment in new projects, expansion, and equipment, as borrowing becomes less appealing. Companies may delay or even cancel projects if the expected return on investment doesn't justify the higher borrowing costs. Second, rising interest rates make existing fixed-income investments like bonds more attractive. Investors may shift their portfolios away from riskier assets like stocks towards safer bonds, leading to a decline in demand for stocks and potentially lowering their prices. This reduced potential return on stocks can further discourage investment in riskier ventures. Third, when evaluating potential investments, businesses and investors discount future cash flows rearward to their present value. Larger interest rates lead to a steeper discount rate, implying that future cash flows have a lower present value. This can make long-term projects, which typically have cash flows spread over longer periods, appear less attractive and deter investment. Fourth, slower economic growth: When investment declines due to higher interest rates, it can lead to slower economic growth. This, in turn, can further dampen investment sentiment as businesses might anticipate lower future demand for their products and services.

In addition, the coefficient of inflation (INF) positively affects investment and is significant at the 1% level in models (1), (2), and (4), while at the 10% level in model (3). A 1% increase in inflation could lead to higher expected profits for export-oriented businesses. Inflation may hint to higher expected profits for businesses, which can encourage investment. This is because businesses can raise their prices to compensate for the increase in inflation. As a result, businesses conceivably be more probable to invest in new projects if they believe that they can earn higher profits in an inflationary environment. However, in general, a high rate of inflation is likely to discourage investment. For instance, a study by the International Monetary Fund noticed that a 1% rise in inflation leads to a 0.5% fall in investment in developing countries. This is because a high rate of inflation can erode the real value of investment returns, which discourages businesses from investing. Foreign direct investment (FDI) is positively correlated with investment and significant at the 1% level in models (1) and (4), and at the 10% level in model (2), but insignificant in model (3). FDI is important for investment because it brings in new capital, technology, and skills. As a result, businesses expand their operations and produce more goods and services in export-oriented industries, which can help to improve the productivity of domestic companies and make them more competitive. Additionally, FDI can help to create new jobs and expand existing businesses, which can lead to buildup in investment. For instance, a study by the World Bank found that a 1% increase in FDI leads to a 0.5% increase in investment in developing countries. Similarly, remittances (REMITTANCES) are positively correlated with investment and significant at the 1% level in model (1), while at the 5% level in models (3) and (4), but insignificant in model (2). Remittances are a source of income for households. They can lead to an increase in savings, which can be used to invest in a variety of activities, including starting new businesses, expanding existing businesses, and purchasing land and other assets. For instance, research by the Inter-American Development Bank unearthed that a 1% increase in remittances leads to a 0.25% increase in investment in Latin America. This is because households use remittances to invest in a variety of activities, including starting new businesses, expanding existing businesses, and purchasing land and other assets.

However, the impact of NDCTOT on investment is likely to depend on the conditional role of other factors, such as the structure, institutional quality, and government policies in place in the export-dependent economies at the time of export commodity price shock. Therefore, in this context, for instance, the interactive term of NDCTOT and FDEVLP, (NDCTOT * FDEVLP) is positive and significant at a 5% level along with the individual effect of FDEVLP in the model (2) of Table 2.4. The coefficient of interaction term implies that the impact of NDCTOT on investment is provisional upon the level of FDEVLP. So, the positive interaction term suggests that the negative effect of investment, in response to increased NDCTOT, decreases or improves when FDEVLP a conditioning variable increase and vice versa. The negative effect of NDCTOT on investment is weaker in countries with more financial development. More specifically, model (2) in Table 2.5 shows that as the level of FDEVLP increases, from low to average to high, the negative effect of NDCTOT on investment decreases with a 5% significance level throughout low and average levels of FDEVLP and on high level of FDEVLP at 10% significant level. This is due to the role of financial development in mitigating the adverse effects of commodity price volatility on investment, particularly in industries heavily reliant on external finance for long-term investments (Lee, 2023). There are a few economic reasons for this finding. First, a well-developed financial system provides better access to credit and other financial services, which can help firms, especially those in commodity-dependent industries, cope with the negative effects of volatile commodity prices on investment. This is supported by the theory of the financial accelerator, which suggests that financial development can amplify or dampen the impact of external shocks on investment, depending on the level of financial development (Aghion et al., 2018; Aghion et al., 2005). Developed financial markets allow for efficient allocation of capital and access to diverse investment options, reducing dependence on volatile commodities. This benefit, however, requires efficient institutions and regulatory frameworks to ensure productive investment. Financial instruments like derivatives and futures contracts enable businesses to hedge against commodity price fluctuations. Efficient financial markets disseminate information about commodity prices and economic conditions, facilitating informed investment decisions. The quality and accessibility of information varies across different levels of financial development. Lower transaction costs in developed markets can encourage investment even with low commodity prices. However, the impact might be limited for small businesses or in informal financial sectors. The overall quality of institutions, including legal systems, property rights protection, and regulatory frameworks, plays a crucial role in determining how effectively financial development can mitigate the negative impact of

Table 2.5: Indirect Effects of Narrow Dependent Commodity Terms of Trade on Investment through Different Conditional Variables having Different Percentile Levels

Conditional variables and their different levels	FDEVLP From Model (2)	EXCRATE From Model (3)	POLSTB From Model (4)
Low	-0.0484**	-0.0435**	-0.0423**
	(0.0203)	(0.0193)	(0.0165)
Average	-0.0413**	-0.0455**	-0.0319*
	(0.0198)	(0.0194)	(0.0176)
High	-0.0195*	-0.0485**	-0.0219*
	(0.0211)	(0.0198)	(0.0199)

Note: Financial development (FDEVLP), exchange rate (EXCRATE), and Political stability (POLSTB) are conditional variables. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Low, Average, and High mean 25th, 50th, and 75th percentile respectively.

terms of trade shocks. Conditional convergence theory proposes that countries with similar levels of financial development tend to converge in terms of economic growth, but the convergence rate depends on factors like institutional quality and government policies. Theories like McKinnon-Shaw's financial repression hypothesis and the endogenous growth theory emphasize the role of financial development in promoting investment and economic growth. Overall, we can compare the results, in terms of magnitude, of the impact of NDCTOT on investment without FDEVLP as a conditional variable and with FDEVLP as a conditional variable. It is indicated that the impact of NDCTOT on investment in the presence of improved FDEVLP is more useful and profound in reducing the negative effect of

NDCTOT on investment, in terms of magnitude than the impact of NDCTOT on investment without FDEVLP (for more details, see model (2) in Tables 2.4 and 2.5).

Moreover, the interactive term of NDCTOT and EXCRATE, (NDCTOT * EXCRATE) is negative, while the individual effect of EXCRATE is positive, as both effects are significant at the 10% level (see, model (3) of Table 2.4). This represents that the impact of NDCTOT on investment is dependent on the level of EXCRATE. The negative interaction term suggests that the negative effect of investment further increases or is worse off in countries where the level of EXCRATE increases/depreciates and vice versa. Model (3) in Table 2.5. indicates that as the level of EXCRATE increases, from low to average to high, the negative effect of NDCTOT on investment further intensifies with a 10% significance level. The impact of nominal exchange rate fluctuations is more pronounced in countries with flexible exchange rate regimes compared to those with fixed or managed regimes. The openness of the economy to international trade significantly influences the effect of exchange rate fluctuations on investment. The highly increased and volatile nominal exchange rate creates uncertainty about future exchange rates, making it difficult for businesses to accurately predict costs and returns on investments. This could result in a reduction in investment, particularly in long-term projects. Additionally, high volatility can create uncertainty about the future value of the domestic currency. This can lead risk-averse investors to seek safer havens such as foreign assets with more stable currencies. If exchange rate volatility is accompanied by depreciation of the domestic currency, returns on domestic assets become less attractive compared to foreign assets. This can encourage investors to shift their investments to countries with stronger currencies and potentially higher returns. Volatile exchange rates can increase the perceived risk of domestic assets, motivating investors to broaden their portfolios by holding more foreign assets. This can lead to capital flight, further pushing down the domestic currency and potentially exacerbating the outflow. Similarly, increased and volatile nominal exchange rates can also exacerbate financial instability by increasing risks for foreign currency-denominated debt and encouraging speculative short-term investments. This can create a chilling effect on long-term investments and undermine macroeconomic stability. Overall, we can compare the results, of the impact of NDCTOT on investment without EXCRATE as a conditional variable and with EXCRATE as a conditional variable. It is indicated that the impact of NDCTOT on investment in the presence of high and volatile EXCRATE is more adverse and profound to further increase the negative effect of NDCTOT on investment, in terms of magnitude, than the impact of NDCTOT on investment without EXCRATE (for more details, see model (3) in Tables 2.4 and 2.5).

Furthermore, the interactive term of NDCTOT and POLSTB, (NDCTOT * POLSTB) along with the individual effect of POLSTB is positive and significant at a 10% level (see, model (4) of Table 2.4). The coefficient of interaction term indicates that the effect of NDCTOT on investment is contingent on the level of POLSTB. The positive interaction term intends that the negative effect of investment decreases or improves in countries where POLSTB improves because political stability lessens the adversative effects of commodity price volatility on investment (for more details, see model (4) in Table 2.5). Political stability is a crucial factor for investment decisions, as it provides a favorable environment for businesses to operate and grow (Lee, 2023). This implies that investors favour to invest in countries with more stable political conditions. Additionally, political stability ensures the protection of property rights, encouraging investment by reducing the risk of expropriation or confiscation. As well as effective contract enforcement mechanisms facilitate business transactions and encourage investment by fostering trust and predictability. Political stability minimizes bureaucratic hurdles and corruption, leading to lower transaction costs and making investment more attractive. A stable political environment fosters investor confidence, attracting both domestic and foreign capital. Theories of economic growth and development emphasize the importance of political stability for creating a conducive environment for investment and economic prosperity. Endogenous growth theory suggests that political stability fosters innovation and technological progress, which are key drivers of long-term economic growth (Romer, 1990). Similarly, new institutional economics highlights the role of institutions, including the rule of law and political stability, in shaping investment incentives and promoting economic development (North, 1990). Higher volatility in commodity prices may induce greater volatility in government finances, which in turn can affect investment in physical and human capital. However, the presence of political stability can help mitigate these negative effects. Overall, we can compare the results, in terms of magnitude, of the effect of NDCTOT on investment without POLSTB as a conditional variable and with POLSTB as a conditional variable. It is indicated that the impact of NDCTOT on investment in the presence of improved POLSTB is more useful and profound in reducing the negative effect of NDCTOT on investment, in terms of magnitude than the impact of NDCTOT on investment without POLSTB (for more details, see the model (4) in Tables 2.4 and 2.5).

2.5.1.3 Effects of Narrow Dependent Commodity Terms of Trade on Unemployment

In order to capture the dynamic effects of unemployment fluctuations, this study includes a one-period lag of the dependent variable, specifically unemployment(t-1). This approach is well established in the literature for various reasons (Blanchard and Summers, 1986; Nickell, 1979). For example, unemployment often demonstrates a degree of persistence, indicating that past levels influence current unemployment levels. Additionally, long-term unemployment can result in skill erosion and a detachment from the labor market, making it more challenging for individuals to secure new jobs. Prolonged periods of unemployment may also lead individuals to become discouraged and cease actively seeking employment, further contributing to the persistence of unemployment. Moreover, employment protection legislation, unemployment benefits, and collective bargaining arrangements can also impact the persistence of unemployment. Furthermore, economic theory suggests that unemployment can have enduring effects, even after the initial shock that caused it has subsided. This phenomenon, known as hysteresis, implies that past unemployment levels can directly impact current levels. Our study's results demonstrate that the coefficients of unemployment(t-1), the lagged unemployment demonstrative variable, consistently exhibit a positive sign, indicating that past unemployment has a positive association with current unemployment, suggesting that past unemployment influences today's unemployment. This relationship is highly statistically significant at the 1% level across all models (1–4) (refer to Table 2.6).

Similarly, Table 2.6 indicates that the coefficients of NDCTOT also hurt unemployment, with significance levels of 5% and 10% throughout models (1), and (2)-(4), respectively. The coefficients of NDCTOT suggest that an expansion in commodity terms of trade creates a slight decrease in unemployment or an increase in employment, all else being equal. Our findings are consistent with other studies (Acosta et al., 2009; Aghion et al., 2010; Aizenman and Jinjarak, 2010). There are several possible explanations for this negative relationship. One possibility is that an improvement in the terms of trade makes exports more profitable, leading to increased demand for labor from export-oriented industries, thereby decreasing the unemployment rate as more people are employed in these industries. Another possibility is that an increase in the terms of trade leads to higher incomes for households and businesses, resulting in increased spending on goods and services, which can boost economic activity and create new jobs. However, it is critical to observe that the relationship between NDCTOT and unemployment can also be complex and ambiguous. If the terms of trade improve due to a general increase in the prices of all exportable commodities, this may have a less pronounced impact on unemployment, as the increase in employment in export-oriented industries may be offset by a decrease in employment in import-competing industries. This is because an improvement in the terms of trade can make imported goods cheaper, leading to a decline in demand for domestically produced goods and services. However, the magnitude of this relationship is likely to depend on several factors, such as the specific commodities that are exported and the structure of the economy (Ait-Sahalia et al., 2014; Claessens et al., 2012). In some cases, an improvement in the terms of trade can lead to a decrease in

Table 2.6: Direct Effects of Narrow Dependent Commodity Terms of Trade on Unemployment_Estimations Based on DFEIV

Independent Variables	Model (1)	Model (2)	Model (3)	Model (4)
Lag Dependent	0.808*** (0.0197)	0.808*** (0.0197)	0.802*** (0.0201)	0.806*** (0.0201)
NDCTOT	-0.0215** (0.0105)	-0.0179* (0.00975)	-0.0200* (0.0105)	-0.0196* (0.0104)
OUTPUT	-0.0511 (0.0405)	-0.0441 (0.0349)	-0.0492 (0.0407)	-0.0376 (0.0425)
INF	-0.0195 (0.0180)	-0.00948 (0.0166)	-0.0131 (0.0182)	-0.0164 (0.0180)
FDI	0.00120 (0.00507)	0.000905 (0.00499)	-0.0000959 (0.00509)	-0.000184 (0.00506)
POPULATN	-0.125** (0.0525)	-0.101** (0.0493)	-0.148*** (0.0548)	-0.145*** (0.0544)
GOVTDEBT	-0.0269** (0.0123)	-0.0499** (0.0224)	-0.0269** (0.0123)	-0.0276** (0.0123)
NDCTOT x GOVTDEBT		0.000491** (0.000218)		
POLSTB			0.0799 (0.0985)	
NDCTOT x POLSTB			-0.00216** (0.000989)	
GOVRNANC				-0.785** (0.0327)
NDCTOT x GOVRNANC				-0.0103*** (0.00329)
Constant	5.833*** (1.441)	4.757*** (1.048)	6.043*** (1.446)	5.749*** (1.434)
Year Dummies	Yes	Yes	Yes	Yes
No. of Observations	941	940	941	941
No. of Groups	48	48	48	48
R-squared	83.59	86.94	81.61	82.96
p-Values Hansen's J-Statistic	0.683	0.493	0.725	0.361

Notes: This table, models (1)-(4), is estimated through dynamic fixed effect within instrumental variable (DFEIV). The dependent variable is the unemployment and the lag dependent is an independent of the unemployment lag. Other independent variables are narrow dependent commodity terms of trade (NDCTOT), output (OUTPUT), inflation (INF), foreign direct investment (FDI), population (POPULATN), government debt (GOVTDEBT), political stability (POLSTB), and governance (GOVRNANC). All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Model (1) shows results of the base model solely, whereas models (2), (3), and (4) indicate results of the base model with GOVTDEBT, POLSTAB, and GOVRNANC as conditional variables, and (NDCTOT x DEBT), (NDCTOT x POLSTB), and (NDCTOT x GOVRNANC), are their interactive terms, respectively.

employment, particularly in import-competing industries, because an improvement in the terms of trade can make imported goods inexpensive, leading to a decline in demand for domestically produced goods and services.

Furthermore, we included some important control variables in our models to examine their impact on unemployment (see Table 2.6). First, the impact of output (OUTPUT) on unemployment is consistently negative across all models (1)-(4), but unfortunately, it is insignificant. Second, the coefficient of inflation (INF) is theoretically negative, but it is also insignificant across all models (1)-(4). Third, the coefficient of foreign direct investment (FDI) shows both positive and negative correlations with unemployment in models (1), (2), and (3), (4) respectively, but it is insignificant across all models. Fourth, population (POPULATN) is consistently and significantly associated with unemployment across all models. A larger population means a larger labor force, which can lead to an increase in unemployment as more people compete for the same jobs. Therefore, a 1% increase in population is likely to lead to a small increase in unemployment (Blanchard and Katz, 1997). Fifth, the coefficient of GOVTDEBT negatively affects unemployment and is statistically significant across all models (1)-(4) at the 5% level. Government debt is often used to finance government spending on infrastructure, education, and other public goods. This spending may lead to an increase in economic growth and job creation, resulting in decreased unemployment (Barro, 1989; Bohn, 2008).

However, the overall impact of NDCTOT on unemployment is also likely to depend on export-dependent economies' economic structure, institutional quality, and government policies in place. Therefore, in this context, the interactive term of NDCTOT and GOVTDEBT, (NDCTOT * GOVTDEBT) is positive and significant at a 5% level in the model (2) of Table 2.6. The coefficient of interaction term signifies that the impact of NDCTOT on unemployment is conditional upon the level of GOVTDEBT. So, this means that the negative effect of unemployment decreases, or the employment level falls when GOVTDEBT a conditioning variable increase and vice versa. Model (2) in Table 2.7 shows that as the level of GOVTDEBT increases, from low to average to high, the negative effect of NDCTOT on unemployment decreases in a low level of GOVTDEBT at 10% level, but still negative, however, this unemployment decreasing effect gone away or convert to positive numbers as GOVTDEBT level increases to average and high, with 10% level of significant. More explicitly, when governments experience unexpected revenue increases, like a surge in commodity prices, a part of this windfall might be used to increase spending. This "windfall gain effect" can positively impact the economy and employment. However, with high debt levels, governments might feel pressured to use windfall gains to pay down debt or serve existing interest payments rather than increase government spending domestically. This reduced windfall gain effect weakens the positive impact on the economy and potentially leads to lower employment growth. This means that the negative impact of NDCTOT on unemployment is weaker in countries with more GOVTDEBT burden as compared to less GOVTDEBT burden. The elevated level of government debt limits the government's capability to increase its spending in response to an increase in government revenue due to export commodity price boom(s). That is, governments might resort to austerity measures, such as spending cuts or tax increases, to reduce borrowing. These austerity measures can directly suppress economic activity and lead to job losses, depending on their design and implementation. Overall, we can compare the results, in terms of magnitude, of the influence of NDCTOT on unemployment without GOVTDEBT as a conditional variable and with GOVTDEBT as a conditional variable. It is indicated that the impact of NDCTOT on unemployment in the presence of GOVTDEBT is weaker and converts to an increase in unemployment, in terms of magnitude and sign, than the impact of NDCTOT on unemployment without GOVTDEBT (for more details, see model (4) in Tables 2.6 and 2.7).

Table 2.7: Indirect Effects of Narrow Dependent Commodity Terms of Trade on Unemployment through Different Conditional Variables having Different Percentile Levels

Conditional variables and their different levels	GOVTDEBT From Model (2)	POLSTB From Model (3)	GOVRNANC From Model (4)
Low	-0.00641*	-0.0207**	-0.0233**
	(0.0104)	(0.0105)	(0.0104)
Average	0.00393*	-0.0211**	-0.0241**
	(0 .0128)	(0.0105)	(0 .0105)
High	0.0162*	-0.0214**	-0.0255**
	(0.0169)	(0.0105)	(0.0105)

Note: Government debt (GOVTDEBT), Political stability (POLSTB), and governance (GOVRNANCE) are conditional variables. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Low, Average, and High mean 25th, 50th, and 75th percentile respectively.

Additionally, the interactive term of NDCTOT and POLSTB, (NDCTOT * POLSTB) is negative and significant at a 10% level and unfortunately, the individual effect of POLSTB is positive but insignificant (see, model (3) of Table 2.6). The coefficient of interaction term suggests that the effect of NDCTOT on unemployment is conditional upon the level of POLSTB. So, this means that the negative effect of NDCTOT on unemployment increases or unemployment decreases when POLSTB a conditioning or moderating variable increases and vice versa. This means that the negative effect of NDCTOT on unemployment is stronger in countries with more steady political systems. Specifically, the negative impact of NDCTOT on unemployment is greater when political stability is high, and smaller when political stability is low. This is due to the role of political stability in reinforcing the favorable effects of commodity price booms on employment. Model (3) in Table 2.7 shows that as the level of POLSTB increases, from low to average to high, the negative effect of NDCTOT on unemployment increases with a 5% significance level. There are a few economic reasons for this finding. First, political stability allows for the efficient allocation of resources towards export-promoting sectors, ensuring that windfall gains from export booms are directed towards areas that maximize their impact on job creation. Political stability fosters confidence in the government and economy, encouraging domestic and foreign investment. This increased investment can lead to increased exports through capacity expansion and technological advancements. This is because political stability can help to attract investment and promote economic growth, which can boost the negative/decreasing effects of the NDCTOT boom. When political stability is high, businesses are more likely to finance in the country, which can create jobs and reduce unemployment. Additionally, political stability allows policymakers to focus on long-term economic development strategies, rather than short-term political concerns, ensuring sustainable utilization of windfall gains. This can include trade agreements, infrastructure development, and skill development programs, all of which can contribute to export competitiveness and growth. Political stability reduces uncertainty about economic policies and regulations, making it easier and simple for businesses to plan and invest in export-oriented activities. This reduced risk lowers barriers to entry and encourages new firms to join the export market (for more details see, Acemoglu and Robinson, 2012; Levine & Renelt, 1992). Overall, we can compare the results, in terms of magnitude, of the impact of NDCTOT on unemployment without POLSTB as a conditional variable and with POLSTB as a conditional variable. It is indicated that the impact of NDCTOT on unemployment in the presence of improved POLSTB is more useful and profound to increase the negative effect of NDCTOT on unemployment, in terms of magnitude, than the impact of NDCTOT on unemployment without POLSTB (for more details, see model (3) in Tables 2.6 and 2.7).

Moreover, the interactive term of NDCTOT and GOVRNANC, (NDCTOT * GOVRNANC) is negative along with the individual effect of GOVRNANC however the former is significant at a 1% level while the latter is at 5% level in model (4) of Table 2.6. The coefficient of interaction term proposes that the impact of NDCTOT on unemployment is conditional on the level of GOVRNANC. So, the negative interaction term means that the negative effect of NDCTOT on unemployment increases or unemployment decreases when GOVRNANC a conditioning or moderating variable increases and vice versa. That is, governance leads to an increase in economic growth, which in turn leads to a decrease in unemployment. This means that the negative effect of NDCTOT on unemployment is stronger in countries with stronger governance levels. For more details, model (4) in Table 2.7 shows that as the level of GOVRNANC increases, from low to average to high, the negative effect of NDCTOT on unemployment increases with a 5% significance level. Specifically, the negative impact of CTOT on unemployment is greater when governance is good, and smaller when governance is poor. This is because good governance can amplify the favorable economic consequences of NDCTOT shocks. An increase in governance leads to an increase in regulations and bureaucracy, which in turn leads to an increase in investment and economic growth and a decrease in unemployment. Good governance reduces corruption and mismanagement, ensuring windfall gains are directed towards intended programs and investments. Transparent budgeting and procurement processes foster public trust and encourage private sector participation, maximizing the multiplier effect of spending. This leads to efficient allocation of resources, minimizing unproductive expenditures, and maximizing the impact on job creation. Additionally, strong institutions have the expertise and planning capabilities to effectively utilize windfall gains for targeted interventions in sectors with high job creation potential. Efficient implementation of programs ensures timely delivery of benefits to intended beneficiaries, leading to quicker economic stimulation and employment growth. Good governance promotes predictable policy environments and fosters long-term economic stability. This reduces uncertainty for businesses and investors, encouraging them to invest and create jobs. Good governance emphasizes inclusivity and stakeholder engagement in policymaking. This ensures windfall gains are directed towards sectors and programs that address the needs of the most vulnerable populations, contributing to broader economic participation and job creation. This is because good governance can help to create a stable and predictable economic environment, which can encourage investment and economic growth. Both investment and economic growth can lead to lower unemployment (Tatar et al., 2024; Berset and Schelker, 2020; Acemoglu and Robinson, 2012; Méndez-Picazo et al., 2012; Ndikumana, 2006). Overall, we can compare the results, in terms of magnitude, of the impact of NDCTOT on unemployment without GOVRNANC as a conditional variable and with GOVRNANC as a conditional variable. It is indicated that the impact of NDCTOT on unemployment in the presence of improved GOVRNANC is more useful and profound to increase the negative effect of NDCTOT on unemployment, in terms of magnitude, than the impact of NDCTOT on unemployment without GOVRNANC (for more details, see model (4) in Table 2.7 and in Table 2.6).

2.5.1.4 Effects of Narrow Dependent Commodity Terms of Trade on External Balance

In order to capture the dynamic effects of external balance fluctuations, this study includes a one-period lag of the dependent variable, specifically external balance(t-1). This approach is well established in the literature for various reasons (Razin, 1993; Persson and Svensson, 1985). For example, changes in external balance, often measured as the current account deficit, may take time to fully manifest due to adjustment lags in trade flows and capital movements. These lags could arise from contract negotiation, production lead times, or information dissemination. Consequently, current external balance might be influenced by past imbalances. Additionally, economic agents such as firms and households form expectations about future economic conditions based on past outcomes, including past external balance. These expectations can impact decisions related to imports, exports, and foreign investment, thereby affecting the current account. Similarly, external balance interacts with other dynamic elements such as output, investment, and exchange rates. Therefore, including lagged external balance allows for a more comprehensive framework to model these economic interdependencies. Our study's results demonstrate that the coefficients of external balance (t-1), the lagged external balance demonstrative variable, consistently exhibit a positive sign, indicating that past external balance has a positive association with current external balance, suggesting that past external balance influences today's external balance. This relationship is highly statistically significant at the 1% level across all models (1–5) (refer to Table 2.8).

Furthermore, Table 2.8 also indicates that the coefficient of NDCTOT shows a positive and significant effect on external balance, at 1% across models (1)-(5). The results demonstrate that an increase in NDCTOT induces an improvement in external balance. This is because a positive exogenous price shock in the international market for a domestic good will lead to an increase in the price of that good, resulting in a surplus in the current account. Our results align with the findings of (Daude et al., 2016). First, an increase in NDCTOT implies an increase in the prices of major exportable commodities, leading to increased export earnings for firms and the government, generating additional foreign currency inflows and improving the current account balance. Second, the relative price increase makes imports more expensive, potentially leading consumers and firms to substitute with domestic alternatives and lowering foreign currency outflows. A NDCTOT improvement can strengthen a country's comparative advantage in certain sectors, leading to increased exports and a current account surplus (Ricardo, 1817). However, a surge in export prices or resource rents in a specific sector (e.g., oil boom) can lead to resource misallocation and deindustrialization in other sectors known as Dutch Disease. However, a moderate and broad-based NDCTOT increase may not trigger Dutch Disease and instead improve the overall current account balance by encouraging diversification and productivity gains (Corden and Neary, 1982). Additionally, higher export earnings and reduced imports can stimulate aggregate demand through increased income and spending, potentially leading to further economic growth and improving the current account balance. NDCTOT gains act as a transfer of income from trading partners to the country experiencing the increase, boosting domestic aggregate demand and economic activity, contributing to increased exports and reduced imports (Keynes, 1936). As a result, there is a rise in the demand for exports and a decline in the demand for imports, leading to a trade surplus, which improves the current account balance. Furthermore, if the country has a net investment position in other countries, the increase in the prices of exported goods will lead to an increase in the country's net factor income, improving the current account balance. Finally, improved NDCTOTs can attract foreign investment and encourage domestic resource allocation towards export-oriented sectors. Additionally, an improvement in the external or current account balance may lead to an increase in the country's creditworthiness, attracting foreign investment and further enhancing and improving the current account balance (Daude et al., 2016; Aït-Sahalia et al., 2014; Claessens et al., 2012).

Additionally, we included some important control variables in our models to examine their impact on external balance (see Table 2.8). For example, the coefficient of trade openness (TRDOPNES) is positively correlated with external balance across all models (1)-(5), but significant only in models (1)-(3) at 5%. Openness to trade enables countries to specialize in producing goods and services in which they have a comparative advantage, while importing goods and services that can be produced more efficiently elsewhere. This can result in an increase in exports and a decrease in imports, thereby improving the current account balance or external balance (Chen, 2022; Neary, 2001). Similarly, the sign of the savings (SAVINGS) variable is per the theory, positive, across all models except model (4), but insignificant through included models (see Table 2.8). Likewise, the nominal exchange rate (EXCRATE) positively affects external balance in all models (1)-(5), but is significant only in the model (3) at the 5% level. A higher nominal exchange rate lowers the cost of a country's exports and increases the cost of imports. This can result in an increase in exports and a decrease in imports, ensuing in an improvement in the current account balance (Dornbusch, 1980). Moreover, output (OUTPUT) is positively and significantly associated with external balance across all included models except model (4), which is insignificant (see Table 2.8). The expansion of the domestic economy in the form of an increase in output can lead to an upsurge in exports and a decline in imports, resulting in a surplus in the balance of payments. For instance, if a country's economy is growing, domestic firms will produce more goods and services, leading to an expansion in exports as domestic firms become more competitive in the global market. Additionally, a growing economy can lead to a decrease in imports, as domestic consumers and businesses are able to produce more of the goods and services than they were previously importing (Dornbusch, 1980). In contrast, foreign direct investment (FDI) is negative and significantly affects external balance at 1% level across all models (1)-(5). FDI inflows can drive domestic

Table 2.8: Direct Effects of Narrow Dependent Commodity Terms of Trade on External Balance_Estimations Based on DFEIV

IndependentVariables	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
Lag Dependent	0.531*** (0.0428)	0.621*** (0.0437)	0.552*** (0.0428)	0.586*** (0.0442)	0.506*** (0.0723)
NDCTOT	0.0390*** (0.00509)	0.0845*** (0.00685)	0.0382*** (0.00503)	0.0596*** (0.00601)	0.0584*** (0.00764)
TRDOPNES	0.0291** (0.0141)	0.0299** (0.0135)	0.0298** (0.0140)	0.0139 (0.0143)	0.0215 (0.0150)
EXCRATE	0.00475 (0.00315)	0.00451 (0.00301)	0.0133** (0.00570)	0.00300 (0.00310)	0.00407 (0.00359)
SAVINGS	0.00107 (0.00432)	0.00126 (0.00410)	0.00131 (0.00425)	-0.00185 (0.00427)	0.00273 (0.00468)
OUTPUT	0.0381** (0.0157)	0.0399*** (0.0152)	0.0408** (0.0161)	0.0290* (0.0155)	0.0212 (0.0174)
FDI	-0.0112*** (0.00275)	-0.0101*** (0.00266)	-0.0102*** (0.00271)	-0.0105*** (0.00270)	-0.0128*** (0.00302)
FEXCRESERS		0.260*** (0.0320)			
NDCTOT x FEXCRESERS		-0.00266*** (0.000319)			
NDCTOT x EXCRATE			-0.000117** (0.0000571)		
POLSTB				4.828*** (0.854)	
NDCTOT x POLSTB				-0.0485*** (0.00858)	
KAOPNES					1.743*** (0.496)
NDCTOT x KAOPNES					-0.0177*** (0.00490)
Constant	-2.844*** (0.601)	-7.737*** (0.783)	-2.916*** (0.605)	-4.848*** (0.679)	-4.218*** (0.751)
Year Dummies	Yes	Yes	Yes	Yes	Yes
No. of Observations	835	828	831	835	779
No. of Groups	42	42	42	42	42
R-squared	50.57	66.31	54.22	58.69	63.58
p-Values for Hansen's J-Statistic	0.827	0.567	0.410	0.732	0.619

Notes: This table, models (1)-(5), is estimated through dynamic fixed effect within instrumental variable (DFEIV). The dependent variable is the external balance (EXTBL), and the lag dependent is independent of the external balance lag. Other independent variables are narrow dependent commodity terms of trade (NDCTOT), trade openness (TRDOPNES), exchange rate (EXCRATE), savings (SAVINGS), output (OUTPUT), foreign direct investment (FDI), foreign exchange reserves (FEXCRESERS), capital account openness (KAOPNES) political stability (POLSTSB), governance (GOVRNANC). All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Model (1) shows results of the base model solely, whereas models (2), (3), (4), and (5) indicate results of base model with FEXCRESERS, EXCRATE, POLSTB, and KAOPNES as conditional variables and (NDCTOT x FEXCRESERS), (NDCTOT x EXCRATE), (NDCTOT x POLSTAB), and (NDCTOT x KAOPNES) are their interactive terms, respectively.

investment, increasing imports and decreasing exports, worsening current account balances by reducing surpluses. Higher FDI can boost imports of technology, capital goods, and raw materials, further impacting the current account balance negatively. Countries with better institutional quality attract more FDI, potentially leading to increased imports and investment, exacerbating current account deficits. The rise of efficiency-seeking FDI can also influence external balances, potentially stalling or reducing domestic consumption alongside GDP growth, affecting the overall balance (Sahoo et al., 2016; Mandel and Tomsik, 2008).

It is imperative to note that the effect of a change in the NDCTOT on the external balance also depends on a number of factors, such as the structure of the economy, institutions quality, and government policies in place at the time of export commodity price shock in the export-dependent economies. For instance, the interactive term of NDCTOT and FEXCRESERS, (NDCTOT * FEXCRESERS) is negative while the individual effect of FEXCRESERS is positive, however, both of them are significant at 1% level in the model (2) of Table 2.8. The coefficient of interaction term intends that the impact of NDCTOT on external balance is conditional upon the level of FEXCRESERS. So, the negative interaction term indicates that the positive effect of NDCTOT on external balance decreases, in response to favorable NDCTOT, when FEXCRESERS increases, but still positive, and vice versa. This means that the negative effect of NDCTOT on the external balance is weaker in countries with stronger FEXCRESERS levels. For more details, model (2) in Table 2.9 shows that as the level of FEXCRESERS increases, from low to average to high, the positive effect of NDCTOT on external balance decreases at a 1% significance level. A boom in NDCTOT typically leads to currency appreciation, especially with lower foreign exchange reserves (Edwards & Rigobon, 2009). This makes exports more expensive in foreign currency, potentially reducing export volumes and widening the trade deficit. However, it also simultaneously makes imports cheaper in domestic currency, leading to reduced import volumes and narrowing the trade deficit. The net effect on the trade balance depends on the relative price elasticities of exports and imports, Income effects, investment decisions, and policy responses can potentially mitigate the negative impact and even lead to improvement over time. With lower reserves, a positive shock in NDCTOT can exacerbate the "Dutch disease," where resource extraction becomes more attractive due to the appreciating currency. This can lead to resource misallocation and neglect of non-resource sectors, hindering overall economic growth and potentially lowering potential improvements in external balances beyond the immediate resource gains. Lower reserves provide less policy space for policymakers to arbitrate in the foreign exchange market and mitigate the appreciation pressurs (Aizenman et al., 2012; Gruss and Kebhaj, 2019). Overall, we can compare the results, in terms of magnitude, of the impact of NDCTOT on external balance without FEXCRESERS as a conditional variable and with FEXCRESERS as a conditional variable. It is indicated that the impact of NDCTOT on external balance in the presence of increased FEXCRESERS is more profound to decrease the NDCTOT impact on external balance, but still positive, in terms of magnitude, than the impact of NDCTOT on external balance without FEXCRESERS (for more details, see model (2) in Tables 2.8 and 2.9).

Similarly, the interactive term of NDCTOT and EXCRATE, (NDCTOT * EXCRATE) is negative and significant at a 5% level in model (3) of Table 2.8. This means that the impact of NDCTOT on external balance is conditional upon the level of EXCRATE. So, the negative interaction term means that the favorable effect of NDCTOT on external balance decreases when EXCRATE increases or depreciates and vice versa. That is the positive effect of NDCTOT on external balance is weaker in countries with having more volatile and depreciated EXCRATE. For more details, model (3) in Table 2.9 shows that as the level of EXCRATE increases, from low to average to high, the favorable effects of NDCTOT on external balance decrease with 1% significance level. There are a few economic reasons for this finding. It is well established in the literature that a flexible exchange rate can better manage its external balance, even when there are shocks to the commodity terms of trade. However, when the moderating effect of the exchange rate is considered, the favorable effect of NDCTOT on external balance is limited and diminishe. Meanwhile, a favorable NDCTOT started to appreciate the nominal exchange rate, which means that the domestic currency has become more expensive relative to foreign currencies. This makes the country's exports less competitive and its imports more expensive, which can offset the positive impact of the increase in NDCTOT on external balance (Lerner, 1936; Levy-Yeyati, and Sturzenegger, 2013). Overall, we can compare the results, in terms of magnitude, of the impact of NDCTOT on external balance without EXCRATE as a conditional variable and with EXCRATE as a conditional variable. It is indicated that the impact of NDCTOT on external balance in the presence of increased EXCRATE is more profound to decrease, in terms of magnitude than the impact of NDCTOT on external balance without EXCRATE (for more details, see model (3) in Tables 2.8 and 2.9).

Moreover, the interactive term of NDCTOT and POLSTB, (NDCTOT * POLSTB) is negative while the individual effect of POLSTB is positive but both effects are significant at a 1% level in the model (4) of Table 2.8. The coefficient of interaction term suggests that the impact of NDCTOT on external balance is conditional upon the level of POLSTB. So, the negative interaction term implies that the positive effect of NDCTOT on external balance decreases but is still positive, in response to increased

NDCTOT, when POLSTB a conditioning or moderating variable increases and vice versa. This means that the positive effect of NDCTOT on external balance is weaker in countries with more political stability. For more details, model (4) in Table 2.9 shows that as the level of POLSTB increases, from low to average to high, the positive effect of NDCTOT on external balance decreases with a 1% significance level. There are a few economic reasons for this finding. First, stable political systems might be less prone to implement bold structural reforms, particularly during periods of positive NDCTOT shocks. This could include measures like diversifying exports, improving productivity, or enhancing competitiveness. Without these reforms, the initial boost to the external balance from higher export prices might not translate into sustained improvement. Second, in highly stable political systems, powerful vested interests like incumbent industries or special interest groups might gain more influence.

Table 2.9: Indirect Effects of Narrow Dependent Commodity Terms of Trade on External Balance through Different Conditional Variables having Different Percentile Levels

Conditional variables and their different levels	FEXCRESERS From Model (2)	EXCRATE From Model (3)	POLSTB From Model (4)	KAOPNES From Model (5)
Low	0.0339***	0.0370***	0.0430***	0.0550***
	(0.00545)	(0.00507)	(0.00500)	(0.00736)
Average	0.0296***	0.0346***	0.0354***	0.0506***
	(0.00563)	(0.00534)	(0.00506)	(0.00716)
High	0.0238***	0.0310***	0.0282 ***	0.0424***
	(0.00593)	(0.00616)	(0.00544)	(0.00735)

Note: Foreign exchange reserves (FEXCRESERS), exchange rate (EXCRATE), Political stability (POLSTB), and capital account openness (KAOPNES), are conditional variables. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Low, Average, and High mean 25th, 50th, and 75th percentile respectively.

These groups might resist policies aimed at harnessing the benefits of terms of trade shocks for broader economic development, instead pushing for measures that benefit them directly. This could lead to an inefficient allocation of resources and limit the positive impact on the external balance. Third, stable governments might focus on short-term gains and prioritize policies that offer immediate benefits to their constituents, even if they have long-term negative consequences. This could involve spending windfalls from positive NDCTOT shocks on temporary programs or neglecting investments in infrastructure and human capital. Such short-termism could ultimately undermine the potential for sustained improvement in the external balance. Fourth, a long period of political stability, if not accompanied by continuous innovation and adaptation, could lead to complacency and a decline in the country's overall competitiveness. This could happen if industries fail to upgrade their technology, and skills, or adapt to changing global market conditions. Such erosion of competitiveness could eventually weaken the positive impact of NDCTOT shocks on the external balance. However, it is principal to think of that these are just some potential mechanisms, and the actual impact of political stability on the external balance in the context of NDCTOT shocks depends on several factors. First, stable democracies might be better at managing windfalls than stable autocracies. Second, positive shocks affecting essential imports might have different implications than those affecting exports. Third, countries with high external debt or fiscal imbalances might be more susceptible to negative consequences (Altayligil and Cetrez, 2020; Hussain and June, 2014). Overall, we can compare the results, in terms of magnitude, of the impact of NDCTOT on external balance without POLSTB as a conditional variable and with POLSTB as a conditional variable. It is indicated that the impact of NDCTOT on external balance in the presence of improved POLSTB is more profound in decreasing the external balance, in terms of magnitude than the impact of NDCTOT on external balance without POLSTB (for more details, see model (4) in Tables 2.8 and 2.9).

Furthermore, the interactive term of NDCTOT and KAOPNES, (NDCTOT * KAOPNES) is negative while the individual effect of KAOPNES is positive however both effect is significant at a 1% level in the model (5) of Table 2.8. The coefficient of interaction term represents that the impact of NDCTOT on external balance is contingent on the level of KAOPNES. So, the negative interaction term means that the positive effect of CTOT on external balance decreases, in response to increased NDCTOT, when KAOPNES a moderating variable increases and vice versa. This means that the positive effect of NDCTOT on external balance is weaker in countries with more open KAOPNES. For more details, model (5) in Table 2.9 shows that as the level of KAOPNES increases, from low to average to high, the positive effect of NDCTOT on external balance decreases with a 1% significance level. There are a few economic reasons for this finding. First, with open capital accounts, positive NDCTOT shocks might attract capital inflows due to higher expected returns on domestic assets. This increased capital inflow can appreciate the real exchange rate, making exports more costly and imports cheaper. This could potentially lead to a drop in net exports, offsetting the initial boost from improved NDCTOT. Second, large capital inflows can also lead to "crowding out" effects. The influx of foreign capital might drive down domestic interest rates, discouraging domestic investment and favoring short-term consumption. This can hinder long-term growth and productivity gains, ultimately limiting the potential for sustained improvement in the external balance. Third, in some cases, open capital accounts might encourage excessive borrowing based on optimism fueled by positive NDCTOT shocks. This can lead to increased external debt and vulnerability to foreign capital withdrawals, potentially exacerbating the negative impact of future NDCTOT declines. Finally, open capital accounts can amplify exchange rate volatility, making the external balance more sensitive to external shocks like NDCTOT changes. This volatility can create uncertainty and discourage long-term investment, further dampening the positive effects of NDCTOT windfalls. Overall, we can compare the results, in terms of magnitude, of the impact of CTOT on external balance without KAOPNES as a conditional variable and with KAOPNES as a conditional variable. It is indicated that the impact of CTOT on external balance in the presence of KAOPNES is more profound in decreasing the effect of CTOT on external balance, in terms of magnitude than the impact of CTOT on external without KAOPNES (for more details, see model (5) in Tables 2.8 and 2.9).

2.5.1.5 Effects of Narrow Dependent Commodity Terms of Trade on Inflation

In order to capture the dynamic effects of inflation fluctuations, this study includes a one-period lag of the dependent variable, specifically inflation(t-1). This approach is well established in the literature for various reasons (Mishkin, 2007; Gali and Gertler, 1999; Friedman, 1977). Firstly, price and wage setting decisions in many sectors take into account past inflation, reflecting inertia in price adjustment mechanisms. Secondly, economic agents form expectations about future inflation based on past experiences, influencing current price and wage setting behaviors. This creates a self-fulfilling prophecy effect, where past inflation influences expectations and ultimately becomes realized in the current period. Thirdly, firms and workers may adjust their prices and wages to inflation slowly due to various factors like contract structures, menu costs, and information dissemination. These adaptive lags imply that current inflation depends on past inflationary pressures. Therefore, incorporating lagged inflation allows for a more comprehensive framework to analyze these dynamic relationships. Our study's results demonstrate that the coefficients of inflation(t-1), the lagged inflation demonstrative variable, consistently exhibit a positive sign, indicating that past inflation has a positive association with current inflation, suggesting that past inflation influences today's inflation. This relationship is highly statistically significant at the 1% level across all models (1–4) (refer to Table 2.10).

Similarly, Table 2.10 demonstrates that the coefficients of NDCTOT tend to have a positive but more statistically profound impact on inflation throughout models (1–4). This is because a higher NDCTOT means that domestic exporters are receiving higher prices for their goods, which can result in higher spending and investment within the economy. This increased spending and investment can then lead to higher demand for goods and services, which can take up prices and inflation. From a broader perspective, evidence shows that NDCTOT leads to inflation through a number of economic routes. First, a higher NDCTOT means that the country can export its goods for a higher price relative to import prices. This leads to an increase in the country's export earnings on the one hand and increases individuals' income through further increase in investment and employment on the other hand. Collectively, an increase in aggregate demand, as the country has more money to spend on goods and services, can put upward pressure on prices as businesses try to meet the increased demand for their products (Gruss, and Kebhaj, 2019; Claessens et al., 2010; Reinhart and Rogoff, 2003). Second, a higher NDCTOT can lead to higher inflation through the exchange rate appreciation of the domestic currency. This is because increased demand for domestic goods and services from foreign buyers will lead to an increased demand for the domestic currency. An appreciation of the domestic currency can make imports cheaper, which can lead to lower prices for some goods and services. However, it can also make exports more expensive, which can lead to higher prices for other goods and services. Lastly, a higher NDCTOT can also lead to higher inflation through the cost-push effect and higher input costs for domestic firms. This is because domestic inputs used to produce goods are also affected by the increased general price level. As a result, firms have to pay more for their inputs, which leads to greater production costs and elevated prices for consumers for domestic goods and services (Gruss and Kebhaj, 2019; Arezki et al., 2014; Kilian, 2008). Third, higher commodity prices directly feed into production costs across various sectors as raw materials and energy become more expensive. This translates into higher prices for final goods and services, creating cost-push inflation. Finally, increased profitability in the booming commodity sector often leads to higher wages for workers in those industries. This can spill over to other sectors through wage bargaining and inflationary expectations, further fuelling inflation.

Additionally, we included some important control variables in our models to examine their impact on inflation (see Table, 2.10). First, unemployment (UNEMPLMNT) is negatively and insignificantly associated with inflation across all included models (1)-(4). Second, the coefficient of money supply (MS) is positively and significantly affecting inflation at the 1% level across almost all models (2)-(4), except model (1). It is well established in the literature that an increase in the money supply is typically associated with an increase in inflation. This is because when there is more money in circulation, people have more money to spend on goods and services, preceding to higher prices. The relationship between money supply and inflation is known as the quantity theory of money, based on the law of supply and demand. Once the supply of money surges, the demand for goods and services also increases, leading to higher prices (Fisher, 1911). Third, the exchange rate (EXCRATE) is positively and statistically significantly affecting inflation at the 1% level throughout models (1)-(4). The relationship between the nominal exchange rate and inflation is known as the purchasing power parity (PPP) theory. The PPP theory asserts that the exchange rate between two currencies should be equivalent to the ratio of the price levels of the two countries. When the nominal exchange rate increases, imported goods become

Table 2.10: Direct Effects of Narrow Dependent Commodity Terms of Trade on Inflation_Estimations Based on DFEIV

Independent Variables	Model (1)	Model (2)	Model (3)	Model (4)
Lag Dependent	0.929***	0.923***	0.923***	0.909***
	(0.00481)	(0.00431)	(0.00436)	(0.00502)
NDCTOT	0.0107***	0.0110***	0.0118***	0.0191***
	(0.00275)	(0.00246)	(0.00247)	(0.00545)
UNEMPLMNT	-0.00107	-0.00150	-0.000524	-0.0000780
	(0.00469)	(0.00421)	(0.00428)	(0.00429)
MS	0.0125*	0.0180***	0.0182***	0.0278***
	(0.00685)	(0.00621)	(0.00624)	(0.00660)
EXCRATE	0.0320***	0.0204***	0.0310***	0.0413***
	(0.00202)	(0.00364)	(0.00183)	(0.00211)
TRDOPNES	-0.000570	-0.000212	-0.00256	-0.00696
	(0.00920)	(0.00824)	(0.00828)	(0.00823)
GOVTSIZE	0.0104*	0.00768	0.00888	0.00559
	(0.00594)	(0.00536)	(0.00545)	(0.00569)
GOVTDEBT	0.00239	0.0000661	0.000820	-0.00150
	(0.00295)	(0.00266)	(0.00267)	(0.00269)
NDCTOT x EXCRATE		0.000140***		
		(0.0000394)		
GOVRNANCE			-0.167***	
			(0.0578)	
NDCTOT x GOVRNANCE			-0.00132**	
			(0.000574)	
POLSTB				-1.542*
				(0.785)
NDCTOT x POLSTB				-0.0153*
				(0.00840)
Constant	-0.893***	-0.904***	-0.983***	-1.679***
	(0.282)	(0.251)	(0.253)	(0.539)
Year Dummies	Yes	Yes	Yes	Yes
No. of Observations	890	886	886	819
No. of Groups	42	42	42	42
R-squared	93.85	93.81	94.59	90.56
p-Values Hansen's J-Statistic	0.534	0.275	0.431	0.183

Notes: This table, models (1)-(4), is estimated through dynamic fixed effect within instrumental variable (DFEIV). The dependent variable is the inflation, and the lag dependent is independent of the inflation lag. Other independent variables are narrow dependent commodity terms of trade (NDCTOT), unemployment (UNEMPLMNT), money supply (MS), exchange rate (EXCRATE), trade openness (TRDOPNES), government size (GOVTSIZE), government debt (GOVTDEBT), governance (GOVRNANC), and political stability (POLSTB). All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Model (1) shows results of the base model solely, whereas models (2), (3), and (4) indicate results of the base model with EXCRATE, GOVRNANC, and POLSTAB as conditional variables and (NDCTOT x EXCRATE), (NDCTOT x GOVRNANC), and (NDCTOT x POLSTB) are their interactive terms, respectively.

expensive, leading consumers to buy fewer imported goods and more domestic goods. This shift in demand puts upward pressure on domestic prices and increases general inflation in the domestic economy (Officer, 1976; Rogoff, 1996). Fourth, the coefficient of Trade Openness (TRDOPNES) is negatively correlated with inflation but insignificant across all models (1)-(4). Fifth, government expenditure (GOVTSIZE) positively affects inflation across the models, but only model (1) is significant at the 10% level. The relationship between government expenditure and inflation is known as the demand-pull inflation theory. It states that inflation happens when there is excessive money chasing too rare goods. When the government spends more money, it increases the demand for goods and services, heading to higher prices. Therefore, a 1% increase in government expenditure is typically associated with an increase in inflation (Keynes, 1936). Sixth, the coefficient of GOVTDEBT is positively affecting inflation in models (1)-(3) and negatively in model (4), but all models are insignificant.

Moreover, it is worth noting that the impact of NDCTOT on inflation also depends on the economic structure, institutional quality, and government policies in place in export-dependent economies at the time of export commodity price shock. For example, the interactive term of NDCTOT and EXCRATE, (NDCTOT * EXCRATE), is positive and significant at a 1% level in model (2) of Table 2.10. This indicates that the impact of NDCTOT on inflation is conditional on the level of EXCRATE. A positive interaction term implies that inflation increases as a result of an increase in NDCTOT when EXCRATE increases, and the effect of NDCTOT on inflation decreases as the level of EXCRATE decreases. The positive effect on inflation suggests that a low/higher nominal/real exchange rate can mitigate the inflationary impact of higher commodity prices (Obstfeld and Rogoff, 1996; Krugman, 1987; Allen, 2006; Jaaskela and Smith, 2013; Schembri, 2019). More explicitly, model (2) in Table 2.11 demonstrates that as the nominal exchange rate (EXCRATE) increases, from low to average to high levels, the NDCTOT effect on inflation also increases with a 1% significance level. Countries with depreciated and highly volatile nominal exchange rates are less capable of managing inflation. In a volatile exchange rate environment, businesses may adjust prices more frequently to reflect the fluctuating currency value, potentially amplifying the impact on inflation. High volatility can create uncertainty for businesses and consumers, leading to expectations of higher inflation, which can become self-fulfilling as businesses raise prices and consumers increase spending in anticipation of future price increases. The initial inflation caused by a depreciated exchange rate can trigger secondary effects, such as wage demands from workers to keep pace with rising prices. This can further spiral into higher wages and prices, fueling inflationary pressures. When NDCTOT increases, a country's export earnings rise, and its import costs fall. This can lead to higher inflation, as businesses and consumers have more money to spend. If a significant portion of inputs for domestic production are imported, a depreciated currency increases production costs for domestic firms. This can lead to cost-push inflation as firms pass on loftier costs to consumers in the form of towering prices. Businesses may be more likely to adjust prices frequently to reflect the fluctuating currency value. Automatic adjustments in contracts based on inflation can perpetuate inflationary cycles. Overall, the impact of NDCTOT on inflation in the presence of improved EXCRATE is more profound, in terms of magnitude, than the impact of NDCTOT on inflation without EXCRATE (for more details, see model (3) in Tables 2.10 and 2.11).

Table 2.11: Indirect Effects of Narrow Dependent Commodity Terms of Trade on Inflation through Different Conditional Variables having Different Percentile Levels

Conditional variables and their different levels	EXCRATE From Model (2)	GOVRNANC From Model (3)	POLSTAB From Model (4)
Low	0.0114***	0.0113***	0.0139***
	(0.00246)	(0.00247)	(0.00332)
Average	0.0139***	0.0112***	0.0115***
	(0.00257)	(0.00246)	(0.00282)
High	0.0733***	0.0110***	0.00918***
	(0.0177)	(0.00247)	(0.00287)

Note: Exchange rate (EXCRATE), governance (GOVRNANC), and Political stability (POLSTB) are conditional variables. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Low, Average, and High mean 25th, 50th, and 75th percentile respectively.

In contrast, the interactive term of NDCTOT and GOVRNANC, (NDCTOT * GOVRNANC), is significant at the 5% level, while the individual effect of GOVRNANC is significant at the 1% level in model (3) of Table 2.10. This means that the impact of NDCTOT on inflation is contingent on the level of GOVRNANC. A negative interaction term indicates that the negative effect of NDCTOT on inflation increases or inflation decreases when GOVRNANC, a conditioning variable, improves or increases and vice versa. This suggests that the negative effect of NDCTOT on inflation is stronger in countries with higher levels of governance. This is due to the role of governance in weakening the favorable effects of commodity price booms on inflation. Further details from model (3) in Table 2.11 indicate that as the level of GOVRNANC increases from low to average to high, the positive effect of NDCTOT on inflation decreases with a 1% significance level. There are a few economic reasons for this finding. First, good governance helps to mitigate the negative effects of NDCTOT shocks on inflation. For example, if a country has good governance institutions, it may be better able to absorb the inflationary impact of a sudden increase in commodity prices. Second, it is central to notice that when NDCTOT is high, it means that the country is exporting a greater quantity of goods and services instead of importing. This may lead to inflation, as businesses have more money to spend on wages and other costs, which can drive up prices. However, if governance is also high, it can mitigate the inflationary effects of NDCTOT on the domestic economy. As in transparent and accountable government, businesses are less likely to engage in price gouging. This can help to keep prices down and reduce inflation. Otherwise, if a country with a high NDCTOT has a corrupt government, businesses may be more likely to engage in price gouging, driving up prices and leading to inflation. Third, governance improves the efficiency of the economy, allowing businesses to produce goods and services at a lower cost. This lower cost can subsequently be transferred to consumers in the form of reduced prices, reducing inflation. Additionally, good governance also promotes economic growth, which can help keep inflation low. Countries with good governance institutions are generally more productive and efficient, leading to lower costs and prices. Furthermore, good governance reduces corruption, which can also lead to lower prices. High levels of corruption can raise the cost of doing business, leading to excessive prices for consumers. Additionally, governance can improve the stability of the economy. When the economy is stable, businesses are more likely to invest, and consumers are more probable to spend money, boosting economic growth and leading to lower inflation. Overall, it is evident that the impact of NDCTOT on inflation in the presence of improved GOVRNANC is more significant in decreasing the inflationary effect of NDCTOT than the impact of NDCTOT on inflation without GOVRNANC (for more details, see model (3) in Tables 2.10 and 2.11).

Similarly, the interactive term of NDCTOT and POLSTB, (NDCTOT * POLSTB), is negative and significant at the 1% level, along with the individual effect of POLSTB (see model (4) of Table 2.10). This means that the impact of NDCTOT on inflation is conditional on the level of POLSTB. That is the positive effect of NDCTOT on inflation decreases or inflation decreases when POLSTB increases, and vice versa. This suggests that the positive effect of NDCTOT on inflation is weaker in countries with more stable political systems. This is due to the role of political stability in weakening the favorable effects of commodity price booms on inflation. More specifically, model (4) in Table 2.11 demonstrates that as the level of POLSTB increases, from low to average to high, the positive effect of NDCTOT on inflation decreases with a 1% significance level. There are a few economic reasons for this finding. First, political stability helps to mitigate the negative effects of NDCTOT shocks on inflation. For example, if a country has a enduring political environment, it may be better able to absorb the inflationary impact of a sudden increase in commodity prices. This is because political stability can lead to lower levels of uncertainty and risk, which can encourage businesses to reinvest its windfall gains rather than spend to generate extra demand and thus inflationary effects. Additionally, countries with stable political institutions are generally more productive and efficient, which can lead to lower costs and prices. Second, stable political environment often fosters greater credibility for fiscal and monetary policies, making credible policies aimed at price stability, such as inflation targeting by central banks or fiscal responsibility by governments, more likely to be effective in controlling inflation**.** As a result, decrease in uncertainty about economic policies and regulations for businesses and investors, leading to lower risk premiums incorporated into interest rates and prices of goods and services. Subsequently, stable prices can become the norm as businesses have less incentive to hedge against potential policy instability by raising prices proactively. Third, stable governments often have more effective institutions and governance structures, allowing for efficient allocation of resources towards sectors promoting price stability. For instance, stable governments can invest in infrastructure development or regulate markets effectively to curb artificial price hikes due to monopolies or inefficiencies. Otherwise, political instability can lead to social unrest and conflict, which can disrupt production and distribution channels, leading to temporary shortages and price hikes due to supply chain disruptions. In addition, social unrest can put pressure on governments to adopt inflationary policies to appease specific groups, further contributing to rising prices. Overall, it is evident that the impact of NDCTOT on inflation in the presence of improved POLSTB is more significant in decreasing the positive effect of NDCTOT on inflation than the impact of NDCTOT on inflation without POLSTB (for more details, see model (4) in Tables 2.10 and in 2.11).

2.5.1.6 Effects of Narrow Dependent Commodity Terms of Trade on Exchange Rate

In order to capture the dynamic effects of nominal exchange rate fluctuations, this study includes a one-period lag of the dependent variable, specifically nominal exchange rate(t-1). This approach is well established in the literature for various reasons (Diebold, 2012; Evans and Lyons, 2004; Bilson, 1984; Dornbusch, 1976; Mundell, 1961). For example, nominal exchange rates may not adjust instantaneously to changes in underlying fundamental factors due to various frictions and market inefficiencies. This can lead to temporary deviations from equilibrium, where past exchange rates influence current rates as they gradually converge towards equilibrium. Additionally, exchange rate expectations perform an essential role in determining current rates. Agents form expectations about future exchange rates based on past trends, news, and economic conditions. These expectations influence their current trading decisions and ultimately impact on the present exchange rate. Our study's results demonstrate that the coefficients of nominal exchange rate(t-1), the lagged nominal exchange rate demonstrative variable, consistently exhibit a positive sign, indicating that past nominal exchange rates have a positive association with the current price, suggesting that past nominal exchange rates influence today's nominal exchange rate. This relationship is highly statistically significant at the 1% level across all models (1–5) (refer to Table 2.12).

The NDCTOT coefficients demonstrate its impact on the nominal exchange rate in the form of appreciation throughout models (1), (2), (4), and (3) with 5% and 10% significance, respectively (see Table 2.12). An increase in the value of NDCTOT due to a positive exogenous price shock in the international market for a domestic good can have a negative impact on the exchange rate. This result aligns with theoretical and empirical expectations (Balassa, 1964; Claessens et al., 2010; Reinhart, and Rogoff, 2003). The increase in NDCTOT also means that the domestic country can import goods for a lower price relative to the price of exports. This leads to a decrease in demand for foreign currencies, as domestic buyers need to purchase less foreign currency to buy the same amount of foreign goods. The increased demand for the domestic currency and the reduced demand for foreign currencies will lead to an appreciation of the exchange rate. According to the interest rate parity theory, the exchange rate between two currencies should be equal to the ratio of the two countries' interest rates. If the interest rate in one country increases, the demand for that country's currency will surge, leading to an appreciation of the exchange rate. Additionally, it can make the country's assets more pleasing to foreign investors, which can lead to increased capital inflows (Mankiw and Taylor, 2022).

Furthermore, we included some important control variables in our models to examine their impact on the nominal exchange rate (see Table, 2.12). For instance, the current account balance (CABALNCE) negatively affects the nominal exchange rate at the 1% level across all models (1)-(5). The current account balance is the difference between a country's exports and imports of goods and services, as well as its net income from abroad. A positive current account balance means that the country is exporting more goods and services than it is importing, leading to an appreciation of the currency, as foreigners demand more of the currency to buy the country's goods and services. In contrast, the coefficient of inflation (INF) positively affects the nominal exchange rate at the 1% level across all models (1)-(5). When inflation is soaring, the value of the currency declines, leading to a depreciation of the nominal exchange rate. Similarly, the interest rate (INTRATE) is positively associated with the nominal exchange rate but insignificant in all models. Meanwhile, the coefficient of foreign exchange reserves (FEXCRESERS) is negatively correlated with the exchange rate in models (2), (5), and (1), (3), (4) at 5% and 10% levels, respectively. Research shows that higher foreign exchange reserves can mitigate exchange rate depreciation, especially in less financially developed economies. These reserves are vital for enhancing monetary policy independence amid global influences, supporting stability and autonomy

Table 2.12: Direct Effects of Narrow Dependent Commodity Terms of Trade on Exchange Rate_Estimation Based on DFEIV

IndependentVariables	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
Lag Dependent	0.682*** (0.0358)	0.673*** (0.0517)	0.703*** (0.0369)	0.679*** (0.0366)	0.665*** (0.0376)
NDCTOT	-0.0260** (0.0121)	-0.0279** (0.0130)	-0.0221* (0.0121)	-0.0265** (0.0121)	-0.0210* (0.0124)
CABALNCE	-0.00175*** (0.000538)	-0.00174*** (0.000557)	-0.00155*** (0.000533)	-0.00172*** (0.000533)	-0.00192*** (0.000538)
INF	0.240*** (0.0431)	0.257*** (0.0572)	0.223*** (0.0439)	0.239*** (0.0443)	0.254*** (0.0458)
INTRATE	0.00355 (0.00488)	0.00333 (0.00492)	0.00371 (0.00484)	0.00349 (0.00490)	0.00399 (0.00493)
FEXCRESERS	-0.0150* (0.00816)	-0.0176** (0.00888)	-0.0134* (0.00811)	-0.0158* (0.00817)	-0.0193** (0.00840)
ECNGROWTH	-0.0125** (0.00548)	-0.00989* (0.00560)	-0.0105* (0.00547)	-0.0126** (0.00546)	-0.0132** (0.00552)
GOVTDEBT	0.0134* (0.0104)	0.0323*** (0.0110)	0.0266* (0.0137)	0.00610 (0.0103)	0.000949 (0.0103)
NDCTOT x FEXCRESERS		0.000151* (0.0000846)			
NDCTOT x GOVTDEBT			0.000478*** (0.000144)		
POLSTAB				-0.165** (0.0805)	
NDCTOT x POLSTAB				-0.00190** (0.000803)	
GOVRNANC					-0.506** (0.252)
NDCTOT x GOVRNANC					-0.0129** (0.00601)
Constant	2.956** (1.213)	2.757** (1.300)	2.497** (1.217)	3.090** (1.212)	3.613*** (1.238)
Year Dummies	Yes	Yes	Yes	Yes	Yes
No. of Observations	571	557	570	571	571
No. of Groups	41	41	41	41	41
R-squared	99.35	99.43	99.47	99.32	99.03
p-Values Hansen's J-Statistic	0.834	0.572	0.201	0.863	0.345

Notes: This table, models (1)-(5), is estimated through dynamic fixed effect within instrumental variable (DFEIV). The dependent variable is the exchange rate and lag dependent is an independent of the exchange rate lag. Other independent variables are narrow dependent commodity terms of trade (NDCTOT), current account balance (CABALNCE), inflation (INF), interest rate (INTRATE), foreign exchange reserves (FEXCRESERS), economic growth (ECNGROWTH), government debt (GOVTDEBT), political stability (POLSTSB), and governance (GOVRNANC). All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Model (1) shows results of base model solely, whereas models (2), (3), and (4) indicate results of base model with FEXCRESERS, GOVTDEBT, POLSTAB, and GOVRNANC as conditional variables and (NDCTOT x FEXCRESERS), (NDCTOT x GOVTDEBT), (NDCTOT x POLSTAB), and (NDCTOT x GOVRNANC) are their interactive terms, respectively.

in financially open economies. Central banks actively manage reserves to influence exchange rates without necessarily appreciating the domestic currency, stabilizing exchange rates and managing currency appreciation. Official reserve managers rebalance portfolios to counter exchange rate movements, as seen in the net sales of US dollars in 2022 offsetting the dollar's appreciation and reducing its global reserve share. This underscores the impact of reserves on stabilizing currencies, ensuring policy autonomy, and managing currency appreciation (Fukuda and Kon, 2012; Dominguez et al., 2013; Ahmed et al., 2023). Additionally, economic growth (ECNGROWTH) is negatively and significantly associated with the nominal exchange rate in models (1), (4), (5), and (2), (3) at 5% and 10% levels, respectively. A higher rate of economic growth makes a country's assets more appealing to foreign investors, leading to an appreciation of the nominal exchange rate due to increased demand for its currency. Unlike ECNGROWTH, the coefficient of (GOVTDEBT) is positively affecting the nominal exchange rate with 1% and 10% significance levels in models (2) and (1), (3), respectively. However, models (4) and (5) are insignificant. A higher level of government debt can make a country's economy less delighted to foreign investors, steering to a decrease in demand for its currency and thus depreciation of the nominal exchange rate.

It is notable to mention that the effect of NDCTOT on the exchange rate can vary depending on export-dependent economies' economic structure, institutional excellence, and government policies in place at the time of its export commodity price shock. In this context, for example, the interactive term of NDCTOT and FEXCRESERS, (NDCTOT * FEXCRESERS) is positive and significant at a 10% level in the model (2) of Table 2.12). The coefficient of interaction term represents that the impact of NDCTOT on the exchange rate is conditional on the level of FEXCRESERS. So, the positive interaction term indicates that the negative effect of NDCTOT on the exchange rate decreases when FEXCRESERS a conditioning variable increase and vice versa. This means that the negative effect of NDCTOT on the exchange rate or appreciation of the exchange rate is weaker in countries with greater buffer stock of FEXCRESERS as compared to less buffer stock of FEXCRESERS. More specifically, model (2) in Table 2.13 shows that as the level of FEXCRESERS increases, from low to average to high, the negative effect of NDCTOT exchange rate decreases or appreciation decreases at a 10% significant level. There are a few economic reasons for this finding. While it is true that a positive NDCTOT shock, can lead to a larger exchange rate appreciation with lower foreign exchange reserves, several factors contribute to this phenomenon. First, high reserves translate to a larger pool of foreign currency readily available for intervention by the central bank. This increased supply can lead to weaker upward pressure on the domestic currency compared to situations with limited reserves. Second, when reserves are low, foreign currency becomes scarcer within the domestic market. This scarcity incentivizes foreign investors and importers to demand more of the domestic currency to acquire the needed foreign currency, creating upward pressure on its value. High reserves, however, diminish this scarcity and reduce the immediate need for the domestic currency, leading to a less pronounced appreciation. Third, a country with high reserves might be perceived as less vulnerable to financial shocks by the market. This can lead to reduced demand for the domestic currency as a safe haven, dampening potential appreciation. Additionally, arbitrage opportunities for converting local currency to foreign currency may decrease when reserves are abundant, limiting upward pressure on the exchange rate. Fourth, central banks often employ sterilization strategies to mitigate the inflationary pressures associated with reserve accumulation. These can involve raising interest rates or issuing bonds to absorb excess liquidity created by interventions. Such actions can dampen the upward momentum of the exchange rate. Finally, ultimately, the exchange rate is largely determined by underlying economic fundamentals like productivity, trade balance, and inflation. Even with high reserves, if these fundamentals weaken, the upward pressure on the currency may be limited. Overall, we can compare the results, in terms of magnitude, of the impact of NDCTOT on the exchange rate without FEXCRESERS as a conditional variable and with FEXCRESERS as a conditional variable. It is indicated that the impact of NDCTOT on the exchange rate in the presence of FEXCRESERS is weaker, in terms of magnitude than the impact of NDCTOT on the exchange rate without FEXCRESERS (for more details, see model (2) in Tables 2.12 and 2.13).

Similarly, the interactive term of NDCTOT and GOVTDEBT, (NDCTOT * GOVTDEBT) is positive and significant at a 1% level in a model (3) of Table 2.12). The coefficient of interaction term entails that the impact of NDCTOT on the exchange rate is contingent on the level of GOVTDEBT. So, the positive interaction term intends that the negative effect of NDCTOT on the exchange rate decreases when government DEBT a conditioning or moderating variable increases and vice versa. This means that the negative effect of NDCTOT on the exchange rate or appreciation of the nominal exchange rate is weaker in countries with more GOVTDEBT burden as compared to less GOVTDEBT burden economies. More specifically, model (3) in Table 2.13 shows that as the level of GOVTDEBT increases, from low to average to high, the negative effect of NDCTOT nominal exchange rate decreases at 10% significant level. A high level of government debt can lead to concerns about a country's financial stability, which can negatively affect its exchange rate and reduce the favorable impact of NDCTOT on the exchange rate. That is when a country has a high level of government debt, it may need to borrow more to funding its spending, which can lead to an increase in interest rates and inflation. In return, this hurts the country's exchange rate, as investors may become less inclined to hold the country's currency due to concerns about its financial stability. Thus, the favorable impact of NDCTOT on the nominal exchange rate may be reduced or even reversed. Additionally, government debt can influence a country's macroeconomic stability, which can in turn affect its exchange rate. This is supported by various theories, including the Mundell-Fleming model, which suggests that a country's exchange rate is influenced by its fiscal and monetary policies. For instance, if a country has a high level of government debt, investors may be less confident in the ability of the central bank to control inflation. This could lead to a depreciation of the exchange rate (Makhlouf et al., 2023; Hofmann et al., 2023). Overall, we can compare the results, in terms of magnitude, of the impact of NDCTOT on government expenditure without GOVTDEBT as a conditional variable and with GOVTDEBT as a conditional variable. It is indicated that the impact of NDCTOT on the exchange rate in the presence of GOVTDEBT is weaker, in terms of magnitude than the impact of NDCTOT on the exchange rate without GOVTDEBT (for more details, see model (3) in Tables 2.12 and 2.13).

In contrast, the interactive term of NDCTOT and POLSTB, (NDCTOT * POLSTB), along with the individual effect of POLSTB, is negative and significant at a 5% level in a model (4) of Table 2.12. This means that the impact of NDCTOT on the nominal exchange rate is conditional upon the level of POLSTB. That is the negative effect of NDCTOT on the nominal exchange rate increases or appreciates when POLSTB increases or improves, and vice versa. The negative effect of the interactive term of NDCTOT and political stability on the exchange rate suggests that countries with high NDCTOT and high political stability may experience a decrease/appreciation in their nominal exchange rate. This is due to the role of POLSTB in reinforcing the favorable effects of commodity price booms on the appreciation of the nominal exchange rate. For more details, model (4) in Table 2.13 shows that as the level of POLSTB increases, from low to average to high, the negative effect of NDCTOT on the nominal exchange rate increases with a 1% significance level. There are a few economic reasons for this finding. First, if a country has high levels of political stability, at the time of NDCTOT booms, this can make investors more willing to invest and reinvest the windfall profit along with the likeliness to attract foreign investment and capital inflows to gain more profit. This can lead to an appreciation of the nominal exchange rate. Second, political stability can make it easier for a country to benefit from a positive NDCTOT shock. For instance, if a country has a high level of political stability, it may be more likely to experience less corruption or mismanagement of its natural resources or less resource curse. This could increase the country's ability to translate a positive NDCTOT shock into higher economic growth and development. Subsequently, the nominal exchange rate may be appreciated. Overall, the negative effect of the interactive term suggests that political stability is an important factor in determining how a country's nominal exchange rate responds to NDCTOT shocks. Overall, we can compare the results, in terms of magnitude, of the impact of NDCTOT on the nominal exchange rate without POLSTB as a conditional variable and with POLSTB as a conditional variable. It is indicated that the impact of NDCTOT on the nominal exchange rate in the presence of improved POLSTB is more useful and profound to further increase the negative effect of NDCTOT on the nominal exchange rate or appreciate the nominal exchange rate, in terms of magnitude, than the impact of NDCTOT on the nominal exchange rate without POLSTB (for more details, see model (4) in Tables 2.12 and 2.13).

Table 2.13: Indirect Effects of Narrow Dependent Commodity Terms of Trade on Exchange Rate through Different Conditional Variables having Different Percentile Levels

Conditional variables and their different levels	FEXCRESERS From Model (2)	GOVTDEBT From Model (3)	POLSTAB From Model (4)	GOVRNANC From Model (5)
Low	-0.0250*	-0.0210*	-0.0331***	-0.0668***
	(0.0129)	(0.0121)	(0 .0123)	(0.0220)
Average	-0.0248*	-0.0200*	-0.0361***	-0.0770***
	(0.0129)	(0.0122)	(0.0127)	(0.0262)
High	-0.0245*	-0.0188*	-0.0389***	-0.0941***
	(0.0129)	(0 .0122)	(0.0131)	(0.0334)

Note: Foreign exchange reserves (FEXCRESERS), government debt (GOVTDEBT), Political stability (POLSTB), and governance (GOVRNANC) are conditional variables. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Low, Average, and High mean 25th, 50th, and 75th percentile respectively.

Similarly, the interactive term of NDCTOT and GOVRNANC, (NDCTOT * GOVRNANC), is negative, along with the individual effect of GOVRNANC at a significance level of 5% in model (5) of Table 2.12. The coefficient of the interaction term means that the impact of NDCTOT on the nominal exchange rate is conditional upon the level of GOVRNANC. That is the negative effect of NDCTOT on the nominal exchange rate increases or appreciates when GOVRNANC increases or improves and vice versa. This negative interactive term suggests that countries with high NDCTOT and governance may experience a decrease/appreciation in their nominal exchange rate. This could be due to the fact that high NDCTOT can signal to an expand in export revenues, which can assist to reinforce the favorable effects of governance on the exchange rate. For more details, model (5) in Table 2.13 shows that as the level of GOVRNANC increases, from low to average to high, the negative effect of NDCTOT on the nominal exchange rate increases with a 1% significance level. There are a few economic reasons for this finding. For instance, if a country has good governance, it is more prone to have sound economic policies and institutions in place. This can help to moderate and drive to increase NDCTOT by reducing uncertainty and risk aversion among investors. Consequently, the positive impact of the NDCTOT shock on the nominal exchange rate would be larger. Additionally, good governance can affect the credibility of a country's central bank. If a country has good governance, investors are more likely to be confident in the ability of the central bank to control inflation and maintain macroeconomic stability. This can give confidence to investors to reinvest its windfall gains rather than shifting it to other countries that have quality institutions. This can lead to a further increase in economic activities and hence an appreciation of the nominal exchange rate. However, if a country has poor governance, investors may be less confident in the central bank's capability to administer the economy. This could lead to a depreciation of the nominal exchange rate. Similarly, a country with high NDCTOT and low governance may be more likely to face a resource curse. This is because the windfall profits from natural resources can lead to corruption, economic inequality, and political instability. All these factors can steer to a depreciation of the nominal exchange rate. Overall, we can compare the results, in terms of magnitude, of the impact of NDCTOT on the nominal exchange rate without GOVRNANC as a conditional variable and with GOVRNANC as a conditional variable. It is indicated that the impact of NDCTOT on nominal exchange in the presence of improved GOVRNANC is more useful and profound to increase the negative effect of NDCTOT on nominal exchange rate or appreciate nominal exchange rate, in terms of magnitude, than the impact of NDCTOT on nominal exchange rate without GOVRNANC (for more details, see model (5) in Tables 2.12 and 2.13).

2.5.1.7 Effects of Narrow Dependent Commodity Terms of Trade on Government Expenditure

In order to capture the dynamic effects of government expenditure fluctuations, this study includes a one-period lag of the dependent variable, specifically government expenditure(t-1). This approach is well established in the literature for various reasons (De Cesare and Sportelli, 2012; Auerbach and Kotlikoff, 1998; Turnovsky, 1976). For example, government spending decisions often involve complex political processes and budgetary constraints. Past spending allocations may influence current decisions due to factors like incremental budgeting practices, political inertia, and path dependence. Additionally, implementing new spending programs or adjusting existing ones can take time, involving processes like planning, procurement, and hiring. This can lead to lagged effects of past spending decisions on current government expenditure. Similarly, governments may undertake long-term spending plans or commitments for infrastructure projects, social programs, or debt servicing. These commitments can introduce persistence in government expenditure, with past trends influencing current levels. Our study's results demonstrate that the coefficients of government expenditure(t-1), the lagged government expenditure demonstrative variable, consistently exhibit a positive sign, indicating that past government expenditure has a positive association with current government expenditure, suggesting that past government expenditure influences today's government expenditure. This relationship is highly statistically significant at the 1% level across all models (1–4) (refer to Table 2.14).

Additionally, Table 2.14 shows that the coefficient of NDCTOT indicates that commodity terms of trade tend to have a positive and significant effect on government expenditure throughout models (1), (2), (3), and (4) at 1% and 5%, respectively. The affirmative and significant results demonstrate that an improved NDCTOT increases government expenditure. Our results are in line with the hypothesis that demand for commodities tends to rise during times of excessive political uncertainty, causing prices to soar (Auty, 1993; Karl, 1997; Sachs and Warner, 1999). However, this effect works indirectly. For instance, one possibility is that an increase in NDCTOT could lead to an increase in government revenue. Since the government typically receives a share of the profits from the export of domestic goods. If the price of these goods increases, then the government's revenue will also increase. Thus, the government can use this additional revenue from taxes on exports to increase its expenditure on goods and services. Another possibility is that a higher NDCTOT can also lead to an increase in economic activity, as the country's exports become more competitive, and imports become more expensive. This increased economic activity can lead to higher tax revenue and increased demand for government services, both of which can lead to increased government expenditure. Additionally, a higher NDCTOT can also lead to increased government investment, as the government has more resources to invest in social programs, such as infrastructure, education, and other public goods. This increased government investment can lead to long-term economic growth and benefits for the population, resulting in an increase in net exports and overall economic growth.

In addition, we included some important control variables in our models to examine their impact on government expenditure (see Table 2.14). First, the government revenue (GOVTREVNUE) is positive and significant across all models (1)-(4). A 1 percent increase in government revenue typically leads to an increase in government expenditure because governments tend to spend more money when they have more money to spend. Second, the government debt (GOVTDEBT) also positively affects government expenditure with a 1% significance level in models (2)-(4) and a 10% significant level in model (1). A 1 percent increase in government debt can be used to finance government spending, such as infrastructure projects or education programs, which in turn leads to increased government expenditure. Third, the sign of savings (SAVINGS) is negative across all models and significant at the 1% level in

Table 2.14: Direct Effects of Narrow Dependent Commodity Terms of Trade on Government Expenditure_Estimation Based on DFEIV

Independent Variables	Model (1)	Model (2)	Model (3)	Model (4)
Lag Dependent	0.761***	0.727***	0.676***	0.726***
	(0.0270)	(0.0364)	(0.0315)	(0.0371)
NDCTOT	0.0472***	0.0305***	0.0253**	0.0174**
	(0.00871)	(0.00935)	(0.0101)	(0.00836)
GOVTREVNUE	0.0737***	0.0872***	0.0798***	0.0879***
	(0.0241)	(0.0249)	(0.0257)	(0.0250)
GOVTDEBT	0.0162*	0.726***	0.0401***	0.0392***
	(0.00930)	(0.242)	(0.0102)	(0.00982)
SAVINGS	-0.00695	-0.0535***	-0.0573***	-0.0541***
	(0.00902)	(0.0100)	(0.00997)	(0.0100)
INF	0.000235*	0.000306**	0.000332***	0.000285**
	(0.000123)	(0.000128)	(0.000128)	(0.000128)
POLSTB	-0.112*	-0.0415**	-0.0182	-0.0814***
	(0.0641)	(0.0187)	(0.0212)	(0.0299)
NDCTOT x GOVTDEBT		-0.00693***		
		(0.00244)		
GOVRNANC			-0.228**	
			(0.100)	
NDCTOT x GOVRNANC			0.00635***	
			(0.00232)	
NDCTOT x POLSTB				0.00199*
				(0.00103)
Constant	5.230***	-2.612***	-2.404**	-1.449*
	(0.890)	(0.955)	(1.026)	(0.857)
Year Dummies	Yes	Yes	Yes	Yes
No. of Observations	849	836	815	836
No. of Groups	43	43	43	43
R-squared	80.01	85.78	80.23	84.85
p-Values Hansen's J-Statistic	0.489	0.721	0.844	0.639

Notes: This table, models (1)-(4), is estimated through dynamic fixed effect within instrumental variable (DFEIV). The dependent variable is the government expenditure (GOVTEXPND) and lag dependent is independent of the government expenditure lag. Other independent variables are narrow dependent commodity terms of trade (NDCTOT), government revenue (GOVTREVNUE), government debt (GOVTDEBT), savings (SAVINGS), inflation (INF), political stability (POLSTSB), and governance (GOVRNANC). All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Model (1) shows results of base model solely, whereas models (2), (3), and (4) indicate results of base model with GOVTDEBT, GOVRNANC and POLSTAB as conditional variables and (NDCTOT x GOVTDEBT), (NDCTOT x GOVRNANC), and (NDCTOT x POLSTAB), are their interactive terms, respectively.

all three models except model (1) (see Table 2.14). An increase in savings can lead to a decrease in government expenditure because when the government saves more money, they have less money to spend on goods and services. This can lead to a decrease in the demand for government services, such as education and healthcare, resulting in a decrease in government expenditure. Fourth, the sign of the consumer price index (CPI) is positive across all models and significant at different levels in these models (see Table 2.14). High inflation can lead to an increase in government expenditure because it can increase the cost of goods and services, which can lead to an increase in government spending on subsidies and other programs. Additionally, inflation can lead to higher wages and salaries for government employees, which can increase government expenditure. Fifth, political stability (POLSTB) is negatively and significantly affecting government expenditure across all models (see Table 2.14). Political stability fosters a conducive environment for investment by reducing uncertainty. Increased investor confidence leads to higher economic growth, generating more revenue for the government without the need for excessive spending. Stable political environments enable governments to focus on efficient resource allocation, avoiding wasteful spending due to political turmoil or instability. This efficiency leads to a reduction in unnecessary government expenditure. Political stability supports policy continuity, allowing for the implementation of long-term economic plans without disruptions. This continuity reduces the need for frequent policy changes that can be costly for the government. By promoting these economic mechanisms, an increase in political stability can effectively lead to decreased government expenditure, contributing to overall economic growth and stability (Singha and Singh, 2022; Aisen and Veiga, 2013).

The impact of NDCTOT on government expenditure may depend on the structure, institutions, and government policies in place and at the time of export commodity price shock of export-dependent economies in the international market. For instance, the interactive term of NDCTOT and GOVTDEBT, (NDCTOT * GOVTDEBT), is negative and significant at a 1% level of GOVTDEBT in the model (2) of Table 2.14. This means that the impact of NDCTOT on government expenditure is conditional upon the level of GOVTDEBT. That is the positive effect of NDCTOT on government expenditure decreases when government GOVTDEBT increases, and vice versa. More precisely, model (2) in Table 2.15 shows that as the level of GOVTDEBT increases, from low to average to high, the negative effect of NDCTOT on government expenditure decreases at a 5% significant level at the low level and a 1% significant level at average and high levels of GOVTDEBT. This means that the positive effect of NDCTOT on government expenditure is weaker in countries with more GOVTDEBT burden as compared to less GOVTDEBT burden economies. Because a high level of government debt diminishes and limits the government's ability to increase its spending in response to an increase in government revenue. As the government is in a heavy debt burden, may need to use a significant portion of the windfall gains to service the debt, reducing the funds available for government expenditures. This is known as the "debt overhang" effect (Aizenman et al., 2012; Makhlouf et al., 2023). Overall, we can compare the results in terms of the magnitude of the impact of NDCTOT on government expenditure without GOVTDEBT as a conditional variable and with GOVTDEBT as a conditional variable. It is indicated that the impact of NDCTOT on government expenditure in the presence of GOVTDEBT is weaker, in terms of magnitude than the impact of NDCTOT on government expenditure without GOVTDEBT (for more details, see model (2) in Tables 2.14 and 2.15).

Additionally, the interactive term of NDCTOT and GOVRNANC, (NDCTOT * GOVRNANC), is positive and significant at the 1% level, while the individual effect of GOVRNANC is negative but significant at the 5% level in model (3) (see Table 2.14). The coefficient of the interaction term proposes that the impact of NDCTOT on government expenditure is conditional upon the levels of GOVRNANC. That is government expenditure increases as a result of an increase in NDCTOT when the GOVRNANC level improves or increases, and the effect of NDCTOT on government expenditure decreases as the level of GOVRNANC deteriorates or decreases. More strictly, model (3) in Table 2.15 shows that as the level of GOVRNANC increases, from low to average to high, the NDCTOT effect on output also increases with a 1% significance level. This means that countries with better governance can take advantage of the higher prices for their exports in terms of increased revenues and government expenditure to further boost their output. For instance, a country with high NDCTOT and good governance may be more likely to experience a "resource blessing" rather than a "resource curse." A resource blessing is a phenomenon in which countries that are rich in natural resources can use their wealth to improve the lives of their citizens and promote economic growth. Good governance can help to ensure that the windfall profits from NDCTOT shocks are used effectively. For example, a country with good governance is more likely to have sound fiscal policies in place, which can help to reduce corruption and ensure that the government's revenue is spent on productive investments. This can lead to higher economic growth and higher government revenue, which can in turn lead to higher government expenditure. Additionally, good governance can lead to a more efficient and effective public sector. This can make it easier for the government to deliver essential services to its citizens and to implement its policies. As a result, the government may be able to achieve higher levels of economic growth and development, which can lead to higher government expenditure. Similarly, good governance can help to improve the efficiency and effectiveness of government spending. That is if a country has good governance, it is more likely to have sound budgeting and procurement procedures in place. This can help to ensure that government spending is used in a way that maximizes the benefits to the economy.

Table 2.15: Indirect Effects of Narrow Dependent Commodity Terms of Trade on Government Expenditure through Different Conditional Variables having Different Percentile Levels

Conditional variables and their different levels	GOVTDEBT From Model (2)	GOVRNANC From Model (3)	POLSTB From Model (4)
Low	-0.132**	0.0275***	0.0181**
	(0.0536)	(0.00999)	(0.00834)
Average	-0.278***	0.0280***	0.0184**
	(0 .105)	(0.00998)	(0.00834)
High	-0.451***	0.0289***	0.0187**
	(0.166)	(0.00997)	(0.00834)

Note: government debt (GOVTDEBT), governance (GOVRNANC), and Political stability (POLSTB) are conditional variables. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Low, Average, and High mean 25th, 50th, and 75th percentile respectively.

Likewise, good governance can lead to higher economic growth, which can generate more tax revenue for the government. This can allow the government to increase spending on public goods and services, such as education, healthcare, and infrastructure (Heuty, 2002; Apergis and Katsaiti, 2018). Overall, we can compare the results, in terms of magnitude, of the impact of NDCTOT on government expenditure without GOVRNANC as a conditional variable and with GOVRNANC as a conditional variable. It is indicated that the impact of NDCTOT on government expenditure in the presence of improved GOVRNANC is more profound, in terms of magnitude than the impact of CTOT on output without GOVRNANC (for more details, see model (3) in Tables 2.14 and 2.15).

Moreover, the interactive term of NDCTOT and POLSTB, (NDCTOT*POLSTB), is positive and significant at the 10% level in a model (2) of Table 2.14. This means that the impact of NDCTOT on government expenditure is conditional upon the level of POLSTB. That is government expenditure increases because of an increase in NDCTOT when POLSTB improves or increases and vice versa. More explicitly, model (2) in Table 2.15 shows that as the level of POLSTB increases, from low to average to high, the NDCTOT effect on government expenditure increases with a 5% significance level throughout these different threshold levels of POLSTB. There are a few economic reasons for this finding. One reason is that political stability can help to reduce uncertainty and risk aversion among investors. This can lead to further extended higher levels of investment and economic growth from the windfall gains from NDCTOT booms. As a result, the government may have more revenue, in the form of additional tax revenue, to spend on public services and infrastructure. Additionally, political stability can make it easier for the government to implement its policies and deliver essential services to its citizens. Another reason is that political stability can lead to a more efficient and effective public sector. This is because political stability can help to reduce corruption and nepotism. A country with high NDCTOT and political stability may be more likely to be a democracy. Democracies tend to have higher levels of government expenditure than non-democracies because citizens in democracies are more likely to demand public services and hold their governments accountable for providing these services. As a result, the government may be able to achieve higher levels of economic growth and development, which can lead to higher government expenditure. Overall, we can compare the results in terms of the magnitude of the impact of NDCTOT on government expenditure without POLSTB as a conditional variable and with POLSTB as a conditional variable. It is indicated that the impact of NDCTOT on government expenditure in the presence of improved POLSTB is more profound than the impact of NDCTOT on government expenditure without POLSTB (for more details, see model (2) in Tables 2.14 and 2.15).

2.5.1.8 Effects of Narrow Dependent Commodity Terms of Trade on Income Inequality

To capture the dynamic effects of commodity price fluctuations, this study includes a one-period lag of the dependent variable, specifically income inequality(t-1). This approach is well-established in the literature for various reasons (Kanbur, 2017). For example, income inequality often demonstrates a degree of persistence, meaning that past levels influence current levels. This can happen due to many influences such as wealth accumulation dynamics, skill bias in technological progress, and institutional features like inheritance laws. Past inequality can therefore act as a catalyst for further inequality. Additionally, historical events and policies can create unequal starting points for different groups, leading to path dependence where past inequality perpetuates itself through the intergenerational transmission of wealth and advantages. Lagged inequality captures this path dependence effect. Similarly, income inequality interacts dynamically with other factors such as economic growth, political institutions, and social mobility. Our study's results demonstrate that the coefficients of income inequality(t-1), the lagged income inequality demonstrative variable, consistently exhibit a positive sign, indicating that past income inequality has a positive association with current income inequality, suggesting that past income inequality influences today's income inequality. This relationship is statistically significant at the 1% level across all models (1–5) (refer to Table 2.16).

Similarly, Table 2.16 demonstrates that the coefficients of NDCTOT, the commodity terms of trade representative variable, tend to indicate the theoretically correct sign, and the relationship is statistically significant at the 1% level in the model (5), and at the 5% level in models (2) and (4), while models (1) and (3) are significant at the 10% level. These findings indicate that an improvement in NDCTOT, due to positive exogenous export price shocks, leads to a decrease in income inequality. The negative impact of an increase in NDCTOT on income inequality can be explained by the fact that an increase in NDCTOT leads to an increase in export earnings for the country, as a result increase in government revenue from exports. As a result, the government has more money to spend on social programs, public goods, and services, leading to a decrease in income inequality and vice versa. Increased commodity prices can contribute to reduced income inequality, as higher prices for commodity exports can elevate the demand for low-skilled labor (Mohtadi and Castells-Quintana, 2021). An improvement in the terms of trade can be advantageous because the country requires fewer exports to purchase a specific quantity of imports (Lim and McNelis, 2014). Trade can contribute to decreases in income inequality between countries, but it is far from being the main driver of it (UNCTAD, 2019). However, the composition of imports and exports can play a crucial role in the connection between trade and increased income inequality. Companies that hire highly educated, higher-paid individuals also tend to benefit more from trade, as it enables their businesses to purchase manufactured goods at lower costs and thrive, thereby boosting the demand for more extensively educated workers. Consequently, income inequality is ultimately higher in certain countries than it would be in the absence of trade (Urata and Narjoko, 2017). The increase in aggregate income is likely to be concentrated in the sectors that produce the exportable commodities that are experiencing the price shock. This is because the producers of these commodities will be able to sell their goods at higher prices. As a result, these producers will earn higher profits and wages. However, the benefits of the increase in aggregate income are not likely to be evenly distributed across the population. This is because the owners of the capital and resources used to produce the exportable commodities are likely to capture a disproportionate share of the benefits.

Additionally, we included some important control variables in our models to examine their impact on income inequality (see Table 2.16). For example, unemployment (UNEMPLMNT) is negatively associated with income inequality across all models (1)-(5) but is insignificant in all cases. In contrast, the sign of human capital (HUCPTL) is positive across all models (1)-(4) but significant at different levels across the models, at the 1% level in models (1), (2), (4), and the 5% level in models (3), (4). A 1 percent increase in human capital typically leads to a decrease in income inequality. This is because human capital, such as education and skills, can help people get higher-paying jobs. Similarly, it can increase the skills and productivity of workers, which can lead to higher wages and better job opportunities. As a result, the difference between the rich and the poor can narrow. Meanwhile, economic growth (ECNGROWTH) is negatively associated with income inequality in all models (1), (4), (5), and (2), (3) at the 5% and 10% levels, respectively. Income inequality can decrease with economic growth because it can result in a rise in employment opportunities and elevated wages for low-skilled workers. Additionally, government expenditure (GOVTSIZE) is negatively affecting income inequality across all models (1)-(5) but unfortunately is insignificant in all cases.

It is significant to observe that the impact of a change in NDCTOT on income inequality may vary depending on the structure, institutions, and policies placed in the exporting economies at the time of booms and busts to major export commodity prices of export-dependent economies. In this context, for example, the interactive term of NDCTOT and GOVTSIZE, (NDCTOT * GOVTSIZE), is negative and significant at a 10% level in model (2) of Table 2.16. This means that the impact of NDCTOT on income inequality is conditional upon the level of GOVTSIZE. That is the negative effect of NDCTOT on income inequality, in response to favorable NDCTOT, increases or income inequality decreases when GOVTSIZE increases and vice versa (Guzi and Kahanec, 2019; Ulu, 2018). More specifically, model (2) in Table 2.17 shows that as the level of GOVTSIZE increases, from low to average to high, the negative effect of NDCTOT on income inequality increases with a 5% significance level at low and average levels and a 1% at high level of GOVTSIZE. There are a few economic reasons for this finding. First, government expenditure can boost the negative but favorable effects of NDCTOT on income inequality. For example, when NDCTOT is high, the government can use its revenue to redistribute income to lower-income households or to provide them with access to essential services such as education and healthcare. This can help to reduce the gap between rich and poor households (Barro, 2000; Easterly et al., 1993; Alesina and Rodrik, 1994; Stiglitz, 2015). Second, government expenditure can help to reduce the volatility of income inequality. For example, when NDCTOT fluctuates, the government can use its budget to stabilize the economy and protect vulnerable households from income shocks. This can help to prevent income inequality from increasing during periods of economic downturn. Studies have shown that higher government expenditure can lead to reduced income inequality, as the government can use its resources to redistribute income and provide essential services to lower-income households. Overall, we can compare the results in terms of the magnitude of the impact of NDCTOT on income inequality without GOVTSIZE as a conditional variable and with GOVTSIZE as a conditional variable. It is indicated that the impact of NDCTOT on income inequality in the presence of increased GOVTSIZE is more useful and profound in increasing the negative effect

Table 2.16: Direct Effects of Narrow Dependent Commodity Terms of Trade on Income Inequality_Estimations Based on DFEIV

Independent Variables	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
Lag Dependent	0.941*** (0.00941)	0.935*** (0.00996)	0.935*** (0.00984)	0.939*** (0.00936)	0.941*** (0.00937)
NDCTOT	-0.0645* (0.0339)	-0.0754** (0.0361)	-0.0641* (0.0348)	-0.0788** (0.0340)	-0.0933*** (0.0357)
UNEMPLMNT	-0.0832 (0.0512)	-0.0772 (0.0525)	-0.0833 (0.0532)	-0.0660 (0.0517)	-0.0902 (0.0516)
HUCPTL	-0.142*** (0.0513)	-0.143*** (0.0538)	-0.137** (0.0540)	-0.133*** (0.0509)	-0.119** (0.0514)
ECGROWTH	-0.00524* (0.00295)	-0.00581* (0.00309)	-0.00522* (0.00307)	-0.00514* (0.00295)	-0.00442 (0.00307)
GOVTSIZE	-0.0339 (0.0567)	-0.00388 (0.0637)	-0.0444 (0.0586)	-0.0419 (0.0564)	-0.0367 (0.0570)
NDCTOT x GOVTSIZE		-0.00120* (0.000637)			
GOVRNANC			-0.0442** (0.0222)		
NDCTOT x GOVRNANC			-0.0118* (0.00620)		
POLSTB				-0.0824* (0.0431)	
NDCTOT x POLSTB				-0.00695*** (0.00199)	
GOVTDEBT					-0.00111 (0.000710)
NDCTOT x GOVTDEBT					0.000879** (0.000369)
Constant	9.463*** (3.479)	11.03*** (3.708)	10.58*** (3.595)	10.54*** (3.475)	12.06*** (3.647)
Year Dummies	Yes	Yes	Yes	Yes	Yes
No. of Observations	600	565	573	599	596
No. of Groups	36	36	36	36	36
R-squared	99.71	99.69	99.69	99.73	99.69
p-Values Hansen's J-Statistic	0.912	0.417	0.284	0.349	0.705

Notes: This table, models (1)-(5), is estimated through dynamic fixed effect within instrumental variable (DFEIV). The dependent variable is the income inequality (INCINEQ) and lag dependent is independent of the income inequality lag. Other independent variables are narrow dependent commodity terms of trade (NDCTOT), unemployment (UNEMPLMNT), human capital (HUCPTL), economic growth (ECGROWTH), government size (GOVTSIZE), governance (GOVRNANC), political stability (POLSTB), and government debt (GOVTDEBT). All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Model (1) shows results of base model solely, whereas models (2), (3), and (4) indicate results of base model with GOVTSIZE, GOVRNANC, POLSTB and GOVTDEBT as conditional variables and (NDCTOT x GOVTSIZE), (NDCTOT x GOVRNANC), (NDCTOT x POLSTAB), and (NDCTOT x GOVTDEBT) are their interactive terms, respectively.

of NDCTOT on income inequality, in terms of magnitude than the impact of NDCTOT on income inequality without GOVTSIZE (for more details, see model (2) in Tables 2.16 and 2.17).

Additionally, the interactive term of NDCTOT and GOVRNANC, (NDCTOT * GOVRNANC), is negative, along with the individual effect of GOVRNANC; however, the former is significant at a 10% level, while the latter is at a 5% level in a model (3) of Table 2.16. This result in that the impact of NDCTOT on income inequality is conditional upon the level of GOVRNANC. That is the negative effect of NDCTOT on income inequality increases or income inequality decreases when the GOVRNANC level improves and vice versa (Deininger and Squire, 1998). More precisely, model (3) in Table 2.17 shows that as the level of GOVRNANC improves from low to average to high, the negative effect of NDCTOT on income inequality increases with a 5% significance level. That is the negative effect of NDCTOT on income inequality is stronger in countries with a stronger governance level, as governance reinforces the favorable effects of commodity price booms through increased growth and employment opportunity which in turn increase income and hence income inequality to decrease (Zhuang et al., 2010; Resnick and Birner, 2006). These results can be attributed to several economic factors. Although there are no specific studies available that directly address this interactive term, the literature suggests that effective governance, particularly in controlling corruption and enhancing regulatory quality, enhances the income of the poor and reduces poverty (Ochi et al, 2023; Doumbia, 2019). Therefore, several mechanisms can explain the moderating influence of governance on the NDCTOT-income inequality nexus. First, effective governance fosters equitable distribution of NDCTOT gains by promoting pro-poor policies, such as targeted investments in education, healthcare, and infrastructure. In addition, governance can help to reduce the volatility of income inequality. For example, when NDCTOT fluctuates, countries with good governance can use their policies to stabilize the economy and protect vulnerable households from income shocks. This can help to prevent income inequality from increasing during periods of economic downturn. Second, strong governance institutions minimize the risk of conflict and expropriation, which often accompany NDCTOT booms and exacerbate income inequality. Third, sound governance creates a stable and predictable environment conducive to investment the windfall gains again, and increases further economic growth, benefiting all income groups and mitigating income inequality (Zhuang et al., 2010). Overall, we can compare the results in terms of the magnitude of the impact of NDCTOT on income inequality without GOVRNANC as a conditional variable and with GOVRNANC as a conditional variable. It is shown that the impact of NDCTOT on income inequality in the presence of improved GOVRNANC is more useful and profound in decreasing the negative effect of NDCTOT on income inequality, in terms of magnitude, than the impact of NDCTOT on income inequality without GOVRNANC (see model (3) in Tables 2.16 and 2.17) (for more details see for instance, Alesina et al., 2004; Easterly, 2002; Acemoglu et al., 2001).

Table 2.17: Indirect Effects of Narrow Dependent Commodity Terms of Trade on Income Inequality through Different Conditional Variables having Different Percentile Levels

Conditional variables and their different levels	GOVTSIZE From Model (2)	GOVRNANC From Model (3)	POLSTB From Model (4)	GOVTDEBT From Model (5)
Low	-0.0901**	-0.0872**	-0.0743**	-0.0708**
	(0.0366)	(0.0359)	(0 .0339)	(0.0349)
Average	-0.0951**	-0.0893**	-0.0753**	-0.0692**
	(0.0371)	(0.0358)	(0.0339)	(0.0349)
High	-0.103***	-0.0913 **	-0.0764**	-0.0683**
	(0.0383)	(0.0358)	(0 .0339)	(0.0348)

Note: Government size (GOVTSIZE), governance (GOVRNANC), Political stability (POLSTB), and government debt (GOVTDEBT) are conditional variables. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Low, Average, and High means 25th, 50th, and 75th percentile respectively.

Moreover, the interactive term of NDCTOT and POLSTB, (NDCTOT * POLSTB), is negative, along with the individual effect of POLSTB, however, the former is significant at a 10% level, while the latter is at a 1% level in the model (4) of Table 2.16. This suggests that the impact of NDCTOT on income inequality is dependent upon the level of POLSTB. That is the negative effect of NDCTOT on income inequality increases or income inequality decreases when the POLSTB of a country improves, and vice versa. For more clear details, model (4) in Table 2.17 shows that as the level of POLSTB improves or increases, from low to average to high, the negative effect of NDCTOT on income inequality increases with a 5% significance level. This means that the negative effect of NDCTOT on income inequality is stronger in countries with a stronger level of POLSTB. There are some possible explanations for this finding. One possibility is that political stability leads to a more equitable distribution of the gains from NDCTOT booms. For example, governments in politically stable countries may be more likely to invest NDCTOT revenues in pro-poor programs, such as education and healthcare. Additionally, political stability may reduce the risk of conflict and expropriation, which can also contribute to a more equitable distribution of income. Another possibility is that political stability leads to a more efficient use of NDCTOT revenues. For example, governments in politically stable countries may be less likely to engage in corruption or rent-seeking behavior, which can divert resources away from productive investment. Additionally, political stability may create a more stable and predictable environment for businesses, which can encourage investors to reinvest their windfall profit to enhance economic growth and income and so diminish income inequality. Overall, we can compare the results, in terms of magnitude, of the impact of NDCTOT on income inequality with and without POLSTB as a conditional variable. It is indicated that the impact of NDCTOT on income inequality in the presence of improved POLSTB is more useful and profound in decreasing the negative effect of NDCTOT on income inequality, in terms of magnitude than the impact of NDCTOT on income inequality without POLSTB (see model (4) in Tables 2.16 and 2.17) (for more details, see Milanovic, 2016; Piketty and Saez, 2006; Kuznets, 2019).

Furthermore, the interactive term of NDCTOT and GOVTDEBT, (NDCTOT * GOVTDEBT), is positive and significant at a 5% level, while the individual effect of GOVTDEBT is negative but insignificant in the model (5) of Table 2.16. The coefficient of the interaction term indicates that the impact of NDCTOT on income inequality is contingent on the level of GOVTDEBT. This indicates that the negative effect of NDCTOT on income inequality decreases, or income inequality increases when government DEBT increases and vice versa. This means that the negative effect of NDCTOT on income inequality is weaker in countries with more GOVTDEBT burden as compared to less GOVTDEBT burden (for more details see, Table 2.17). This is because a high level of government debt constrains the government's capacity to increase its spending in response to an increase in government revenue as a result of the NDCTOT boom. Similarly, an elevated level of government debt may result in increased taxes. and interest rates, which can also reduce aggregate demand and employment. The literature suggests that high levels of government debt can lead to income inequality due to its excessive reliance which amplifies wealth inequality. Government debt can reduce the negative and favorable effects of NDCTOT on income inequality, that is when there is a boom in NDCTOT, the government can use its windfall revenues from commodity exports to reduce its debt burden. This can free up resources that could be used for government spending on social programs such as education, healthcare, and infrastructure, that could benefit lower-income households, along with policies like unemployment insurance, food subsidies, and access to credit, which in turn can help to reduce income inequality (for more details see for instance, Obiero and Topuz, 2022; Anselmann and Kraemer, 2016). Overall, we can compare the results, in terms of magnitude, of the impact of NDCTOT on income inequality without GOVTDEBT as a conditional variable and with GOVTDEBT as a conditional variable. It is indicated that the impact of NDCTOT on income inequality in the presence of GOVTDEBT is weaker, in terms of magnitude than the impact of NDCTOT on income inequality without GOVTDEBT (for more details, see model (5) in Tables 2.16 and 2.17).

2.5.2 Macroeconomic Effects of Narrow Dependent Commodity Terms of Trade Booms and Busts

After all, we have examined the macroeconomic effect of commodity price fluctuations, in terms of NDCTOT changes, in export commodity-dependent economies. Now, we are further interested that what would be the macroeconomic implication of large fluctuations, in terms of magnitude, that are commonly indicated as commodity price booms and busts for export commodity-dependent economies? For this purpose, we have calculated the booms and busts series for two different threshold levels that is BOOMS_15% (BUSTS_15%) and BOOMS_25% (BUSTS_25%).[61] However, regarding the threshold level, there is no specific rule or criteria, it is purely arbitrary to get a fair number of observations and a reasonable analysis vis-à-vis the commodity price booms and busts magnitude. Therefore, we now provide some preliminary illustrative analyses. of these booms and busts episodes, with more analyses left for further research, to compare our same macroeconomic indicators behavior during these episodes under our defined threshold levels of this NDCTOT. However, this time we used the simple fixed effect (FE) technique to estimate and carry out our entire analysis because our purpose is purely based on the commodity price booms and busts magnitude. Additionally, rather than explicitly involving the role of conditional or moderating variables we left it out due to the repetitive nature. But we deduce its role as a conditional variable from our previous analysis of how these conditional variables play in the booms and busts episodes.

2.5.2.1 Effects of Narrow Dependent Commodity Terms of Trade Booms and Busts on Output

Therefore, Table 2.18 above indicates that the coefficients of NDCTOT, under low and high booms, take on a positive and significant impact on output in models (1) and (2). As expected, the effect on output under low NDCTOT booms, BOOMS_15%, as compared to high NDCTOT booms, BOOMS_25%, is less favorable in terms of magnitude. While big booms typically do lead to larger increases in domestic output and economic growth compared to smaller booms, it is decisive to ponder several factors that can affect the outcome. Booming commodity prices translate to a significant increase in export revenue for exporting countries. This bring in more money into the economy, boosting aggregate demand and stimulating production across various sectors. The increased resource wealth and profits during a boom encourage businesses to invest in capacity expansion, technological upgrades, and diversification of their activities. This leads to higher productivity and potential output growth. The windfall from booming exports allows governments to increase their budgets and allocate more

[61] For construction on these booms and busts, see methodology section, above.

resources towards public infrastructure projects, education, and other spending that contributes to long-term economic growth. The positive economic outlook and high demand during a boom create a more optimistic business environment, which can attract foreign investment and stimulate entrepreneurship, further boosting economic activity. However, smaller booms allow for a more gradual increase in demand and investment, enabling businesses and consumers to adjust more smoothly and potentially avoiding overheating or bubbles. Smaller booms might present a better opportunity for governments to adhere to sound fiscal principles, avoiding excessive spending or unsustainable debt accumulation that could later undermine growth. Smaller booms might encourage more deliberate and sustainable resource management, focusing on investments that promote long-term economic diversification and productivity gains rather than temporary consumption boosts. Moreover, our control variables are consistent with the ones we already discussed above. As for the role of our conditional variables, POLSTB, GOVRNANC, and FDEVLP, in cases of small and large booms in NDCTOT. Therefore, based on our models (2) and (3) results in Tables 2.2 and 2.3, we assert that at the time of BOOMS_15% and BOOMS_25% in NDCTOT, the NDCTOTs impact on output become large to larger when the POLSTB and GOVRNANC, conditional variables, are increasing from low to medium to high level. As these conditional variables further reinforce the NDCTOTs booms favorable effect. Similarly, analogous deduction from the model (3) in Tables 2.2 and 2.3, the impact of these two NDCTOTs threshold on output in the presence of FDEVLP, decreases as the levels of FDEVLP increase.

In contrast, Table 2.18 also indicates that the coefficients of NDCTOT under low and high busts, take on a negative and significant impact on output in models (3) and (4). As expected, the effect on output under high NDCTOT busts, BUSTS_15%, as compared to low NDCTOT busts, BUSTS_25%, is more adversely severe and destructive in terms of magnitude. High and big commodity price busts typically lead to a greater decrease in domestic output and economic growth compared to smaller busts. It is vital to consider several factors that can prompt the outcome. Busts trigger a sharp decline in export revenue and foreign exchange earnings for resource-exporting countries. This reduces aggregate demand in the economy, leading to business closures, job losses, and lower production across various sectors. The negative economic outlook and risk aversion during a bust discourage businesses from investing. Existing investments might even be abandoned or scaled back, leading to lower productivity and potential output. As revenue plummets, governments are forced to cut their budgets and reduce spending on public infrastructure projects, education, and other crucial services. This directly decreases the government's contribution to GDP and can further weaken business confidence. The pessimistic economic environment and lower demand during a bust create a challenging business climate, discouraging entrepreneurship and new business formation, further hindering economic activity. However, smaller busts allow for a more gradual decline in economic activity, providing businesses and consumers with some time to adjust and potentially find alternative sources of income and revenue. Smaller busts might still impact business confidence but are less likely to trigger widespread pessimism and risk aversion, allowing some ongoing economic activity and the potential for a softer landing. Smaller busts offer governments more flexibility to implement policies like targeted stimulus packages or temporary tax breaks to support businesses and consumers, mitigating the decline in output and growth. Moreover, our control variables are consistent with the ones we already discussed above.

As for the role of our conditional variables, POLSTB, GOVRNANC, and FDEVLP, in cases of small and large busts in NDCTOT. Therefore, based on our models (2) and (3) results in Tables 2.2 and 2.3, we assert that at the time of BUSTS_15% and BUSTS_25% in NDCTOT, the negative impact of NDCTOTs on output becomes small to smaller when the POLSTB and GOVRNANC, conditional variables, are increasing from low to medium to high level. As both POLSTB and GOVRNANC worked in the opposite direction to NDCTOTs busts to decrease the negative effect of it. For instance, POLSTB can act as a buffer against the negative impacts of declining NDCTOT on the output of exporting economies issue with various mechanisms at play. That is stable political environments foster predictability and investor confidence, promoting long-term investments and economic growth. This resilience helps mitigate the economic shock caused by declining NDCTOT. Conversely, political instability creates uncertainty and discourages investments, hindering the economy's ability to adapt and adjust to changing external conditions like falling commodity prices. Additionally, politically stable governments are often better equipped to formulate and implement sound economic policies in response to external shocks. For instance, implement fiscal and monetary measures to stimulate domestic demand and offset the decline in export revenues along with diversifying the economy to shrink dependency on a narrow range of export commodities. Invest in infrastructure and human capital to improve long-term economic productivity. Political instability, on the other hand, can lead to policy gridlock, corruption, and inefficient resource allocation, further exacerbating the negative effects of falling NDCTOT.

Likewise, stable political systems tend to have more inclusive institutions and mechanisms for conflict resolution, fostering social cohesion and reducing the risk of social conflict. This social stability can help absorb the economic shock and facilitate collective action to mitigate the impact on livelihoods. Political instability, however, can fuel social unrest and hinder cooperation, making it harder for the government and society to collectively respond to the challenges posed by declining NDCTOT. In addition, stable political systems often have well-functioning institutions like property rights, contract enforcement, and regulatory frameworks. These institutions promote efficient resource allocation, attract foreign direct investment, and facilitate economic diversification, making the economy more resilient to external shocks. Weak institutions in politically unstable environments can hamper economic activity, further amplifying the negative effects of declining NDCTOT.

Table 2.18: Effects of Narrow Dependent Commodity Terms of Trade Booms and Busts on Output_Estimations Based on Fixed Effect

Independent Variables	Model (1) BOOMS_15%	Model (2) BOOMS_25%	Model (3) BUSTS_15%	Model (4) BUSTS_25%
NDCTOT	0.0408***	0.0600*	-0.0281***	-0.0411**
	(0.0144)	(0.0311)	(0.0102)	(0.0184)
HUCPTL	0.349***	0.226***	-0.0336	0.264***
	(0.0415)	(0.0735)	(0.0378)	(0.0438)
INVSTMN	0.221***	0.211***	0.000933	0.114*
	(0.0456)	(0.0715)	(0.0310)	(0.0585)
INF	0.0306***	0.00336***	0.000955***	0.362***
	(0.00986)	(0.000570)	(0.000220)	(0.0374)
FDI	0.00326***	0.0453**	0.0247***	0.0101**
	(0.000354)	(0.0182)	(0.00937)	(0.00466)
TRDOPNES	0.205**	-0.194	0.102**	-0.0383
	(0.0865)	(0.122)	(0.0442)	(0.0975)
GOVTSIZE	0.0362	0.0412	-0.151***	-0.260***
	(0.0652)	(0.0932)	(0.0396)	(0.0718)
Constant	17.16***	17.37***	27.96***	26.34***
	(1.494)	(3.142)	(1.068)	(2.032)
Year Dummies	Yes	Yes	Yes	Yes
No. of Obs.	240	122	261	135
No. of Groups	31	29	31	29
R-squared	23.96	31.80	35.84	38.85

Notes: This table, models (1)-(4), is estimated through fixed effect (FE). The dependent variable is the output. The independent variables are narrow dependent commodity terms of trade (NDCTOT), human capital (HUCPTL), investment (INVSTMN), inflation (INF), foreign direct investment (FDI), trade openness (TRDOPNES), government size (GOVTSIZE), political stability (POLSTB), governance (GOVRNANC), and financial development index (FDEVLP). All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Similarly, models (1) and (2) show results of the same base model but with different threshold levels of NDCTOT i.e., booms_25% and booms_15% respectively. Additionally, models (3), and (4) show results of the same base model but with different threshold levels of NDCTOT i.e., busts_25% and busts 15% respectively.

Likewise, good GOVRNANC practices can play a fundamental role in lessening the negative effects of falling NDCTOT in several ways. First, good governance fosters transparency and accountability in government decision-making, leading to more effective and efficient formulation of economic policies in response to declining NDCTOT. Effective policies can include diversification of exports, promoting investment in productive sectors, and implementing social safety nets to alleviate the burden on vulnerable populations. However, poor governance characterized by corruption and weak institutions can lead to misallocation of resources, hindering the effectiveness of economic policies and exacerbating the negative effects of falling NDCTOT. Second, good governance with predictable regulatory frameworks and strong property rights attracts domestic and foreign investments, contributing to economic diversification and reducing dependence on a narrow range of export commodities. This diversification makes the economy less vulnerable to fluctuations in the prices of specific commodities and strengthens its resilience to external shocks like falling NDCTOT. In contrast, weak governance with unpredictable regulations and high corruption discourages investments, hindering diversification efforts and amplifying the negative effects of NDCTOT decline. Third, good governance promotes accountability and transparency in public resource management, leading to better infrastructure development, human capital investment, and overall economic growth. This robust economic foundation enhances the economy's capacity to adapt and adjust to external shocks like declining NDCTOT. Conversely, poor governance with inefficient resource allocation and limited public infrastructure weakens the economy's long-term growth potential, making it more susceptible to the negative effects of falling NDCTOT. Finally, effective governance fosters inclusive institutions and mechanisms for conflict resolution, promoting social consistency and reducing the risk of social strife. This social stability can help absorb the economic shock caused by declining NDCTOT and facilitate collective action to mitigate its impact on livelihoods. Conversely, poor governance with limited social participation and unequal distribution of resources can fuel social unrest, further hindering economic recovery after a NDCTOT shock.

Similarly, analogous deduction from the model (3) in Tables 2.2 and 2.3, the impact of these two NDCTOTs busts on output in the presence of FDEVLP is negatively less propound, as the levels of FDEVLP increase. Because FDEVLP is working as an opposing force to reduce the negative effect of NDCTOT busts. For example, lower borrowing costs and improved access to finance enhance investment, leading to increased production capacity and output growth. Additionally, developed financial systems support the development of new technologies and industries, fostering diversification and reducing dependence on the affected commodity sector, thus contributing to overall economic resilience. Likewise, efficient financial markets allocate resources to their most productive uses, maximizing output and economic growth across various sectors. Last but not least, improved access to hedging tools and risk-sharing mechanisms reduces uncertainty for businesses, encouraging sustained production and preventing output contraction.

2.5.2.2 Effects of Narrow Dependent Commodity Terms of Trade Booms and Busts on Investment

Table 2.19 indicates that the coefficients of NDCTOT, under low and high booms, take on a positive impact on investment in models (1) and (2) but are significant only in the latter model. As expected, the effect on investment under low NDCTOT booms, BOOMS_15%, as compared to high NDCTOT booms, BOOMS_25%, is less favorable in terms of magnitude. While high and big commodity price booms often do lead to a bigger increase in domestic investment compared to smaller booms, it's important to consider several factors that can influence the outcome. Booms generate substantial profits and revenue for resource-exporting countries and companies operating in the sector. This translates into increased savings and investable resources available for businesses and the government. The positive economic outlook and high demand during a boom create a more optimistic business environment. This boosts investor confidence and encourages firms to undertake new investments in expanding production, upgrading technology, and diversifying their activities. Booming export revenue allows governments to increase their budgets and allocate more resources towards public infrastructure projects, education, and other investments critical for long-term growth and development. Strong economic fundamentals and improved creditworthiness during a boom often result in reduced borrowing expenses for businesses and the government. This makes it easier and more attractive to finance new investments. However, smaller booms allow for a more gradual increase in profits and available resources, permitting more strategic and prudent investment planning. Businesses might be more cautious and focused on risk management during smaller booms, leading to more measured investment decisions compared to the potentially overconfident approach observed during big booms. Smaller booms might present a better opportunity for governments to prioritize essential investments and adhere to sound fiscal principles, avoiding excessive spending or unsustainable debt accumulation. Moreover, our control variables are consistent with the ones we already discussed above. As for the role of our conditional variables, FDEVLP, EXCRATE, and POLSTB, in cases of small and large booms in NDCTOT. Therefore, based on our models (2) and (4) results in Tables 2.4 and 2.5, we assert that at the time of BOOMS_15% and BOOMS_25% in NDCTOT, the NDCTOTs impact on investment becomes large to larger when the FDEVLP and POLSTB, conditional variables, are increasing from low to medium to high level. As these conditional variables further reinforce the NDCTOTs booms a favorable effect on investment. Similarly, analogous deduction from the model (3) in Tables 2.4 and 2.5, the impact of these two NDCTOTs thresholds on investment is decreasing, as the levels of EXCRATE increases.

Table 2.19 indicates that the coefficients of NDCTOT, under low and high busts, take on a negative and significant impact on investment in models (3) and (4). As expected, high and big commodity price busts, BUSTS_25%, typically lead to a greater decrease in domestic investment compared to smaller busts, BUSTS_15%. It is foremost to reflect several factors that can influence the outcome. Busts trigger a sharp decline in export revenue and profits for resource-exporting countries and companies operating in the sector. This reduces available resources for investment and leads to decreased savings and cash flow. The negative economic outlook and lower demand during a bust create a pessimistic business environment, dampening investor confidence and discouraging new investments. Companies may focus on survival and cost-cutting rather than expansion or innovation. As revenue plummets, governments are forced to cut their budgets and reduce spending on public infrastructure projects, education, and other investments. This directly diminishes government-driven investment. The economic instability and weakened creditworthiness during a bust often lead to higher borrowing costs for businesses and the government. This makes it more expensive and less attractive to finance new investments. However, smaller busts allow for a more gradual decline in available resources and economic activity, providing firms and the government with some time to adjust investment plans and potentially find alternative financing sources. Smaller busts might still impact business confidence but are less likely to trigger widespread pessimism and risk aversion, allowing some investment activity to continue. Smaller busts offer governments more flexibility to implement policies like targeted loan guarantees or temporary tax breaks to support business investment and prevent a significant decline. Moreover, our control variables are consistent with the ones we already discussed above.

As for as the role of our conditional variables, FDEVLP, EXCRATE, POLSTB, in cases of small and large busts in NDCTOT. Therefore, based on our models (2) and (4) results in table 2.4 and 2.5, we assert that at the time of BUSTS_15% and BUSTS_25% in NDCTOT, the negative impact of NDCTOTs on investment become smaller to small when the FDEVLP and POLSTB conditional variables, are increasing from low to medium to high level. As both FDEVLP and GOVRNANC worked as an opposite direction to NDCTOTs busts to decrease the negative effect of it. For instance, FDEVLP can potentially reverse the detrimental effects through lower interest rates and improved access to finance make investment projects more viable, encouraging businesses to maintain or even increase investment despite the shock. Likewise, efficient financial markets facilitate information sharing and reduce uncertainty, making investment decisions more informed and reducing risk aversion. Additionally, developed financial systems support the development of new technologies and industries, fostering diversification and creating alternative investment opportunities less dependent on the affected commodity sector.

Table 2.19: Effects of Narrow Dependent Commodity Terms of Trade Booms and Busts on Investment_Estimations Based on Fixed Effect

Independent Variables	Model (1) BOOMS_15%	Model (2) BOOMS_25%	Model (3) BUSTS_15%	Model (4) BUSTS_25%
NDCTOT	0.0107	0.163*	-0.0455*	-0.189***
	(0.0486)	(0.0948)	(0.0236)	(0.0636)
SAVINGS	0.0107	0.163	-0.0455*	0.301***
	(0.0486)	(0.138)	(0.0236)	(0.0845)
INTRATE	0.0738	0.0359	-0.00871***	0.00313
	(0.0601)	(0.0345)	(0.00217)	(0.00405)
INF	-0.00910	-0.0000677	0.000283	-0.000205
	(0.0338)	(0.00158)	(0.00230)	(0.000840)
FDI	0.0814	0.210***	0.00123**	0.0627
	(0.180)	(0.0490)	(0.000481)	(0.0419)
REMITTANCES	0.0330***	0.0564	0.103***	0.110**
	(0.00526)	(0.0602)	(0.0193)	(0.0415)
Constant	1.314	-14.08	7.233***	20.91***
	(4.821)	(9.548)	(2.338)	(6.255)
Year Dummies	Yes	Yes	Yes	Yes
No. of Observations	103	61	208	70
No. of Groups	28	24	30	22
R-squared	21.73	20.62	22.88	24.05

Notes: This table, models (1)-(4), is estimated through fixed effect (FE). The dependent variable is the investment. The independent variables are narrow dependent commodity terms of trade (NDCTOT), savings (SAVINGS), interest rate (INTRATE), inflation (INF), foreign direct investment (FDI), remittances (REMITTANCES), financial development (FDEVLP), exchange rate (EXCRATE), and political stability (POLSTB). All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Similarly, models (1) and (2) show results of the same base model but with different threshold levels of NDCTOT i.e., booms_25% and booms_15% respectively. Additionally, models (3), and (4) show results of the same base model but with different threshold levels of NDCTOT i.e., busts_25% and busts 15% respectively.

Similarly, POLSTB can serve as a buffer against the negative impacts of declining NDCTOT on investment in exporting economies through several mechanisms. First, stable political environments offer predictability and reduced risk, attracting both domestic and foreign investors. This foster long-term investments in productive sectors, contributing to economic diversification and reducing dependence on volatile commodity exports. Conversely, political instability creates uncertainty and discourages investments, making businesses hesitant to commit capital to long-term projects due to concerns about potential disruptions or policy changes. Second, politically stable governments are often better equipped to formulate and implement sound economic policies in response to external shocks like falling NDCTOT. These policies can incentivize investments, such as tax breaks and subsidies for specific sectors or activities; infrastructure development initiatives to improve ease of doing business; streamlined regulatory frameworks to attract and retain investors. However, political instability, on the other hand, can lead to inconsistent and unpredictable policies, deterring investors and hindering economic growth. Third, stable political systems often have well-functioning institutions like strong property rights, contract enforcement, and transparent legal frameworks. These institutions create a stable and predictable environment, encouraging both domestic and foreign investors. Weak institutions in politically unstable environments can lead to corruption, bureaucratic hurdles, and unpredictable legal processes, significantly discouraging investment. Fourth, stable political systems tend to have more inclusive institutions and mechanisms for conflict resolution, fostering social unity and reducing the risk of social turbulence. This social stability creates a more conducive environment for investment, attracting companies seeking stable operating environments. Political instability, conversely, can fuel social unrest and hinder collaboration, making it harder to attract and retain investors due to concerns about potential disruptions or violence. Finally, political stability often leads to greater financial stability and a stronger banking system, facilitating access to credit for businesses and entrepreneurs. This readily available financing enables investments in new ventures and expansions, boosting economic growth. Political instability can undermine financial markets and lead to capital flight, reducing access to credit and hindering investment activity.

Additionally, similar analogous deduction from model (3) in table 2.4 and 2.5, the impact of these two NDCTOTs busts on investment in the presence of EXCRATE, is negatively more propound, as the levels of EXCRATE increases. Because EXCRATE depreciation and volatility further reinforces the negative impact of NDCTOTs busts on investment. For instance, depreciation can create uncertainty and risk for businesses, potentially making them hesitant to invest in new projects. This is especially true if depreciation is perceived as volatile or temporary. Additionally, depreciation increases the cost of imported raw materials and inputs, potentially squeezing profit margins and discouraging investment in sectors reliant on such imports. Likewise, depreciation can trigger capital flight as investors seek to move their assets to more stable currencies. This can lead to a credit crunch and further hinder investment. Moreover, depreciation can fuel inflation by raising the price of imported goods, eroding the profitability gains from increased exports and potentially dampening overall economic activity, including investment.

2.5.2.3 Effects of Narrow Dependent Commodity Terms of Trade Booms and Busts on Unemployment

Table 2.20 indicates that the coefficients of NDCTOT, under low and high booms, take on a negative, means decreasing, and significant impact on unemployment in models (1) and (2). As expected, the effect on unemployment under high NDCTOT booms, BOOMS_15%, as compared to low NDCTOT booms, BOOMS_25%, is more favorable in terms of magnitude. High and big commodity price booms often lead to a bigger decrease in unemployment compared to smaller booms. It is valuable to mention several factors that can influence the outcome. Higher commodity prices translate to increased revenue for commodity-exporting nations and potentially higher government spending. This can lead to higher demand for goods and services across the economy, stimulating job creation in various sectors. The booming commodity sector itself can experience significant job growth, directly reducing unemployment in those areas. Higher government revenues and private sector confidence can lead to increased investment in infrastructure, education, and other areas, further fostering job creation. However, high and big booms can trigger "Dutch disease." The appreciation of the real exchange rate due to high export prices makes other sectors less competitive, potentially leading to job losses in manufacturing and other tradeable sectors. This can offset the gains in the commodity sector, resulting in a limited impact on overall unemployment. The skills required in the booming commodity sector might not match the skills of the unemployed workforce, leading to a situation where unemployment persists despite job growth in specific areas. Rapid price increases in a booming economy can lead to inflation, eroding purchasing power and potentially disproportionately impacting lower-income households. This can lead to social unrest and hinder the positive impact of the boom on jobs and unemployment. In contrast, smaller booms provide more time for adjustments and allow the economy to absorb the increased demand effectively. This can lead to a more balanced distribution of gains across sectors and a more sustainable reduction in unemployment. The smaller scale of job creation in a smaller boom might be more aligned with the existing skills of the workforce, leading to faster reductions in unemployment across different segments of the population. The real exchange rate appreciation in a smaller boom is likely to be more moderate, minimizing the risk of Dutch disease and its negative impact on jobs in other sectors. Moreover, our control variables are consistent with the ones we already discussed above.

As for the role of our conditional variables, GOVTDEBT, POLSTB, and GOVRNANC, in cases of small and large booms in NDCTOT. Therefore, based on our models (3) and (4) results in Tables 2.6 and 2.7, we assert that at the time of BOOMS_15% and BOOMS_25% in NDCTOT, the NDCTOTs decreasing impact on unemployment becomes large to larger when the POLSTB, GOVRNANC, conditional variables, are increasing from low to medium to high level, respectively. These conditional variables further reinforce the NDCTOTs boom decreasing the effect on unemployment. Similarly, analogous deduction from the model (2) in Table 2.6 and 2.7, the impact of these two NDCTOTs thresholds on unemployment decreases and then reverses to increase, as the level of GOVTDEBT burden increases from low to average and high levels.

Table 2.20: Effects of Narrow Dependent Commodity Terms of Trade Booms and Busts on Unemployment_Estimations Based on Fixed Effect

Independent Variables	Model (1) BOOMS_15%	Model (2) BOOMS_25%	Model (3) BUSTS_15%	Model (4) BUSTS_25%
NDCTOT	-0.0553*	-0.124*	0.0491*	0.187**
	(0.0330)	(0.0704)	(0.0247)	(0.0787)
OUTPUT	-0.357**	-0.288	-0.466***	-0.361*
	(0.176)	(0.203)	(0.105)	(0.216)
INF	0.158	0.154	-0.0827	-0.116
	(0.101)	(0.142)	(0.0506)	(0.0932)
FDI	0.0517	0.00410	0.0292	0.0471
	(0.0312)	(0.0271)	(0.0190)	(0.0452)
POPULATN	-0.490**	-0.502*	0.0111	-0.157
	(0.212)	(0.257)	(0.171)	(0.425)
GOVTDEBT	-0.00728	0.0162	-0.0581	-0.0246
	(0.0460)	(0.0550)	(0.0386)	(0.0657)
Constant	22.96***	28.41***	8.959**	-5.139
	(5.466)	(8.835)	(3.603)	(11.11)
Year Dummies	Yes	Yes	Yes	Yes
No. of Obs.	258	164	338	123
No. of Groups	47	43	47	38
R-squared	31.84	23.09	30.01	27.75

Notes: This table, models (1)-(4), is estimated through fixed effect (FE). The dependent variable is the unemployment (). The independent variables are narrow dependent commodity terms of trade (NDCTOT), output (OUTPUT), inflation (INF), foreign direct investment (FDI), population (POPULATN), government debt (GOVTDEBT), political stability (POLSTB), and governance (GOVRNANC). All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Similarly, models (1) and (2) show results of the same base model but with different threshold levels of NDCTOT i.e., booms_25% and booms_15% respectively. Additionally, models (3), and (4) show results of the same base model but with different threshold levels of NDCTOT i.e., busts_25% and busts 15% respectively.

Table 2.20 indicates that the coefficients of NDCTOT, under low and high busts, take on a positive, means increasing, and significant impact on unemployment investment in models (3) and (4). As expected, high and big commodity price busts typically lead to a greater decrease in domestic investment compared to smaller busts. The impact depends on several factors, leading to potential increases, in unemployment. A significant price drop directly leads to reduced revenue and profitability for commodity-producing companies and industries. This often translates to significant job losses in mining, extraction, and related sectors. With lower export revenue, governments in commodity-dependent economies experience budget deficits, forcing them to cut spending. This can lead to reductions in public sector jobs and decreased demand for goods and services in other sectors, further pushing up unemployment. However, as commodity prices fall, the real exchange rate depreciates in commodity-exporting countries. This makes other sectors more competitive, potentially leading to job gains in manufacturing and tradeable sectors. However, the extent of these gains may not fully offset the initial losses in the commodity sector. The decline in commodity prices reduces production costs for many businesses, making them more competitive and potentially leading to increased hiring in manufacturing and export sectors. Governments in response to major busts might implement stimulus packages involving increased spending on infrastructure or social programs, creating jobs in those sectors. A big bust can force labor reallocation to more competitive sectors over time, leading to long-term improvements in employment dynamics and productivity. In contrast, smaller busts allow for more gradual adjustments and less severe economic disruptions. This can result in fewer job losses in the commodity sector and less pressure on government budgets, potentially limiting the rise in unemployment. Businesses and governments have more time to adapt to smaller price declines, potentially implementing cost-cutting measures or diversification strategies that mitigate the negative impacts on jobs. Large busts create a more uncertain and riskier environment, discouraging investment and hiring across various sectors, and hindering any potential job gains from Dutch disease reversal or lower production costs. Moreover, our control variables are consistent with the ones we already discussed above.

As for the role of our conditional variables, GOVTDEBT, POLSTB, and GOVRNANC, in cases of small and large busts in NDCTOT. Therefore, based on our models (3) and (4) results in Tables 2.6 and 2.7, we assert that at the time of BUSTS_15% and BUSTS_25% in NDCTOT, the positive impact of NDCTOTs on unemployment become smaller to small when the POLSTB and GOVRNANC, conditional variables, are increasing from low to medium to high level. Both POLSTB and GOVRNANC worked in the opposite direction to NDCTOTs' busts to decrease the positive/increasing effect on unemployment. For instance, POLSTB can play a multifaceted role in lessening the negative effects of declining NDCTOT on unemployment in exporting economies, potentially preventing further increases and even fostering unemployment reduction. First, stable governments have a greater capacity to formulate and implement effective economic policies in response to falling NDCTOT. These policies can directly address unemployment, such as injecting resources into the economy through public spending projects that can create jobs in construction, infrastructure, and social services; providing unemployment benefits and retraining programs can support affected workers while they search for new jobs; increasing flexibility in wages and working conditions can improve business competitiveness and encourage job creation. Second, political stability fosters predictability and confidence, attracting investments in diverse sectors beyond the volatile commodity sector. These investments create new jobs and diversify the economy, reducing overall unemployment dependence on commodity markets. Third, stable political systems tend to have better social cohesion and mechanisms for dispute determination. This reduces the risk of social unrest and protests triggered by unemployment and economic hardship, allowing for a more stable environment for labor market recovery. Fourth, well-functioning institutions in stable environments offer transparent regulations, strong property rights, and efficient legal systems. This facilitates efficient labor market matching, retraining programs, and mobility between sectors, helping unemployed workers find new opportunities. Finally, political stability and economic uncertainty often lead to skilled professionals emigrating for better opportunities. This "brain drain" further hampers economic growth and reduces the skilled workforce needed for diversification and job creation. Political stability can help retain talent and attract skilled professionals, contributing to long-term unemployment reduction.

Likewise, GOVRNANC can act as a crucial conditional variable in mitigating the negative effects of declining NDCTOT on unemployment in exporting economies as it delves deeper into the effectiveness of institutions, policies, and regulations, further influencing unemployment dynamics. First, transparent and accountable governance facilitates the formulation and implementation of evidence-based policies targeted at unemployment reduction. That is, training and upskilling initiatives equip workers with new skills necessary for adapting to changing economic demands and securing jobs in diversified sectors; creating an environment conducive to business creation through simplified regulations, access to finance, and mentorship programs promote new job opportunities; providing essential support like unemployment benefits and targeted aid mitigates immediate hardship and facilitates job search during economic transitions. Second, good governance with predictable regulations, strong property rights, and efficient legal systems attracts domestic and foreign investors, leading to job creation in diverse sectors beyond the volatile commodity sector. This diversification reduces unemployment dependence on specific commodity markets. Third, well-functioning institutions in well-governed environments ensure transparent labor markets, efficient job-matching services, and retraining programs. This allows unemployed workers to easily access relevant job opportunities and facilitates smooth transitions between sectors, hindering further unemployment increases. Fourth, effective governance fosters inclusive institutions and social dialogue mechanisms. This reduces the risk of social unrest and protests triggered by unemployment and economic hardship, creating a more stable environment for labor market recovery and attracting potential investors. Fifth, good governance minimizes corruption and rent-seeking behavior that diverts resources away from productive investments and essential social programs. This ensures efficient resource allocation for job creation initiatives and social safety nets, directly impacting unemployment levels.

Equally, analogous deduction from model (2) in Table 2.6 and 2.7, the impact of these two NDCTOTs busts on unemployment in the presence of GOVTDEBT, is positive and becomes worse, as the level of GOVTDEBT increases from a low to an average and high level. Because the GOVTDEBT burden further reinforces the adverse/positive impact of NDCTOT busts on unemployment. Therefore, at a low level of GOVTDEBT, the Government can help to cushion the blow of negative shocks to NDCTOT by providing a source of fiscal stimulus. For example, if NDCTOT falls, the government can increase spending or cut taxes to offset the decline in aggregate demand and employment. This is particularly important when government debt is low, as the government has more fiscal space to respond to shocks. Keynesian theory emphasizes the role of government spending in stimulating aggregate demand and employment. It suggests that increased government debt can be beneficial if used to finance productive spending during economic downturns. However, at a high level of GOVTDEBT government has no choice of fiscal stimulus. Neoclassical theory emphasizes the importance of fiscal sustainability and long-term economic growth. It suggests that high levels of government debt can be harmful by crowding out private investment and creating uncertainty.

2.5.2.4 Effects of Narrow Dependent Commodity Terms of Trade Booms and Busts on External Balance

Table 2.21 indicates that the coefficients of NDCTOT, under low and high booms, take on a positive and significant impact on external balance in models (1) and (2). As expected, the effect on external balance under high NDCTOT booms, BOOMS_15%, as compared to low NDCTOT booms, BOOMS_25%, is more favorable in terms of magnitude. High and big commodity price booms often lead to a bigger decrease in unemployment compared to smaller booms. It is critical to consider several factors that can influence the outcome. A sharp rise in commodity prices directs to a noteworthy increase in export revenue for commodity-exporting countries. This translates to a trade surplus in the current account, contributing to a positive external balance. Higher export prices in relation to import prices improve the terms of trade for commodity-exporting countries. This means they can import more goods and services with the same amount of exports, further boosting the external balance. Booming commodity exports lead to higher foreign exchange reserves, providing a buffer against external shocks and improving the creditworthiness of the country. However, high and big booms can trigger "Dutch disease." The appreciation of the real exchange rate due to high export prices makes other sectors less competitive, potentially leading to higher imports and a weakening in the trade balance. Boosted government revenues from a big boom can lead to excessive spending, exacerbating inflation and potentially widening the current account deficit through higher imports. Unmanaged booms can lead to volatile investment patterns, with excessive investment in the booming commodity sector followed by sharp declines when prices fall. This can contribute to external imbalances in the long run. In contrast, smaller booms allow for more gradual adjustments in the economy, minimizing the risk of Dutch disease and inflationary pressures. This leads to a more sustainable improvement in the external balance. Smaller booms provide a better opportunity for governments to implement sound policies, like saving part of the windfall in sovereign wealth funds or investing in diversification projects, to ensure long-term external stability. Smaller booms are less likely to lead to excessive spending or volatile investment patterns, reducing the risk of external imbalances in the future. Moreover, our control variables are consistent with the ones we already discussed above.

As for the role of our conditional variables, FEXCRESERS, EXCRATE, POLSTB, and KAOPNES, in cases of small and large booms in NDCTOT. Therefore, based on our models (2), (3), (4) and (5) results in Tables 2.8 and 2.9, we assert that at the time of BOOMS_15% and BOOMS_25% in NDCTOT, the NDCTOTs positive but decreasing impact on external balance become large to larger when the FEXCRESERS, EXCRATE, POLSTB, KAOPNES, conditional variables, are increasing from low to medium to high level, respectively.

Table 2.21 indicates that the coefficients of NDCTOT, under low and high busts, take on a negative and significant impact on external balance in models (3) and (4). As expected, high and big commodity price busts tend to have a much more detrimental impact on domestic external balance or current account balance compared to smaller ones. The impact depends on several factors, leading to potential increases in unemployment. A significant drop in commodity prices leads to a drastic decrease in export revenue for commodity-exporting countries. This translates to a trade deficit in the current account, significantly worsening the external balance. Lower export prices compared to import prices worsen the terms of trade for commodity-exporting countries. This means they need to export more goods and services to acquire the same amount of imports, further straining the external balance. Fearing a prolonged economic downturn, investors and businesses may withdraw capital from the affected country, directing to a reduction in foreign exchange reserves and potentially triggering currency depreciation. This further increases the cost of imports and contributes to a wider current account deficit. Lower export earnings translate to decreased government revenue, limiting the ability to finance essential imports and potentially forcing reductions in foreign aid contributions, further contributing to the external imbalance. However, smaller busts allow for more gradual adjustments and minimize the negative impacts on export earnings and foreign exchange reserves. This facilitates a smaller deterioration in the external balance. Governments have more time to respond to smaller busts with effective policies like austerity measures or currency devaluation, mitigating the decline in the external balance. Smaller busts have less spillover on capital flight and investment decisions, limiting the overall damage to the external balance. Moreover, our control variables are consistent with the ones we already discussed above.

As for the role of our conditional variables, FEXCRESERS, EXCRATE, POLSTB, and KAOPNES in cases of small and large busts in NDCTOT. Therefore, based on our models (2), (3), (4), and (5) results in Tables 2.8 and 2.9, we assert that at the time of BUSTS_15% and BUSTS_25% in NDCTOT, the negative impact of NDCTOTs on external balance become smaller to small when the FEXCRESERS, EXCRATE, POLSTB, KAOPNES, conditional variables, are increasing from low to medium to high level. These conditional variables worked in the opposite direction to NDCTOTs' busts to decrease the negative effect on external balance. When a country has higher FEXCRESERS, it can better manage its external balance, even when there are shocks to the commodity terms of trade. Because foreign exchange reserves can be used to shield the impact of negative shocks to NDCTOT, such as a decline in commodity prices (Levy-Yeyati & Sturzenegger, 2013). For instance, if a country has a high level of foreign exchange reserves, it can import goods and services even if its export earnings decline due to a fall in commodity prices. First, foreign exchange reserves allow countries to smooth out the impact of NDCTOT shocks by importing goods and services even when export earnings are low. This helps to maintain aggregate demand and prevent a recession. Second, foreign exchange reserves allow countries to maintain a more stable exchange rate, which can boost investment and trade. A steady exchange rate simplifies business planning for the future and invest in new projects. It also makes it easier for countries to trade with each other. Third, if a country has a low level of foreign exchange reserves, it may be forced to devalue its currency to maintain its external balance. A devaluation can lead to higher inflation and lower economic growth. Finally, foreign exchange reserves can also be used to signal a country's commitment to economic stability. This can boost investor confidence and invite foreign investment. Foreign exchange reserves can help to cushion the impact of negative shocks to NDCTOT, such as a decline in commodity prices. This can aid in enhancing external balance and fostering economic growth (Aizenman et al., 2012; Gruss and Kebhaj, 2019).

Similarly, EXCRATE, depreciation, from low to average to high, makes domestically produced goods cheaper in foreign markets, boosting exports and potentially generating more foreign currency earnings. This can offset the decline in income from exports caused by the terms of trade shock, improving the trade balance. Likewise, depreciation makes imported goods more costly for domestic consumers, potentially leading to a decline in imports. This can further improve the trade balance by reducing outflows of foreign currency. Additionally, consumers may substitute domestically produced goods for imported goods due to their relative price change, further reducing import demand and boosting the trade balance.

Table 2.21: Effects of Narrow Dependent Commodity Terms of Trade Booms and Busts on External Balance_Estimations Based on Fixed Effect

Independent Variables	Model (1) BOOMS_15%	Model (2) BOOMS_25%	Model (3) BUSTS_15%	Model (4) BUSTS_25%
NDCTOT	0.262***	0.375***	-0.321***	-0.347*
	(0.0694)	(0.0823)	(0.102)	(0.197)
TRDOPNES	0.715*	-0.633	0.391	0.466
	(0.414)	(0.599)	(0.498)	(0.942)
EXCRATE	0.164***	0.0470	-0.0385	0.0930
	(0.0603)	(0.0716)	(0.361)	(0.132)
SAVINGS	0.374***	0.251**	1.026***	2.940***
	(0.0958)	(0.114)	(0.311)	(0.845)
OUTPUT	0.585	1.179**	0.565	0.101
	(0.402)	(0.474)	(0.421)	(0.684)
FDI	-0.357***	-0.144*	-0.118*	-0.136
	(0.0671)	(0.0776)	(0.0697)	(0.172)
Constant	-46.12***	-65.37***	14.95	20.71
	(13.01)	(14.97)	(15.41)	(25.76)
Year Dummies	Yes	Yes	Yes	Yes
No. of Obs	241	175	147	88
No. of Groups	40	38	23	21
R-squared	34.88	15.48	35.68	56.11

Notes: This table, models (1)-(4), is estimated through fixed effect (FE). The dependent variable is the external balance (EXTBL). The independent variables are narrow dependent commodity terms of trade (NDCTOT), trade openness (TRDOPNES), exchange rate (EXCRATE), savings (SAVINGS), output (OUTPUT), foreign direct investment (FDI), foreign exchange reserves (FEXCRESERS), capital account openness (KAOPNES) political stability (POLSTSB), governance (GOVRNANC). All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Similarly, models (1) and (2) show results of the same base model but with different threshold levels of NDCTOT i.e., booms_25% and booms_15% respectively. Additionally, models (3), and (4) show results of the same base model but with different threshold levels of NDCTOT i.e., busts_25% and busts 15% respectively.

Additionally, POLSTB can significantly impact the external balance, or current account balance, of narrowly commodity-dependent exporting economies exposed to declining terms of trade (ToT) through several mechanisms. First, stable political environments foster investor confidence, attracting foreign direct investment (FDI) and portfolio inflows. This inflow of capital offsets the decline in export earnings caused by lower NDCTOT, improving the current account balance. Conversely, political instability deters investors, leading to capital flight. This outflow creates a double whammy: reduced foreign currency inflow and increased weight on the domestic currency, further worsening the current account balance. Second, stable governments are better equipped to formulate and implement sound economic policies in response to falling NDCTOT. These policies can include: reducing government spending and potentially raising taxes to decrease the budget deficit, contributing to a smaller current account deficit; a controlled devaluation of the currency can enhance the competitiveness of exports, potentially increasing export earnings and improving the trade balance, which is a component of the current account balance; diversifying the economy away from a narrow dependence on commodities can reduce vulnerability to future NDCTOT fluctuations and foster long-term sustainable growth, improving the overall external balance. However, political instability often leads to policy gridlock and inefficient resource allocation, hindering effective responses to external shocks like falling NDCTOT and exacerbating the current account deficit. Finally, stable political systems with inclusive institutions and mechanisms for conflict resolution facilitate acceptance of austerity measures needed to improve the current account balance, such as fiscal tightening or reduced subsidies. Political instability can fuel social unrest and resistance to austerity measures, making it harder to implement necessary adjustments and further deteriorating the external balance.

Moreover, KAOPNES can shield the domestic economy from the negative NDCTOT shocks as follows. It can attract foreign investment, providing additional foreign currency and potentially mitigating the decline in export earnings caused by the shock. This influx can help finance current account deficits and stabilize the external balance. Additionally, openness allows domestic investors to diversify their portfolios with foreign assets, potentially reducing their vulnerability to domestic shocks and mitigating capital flight. This can stabilize the exchange rate and lessen the pressure on the external balance. Likewise, openness can facilitate access to better investment opportunities and technology transfer, enhancing productivity and long-term export competitiveness. This can contribute to a gradual improvement in the external balance over time.

2.5.2.5 Effects of Narrow Dependent Commodity Terms of Trade Booms and Busts on Inflation

Table 2.22 indicates that the coefficients of NDCTOT, under low and high booms, take on a positive and significant impact on inflation in models (1) and (2). As expected, the effect on inflation under high NDCTOT booms, BOOMS_15%, as compared to low NDCTOT booms, BOOMS_25%, is more adverse and unfavorable in terms of magnitude. High and big commodity price booms often lead to a bigger decrease in inflation compared to smaller booms. It is foremost to deliberate several factors that can influence the outcome. The surge in export revenue from booming commodity prices leads to increased government spending and private sector investment. This raises aggregate demand in the economy, pushing prices up due to demand exceeding supply. Higher commodity prices directly feed into production costs across various sectors, as raw materials and energy become more expensive. This translates into higher prices for final goods and services, creating cost-push inflation. Increased profitability in the booming commodity sector often leads to higher wages for workers in those industries. This can spill over to other sectors through wage bargaining and inflationary expectations, further fueling inflation. In some cases, the windfall from a big boom can lead to an appreciation of the real exchange rate. While this can make imports cheaper, it also makes exports more expensive and reduces the competitiveness of other sectors, potentially leading to higher domestic prices for certain goods and services. However, smaller booms allow for a more gradual rise in demand and cost pressures, giving the economy time to adjust and absorb the increase without excessive inflation. Smaller booms provide governments with more room for proactive measures like raising interest rates or implementing temporary price controls to mitigate inflationary pressures. Smaller booms are less likely to trigger significant wage increases or inflationary expectations, limiting the spread of cost-push inflation across the economy. Moreover, our control variables are consistent with the ones we already discussed above.

As for the role of our conditional variables, EXCRATE, GOVRNANC, and POLSTB, in cases of small and large booms in NDCTOT. Therefore, based on our models (3) and (4) results in Tables 2.10 and 2.11, we assert that at the time of BOOMS_15% and BOOMS_25% in NDCTOT, the NDCTOTs increasing impact on inflation becomes smaller to small when the POLSTB, GOVRNANC, conditional variables, are increasing from low to medium to high level, respectively. As these conditional variables offset the NDCTOTs booms increasing effect on inflation. Similarly, analogous deduction from the model (2) in Tables 2.10 and 2.11, the impact of these two NDCTOTs thresholds on inflation further increases as the level of EXCRATE increases from a low to an average and high level. This means the depreciation of nominal EXCRATE led to a worsening of the situation of the inflation rate.

Table 2.22 indicates that the coefficients of NDCTOT, under low and high busts, take on a negative and significant impact on inflation in models (3) and (4). As expected, high and big commodity price busts tend to have a much more favorable impact on domestic inflation compared to smaller ones. The impact depends on several factors, leading to potential decreases in inflation. The sharp decline in export revenue from a major bust leads to reduced government spending and private sector investment. This fall in aggregate demand pulls prices down as supply exceeds demand, contributing to deflation. Lower commodity prices directly reduce production costs across various sectors, making raw materials and energy cheaper. This translates into lower prices for final goods and services, creating cost-push deflation. In the face of a bust, unemployment rises, and wage pressures decline. This can lead to lower wages and reduced inflationary expectations throughout the economy, further dampening inflationary pressures. Following a major bust, the real exchange rate typically depreciates as investors pull out capital and export revenue falls. This makes imports more expensive but also makes exports cheaper and boosts the competitiveness of other sectors, potentially leading to lower prices for domestically produced goods and services. However, smaller busts allow for a more gradual decline in demand and cost pressures, mitigating the deflationary impacts on the economy. Smaller busts provide governments with more flexibility to implement stimulus packages or expansionary monetary policies to counter deflationary tendencies. Smaller busts are less likely to trigger significant wage declines or deflationary expectations, limiting the spread of deflation across the economy. However, deflation can be beneficial in the short term by reducing the cost of living and improving affordability. However, prolonged deflation can be harmful as it discourages investment and spending, hindering economic growth in the long run. While some sectors benefit from lower commodity prices and potentially experience deflation, others like the mining and extraction sectors could see significant price increases due to job losses and decreased output. Large busts can exacerbate existing social and political tensions, potentially leading to disruptions that further hinder economic activity and price stabilization efforts. Moreover, our control variables are consistent with the ones we already discussed above. As for the role of our conditional variables, EXCRATE, GOVRNANC, and POLSTB, in cases of small and large busts in NDCTOT. Therefore, based on our models (3) and (4) results in Tables 2.10 and 2.11, we assert that at the time of BUSTS_15% and BUSTS_25% in NDCTOT, the negative impact of NDCTOTs on inflation becomes small to smaller when the GOVRNANC and POLSTB, conditional variables, are increasing from low to medium to high level. Both POLSTB and GOVRNANC worked in the opposite direction to NDCTOTs' busts to moderate the negative impact on inflation. Similarly, analogous deduction from the model (2) in Table 2.10 and 2.11, the impact of these two NDCTOTs busts on inflation in the presence of EXCRATE, is negative and becomes positive as the level of EXCRATE increases from a low to an average and high level. This means the depreciation of nominal EXCRATE led to a better-off situation of a negative inflation rate.

Good GOVRNANC can act as a powerful conditional variable in mitigating the negative effects of declining NDCTOT on inflation in narrow commodity-dependent exporting economies. First, transparent and accountable governance facilitates the formulation and implementation of sound monetary policies tailored to address inflation caused by declining NDCTOT. These can include, central banks can increase interest rates to restrain inflation by reducing money supply and demand for goods

Table 2.22: Effects of Narrow Dependent Commodity Terms of Trade Booms and Busts on Inflation_Estimations Based on Fixed Effect

Independent Variables	Model (1) BOOMS_15%	Model (2) BOOMS_25%	Model (3) BUSTS_15%	Model (4) BUSTS_25%
NDCTOT	0.0896***	0.121***	-0.0587*	-0.105***
	(0.0249)	(0.0354)	(0.0302)	(0.0328)
UNEMPLMNT	-0.210***	-0.236**	-0.154*	-0.189*
	(0.0722)	(0.102)	(0.0843)	(0.105)
MS	0.658***	0.622***	0.410***	0.686***
	(0.0829)	(0.109)	(0.0986)	(0.112)
EXCRATE	0.0538**	0.0109	-0.0188	0.742***
	(0.0250)	(0.0284)	(0.0213)	(0.124)
TRDOPNES	-0.178	-0.196	-0.269*	-0.116
	(0.171)	(0.243)	(0.156)	(0.163)
GOVTSIZE	0.110	0.110	0.198**	0.0813
	(0.0856)	(0.106)	(0.0843)	(0.102)
GOVTDEBT	-0.0700	-0.0431	-0.182***	-0.0536
	(0.0434)	(0.0593)	(0.0344)	(0.0348)
Constant	-6.008**	-8.872**	10.34***	11.12***
	(2.718)	(3.938)	(3.105)	(3.183)
Year Dummies	Yes	Yes	Yes	Yes
No. of Observations	285	182	164	78
No. of Groups	42	38	38	31
R-squared	20.01	20.81	19.33	18.03

Notes: This table, models (1)-(4), is estimated through fixed effect (FE). The dependent variable is the inflation. The independent variables are narrow dependent commodity terms of trade (NDCTOT), unemployment (UNEMPLMNT), money supply (MS), exchange rate (EXCRATE), trade openness (TRDOPNES), government size (GOVTSIZE), government debt (GOVTDEBT), governance (GOVRNANC), and political stability (POLSTB). All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Similarly, models (1) and (2) show results of the same base model but with different threshold levels of NDCTOT i.e., booms_25% and booms_15% respectively. Additionally, models (3), and (4) show results of the same base model but with different threshold levels of NDCTOT i.e., busts_25% and busts_15% respectively.

and services but this can have trade-offs with economic growth; in specific circumstances, central banks can sell domestic currency to purchase foreign currency, appreciating the exchange rate and making imports cheaper, potentially reducing inflationary pressures; regulating credit and capital flows can help prevent excessive borrowing and asset bubbles, contributing to price stability. However, weak governance often leads to policy inconsistencies and delayed responses, amplifying inflationary pressures from declining NDCTOT. Second, responsible fiscal management by avoiding excessive government spending and maintaining balanced budgets minimizes inflationary pressures caused by increased government demand for goods and services. Transparent budgeting and accountability help build public trust and acceptance of necessary measures to control inflation, such as reduced government spending or tax increases. Conversely, fiscal indiscipline and corruption can lead to excessive money printing and wasteful spending, fueling inflation, particularly when combined with NDCTOT decline. Third, promoting competition in domestic markets prevents businesses from exploiting temporary price hikes due to NDCTOT decline and ensures efficient allocation of resources, potentially dampening inflationary pressures. Effective regulation of necessary goods and services can thwart price gouging and guarantee affordability for consumers, notably during periods of high inflation. Weak competition and lax regulations can create an environment where businesses raise prices excessively, exacerbating inflationary pressures from NDCTOT decline. Fourth, good governance promotes long-term planning and investment in economic diversification beyond narrow commodity dependence. This reduces vulnerability to NDCTOT fluctuations and their inflationary impacts by creating alternative sources of economic growth and reducing reliance on volatile commodity prices. Short-sighted policies and a lack of focus on diversification leave economies exposed to NDCTOT shocks and their inflationary consequences.

POLSTB can act as a powerful conditional variable in moderating the negative effects of declining NDCTOT on inflation in narrow commodity-dependent exporting economies. First, stable political environments foster public trust in government institutions and policies. This allows for greater acceptance of necessary measures to control inflation, such as tighter monetary policy or temporary price controls, without triggering social unrest or panic buying that can worsen inflation. Conversely, political instability breeds distrust and uncertainty, making it harder to implement effective anti-inflationary measures and potentially leading to panic buying and hoarding, further fueling inflation. Second, stable political systems enable consistent and long-term economic policies. This allows for predictable responses to external shocks like declining NDCTOT avoiding policy flip-flops that can create uncertainty and disrupt markets, potentially contributing to inflation. Political instability often leads to frequent policy changes and short-termism, hindering effective management of inflation and economic shocks. Third, stable governments can engage in open and transparent communication with the public about the challenges posed by declining NDCTOT and the rationale behind policy measures. This fosters understanding and cooperation, mitigating public resistance to necessary adjustments. Lack of transparency and unclear communication in unstable regimes can fuel speculation and mistrust, exacerbating inflationary pressures. Fourth, stable governments are better positioned to engage in constructive international cooperation and trade negotiations to address global commodity price fluctuations and mitigate their impact on domestic inflation. Political instability can hinder a nation's ability to participate effectively in international forums and negotiations, limiting its options for managing external shocks like declining NDCTOT.

2.5.2.6 Effects of Narrow Dependent Commodity Terms of Trade Booms and Busts on Exchange Rate

Table 2.23 indicates that the coefficients of NDCTOT, under low and high booms, take on a negative, means appreciating, and significant impact on the exchange rate in models (1) and (2). As expected, the effect on the exchange rate under high NDCTOT booms, BOOMS_15%, as compared to low NDCTOT booms, BOOMS_25%, is more favorable in terms of magnitude. High and big commodity price booms often lead to a greater appreciation in the exchange rate compared to smaller booms. It is essential to deliberate several factors that can influence the outcome. Rising commodity prices lead to improved terms of trade for the exporting country. This means they can import more goods and services with the same amount of exports, increasing the demand for their currency and pushing the exchange rate up. The surge in export revenue leads to higher foreign currency inflows, bolstering the supply of foreign currency in the exchange market and further appreciating the domestic currency. A booming resource sector often attracts foreign investment, portfolio flows, and capital inflows seeking exposure to the strong-performing economy. This further increases the demand for the domestic currency and strengthens its value. However, sometimes, governments deliberately interfere in the currency market to stop excessive appreciation due to concerns about Dutch disease or inflationary pressures. But, in many cases, they may allow some appreciation to boost government revenue and improve international competitiveness. However, smaller booms allow for a more gradual rise in demand for the domestic currency and a smoother appreciation, giving market participants time to adjust and adapt. Smaller booms provide governments with more room to manage the exchange rate through interventions or sterilized interventions to mitigate excessive appreciation and its potential negative consequences. Smaller booms might attract some foreign investment but likely wouldn't trigger massive capital inflows, leading to a more moderate appreciation compared to big booms. Moreover, our control variables are consistent with the ones we already discussed above.

As for the role of our conditional variables, FEXCRESERS, GOVTDEBT, POLSTB, and GOVRNANC, in cases of small and large booms in NDCTOT. Therefore, based on our models (4) and

(5) results in Tables 2.12 and 2.13, we assert that at the time of BOOMS_15% and BOOMS_25% in NDCTOT, the NDCTOTs appreciating impact on nominal exchange rate become large to larger when the POLSTB, GOVRNANC, conditional variables, are increasing from low to medium to high level, respectively. As these conditional variables reinforce the NDCTOTs boom appreciating the impact on the exchange rate. Similarly, analogous deduction from models (2) and (3) in Table 2.12 and 2.13, the impact of these two NDCTOTs thresholds on the exchange rate is offset or depreciating as the level of FEXCRESERS and GOVTDEBT increases from low to average and high level.

Table 2.23: Effects of Narrow Dependent Commodity Terms of Trade Booms and Busts on Exchange Rate_Estimations Based on Fixed Effect

Independent Variables	Model (1) BOOMS_15%	Model (2) BOOMS_25%	Model (3) BUSTS_15%	Model (4) BUSTS_25%
NDCTOT	-0.0308**	-0.0396*	0.0317**	0.0489**
	(0.0140)	(0.0212)	(0.0156)	(0.0225)
CABALNCE	-0.000887	-0.00253	-0.00213	-0.00351
	(0.00166)	(0.00163)	(0.00153)	(0.00223)
INF	0.00766***	0.00949***	0.00810***	0.00972***
	(0.000435)	(0.000727)	(0.000388)	(0.00107)
INTRATE	0.00220	-0.00310***	-0.00246*	-0.00501***
	(0.00148)	(0.000997)	(0.00130)	(0.00180)
FEXCRESERS	-0.0930***	-0.0877***	-0.00198	0.00145
	(0.0209)	(0.0287)	(0.0215)	(0.0398)
ECNGROWTH	0.00565	0.00146	-0.00520**	-0.00780*
	(0.00385)	(0.00282)	(0.00221)	(0.00433)
GOVTDEBT	-0.0195	0.122***	0.0167	0.0279
	(0.0253)	(0.0337)	(0.0242)	(0.0348)
Constant	7.711***	8.612***	-0.768	-2.829
	(1.348)	(2.424)	(1.627)	(2.507)
Year Dummies	Yes	Yes	Yes	Yes
No. of Observations	248	130	305	114
No. of Groups	41	39	40	32
R-squared	45.48	41.14	39.00	33.83

Notes: This table, models (1)-(4), is estimated through fixed effect (FE). The dependent variable is the exchange rate. The independent variables are narrow dependent commodity terms of trade (NDCTOT), current account balance (CABALNCE), inflation (INF), interest rate (INTRATE), foreign exchange reserves (FEXCRESERS), economic growth (ECNGROWTH), government debt (GOVTDEBT), political stability (POLSTSB), and governance (GOVRNANC). All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Similarly, models (1) and (2) show results of the same base model but with different threshold levels of NDCTOT i.e., booms_25% and booms_15% respectively. Additionally, models (3), and (4) show results of the same base model but with different threshold levels of NDCTOT i.e., busts_25% and busts_15% respectively.

Table 2.23 indicates that the coefficients of NDCTOT, under low and high busts, take on a negative and significant impact on the exchange rate in models (3) and (4). Compared to smaller busts, high and big commodity price busts tend to lead to a greater depreciation of the domestic nominal exchange rate.

The impact depends on several factors, leading to potential depreciation of the domestic nominal exchange rate. Falling commodity prices worsen the terms of trade for the exporting country. This means they need to export more goods and services to import the same amount, reducing the demand for their currency and pushing the exchange rate down. The decline in export revenue leads to lower foreign currency inflows, shrinking the supply of foreign currency in the exchange market and further depreciating the domestic currency. Fearing a prolonged economic downturn, investors and businesses may pull out capital from the affected country, causing capital flight. This outflow of foreign currency puts sinking pressure on the exchange rate. To defend the exchange rate, central banks might sell foreign exchange reserves. However, during a significant bust, these reserves can easily be depleted, leading to further depreciation. However, smaller bursts allow for a more gradual decline in demand for the domestic currency and a smoother depreciation, giving market participants time to adjust and adapt. Smaller busts provide governments with more flexibility to intervene in the currency market or implement policies like fiscal tightening to stabilize the exchange rate. Smaller busts might trigger some capital flight but likely wouldn't lead to massive outflows, resulting in a more moderate depreciation compared to big busts. Moreover, our control variables are consistent with the ones we already discussed above.

As for the role of our conditional variables, FEXCRESERS, GOVTDEBT, POLSTB, and GOVRNANC, in cases of small and large busts in NDCTOT. Therefore, based on our models (2), (4), and (5) results in Tables 2.12 and 2.13, we assert that at the time of BUSTS_15% and BUSTS_25% in NDCTOT, the negative/depreciating impact of NDCTOTs on nominal exchange rate become smaller to small when the FEXCRESERS, GOVRNANC and POLSTB, conditional variables, are increasing from low to medium to a high level. These conditional variables worked in the opposing direction to NDCTOTs' busts to moderate the negative/depreciating impact on the exchange rate. Foreign exchange reserves help to buffer the impact of NDCTOT shocks on the exchange rate. For example, if a country has a large stock of foreign exchange reserves, it may be able to sell some of these reserves to prevent its currency from depreciating too much in the event of an NDCTOT shock. foreign exchange reserves give central banks more flexibility in managing their exchange rate policies. For instance, a central bank with a large stock of foreign exchange reserves may be more willing to get involved in the foreign exchange market to support its currency in the event of an NDCTOT shock. For example, a country with a prominent stock of foreign exchange reserves experiences a sudden decrease in the price of oil, a key commodity export. The central bank of this country may be able to sell some of its foreign exchange reserves to buy back its currency in the foreign exchange market. This would help to inhibit the currency from depreciating too much, even though the price of oil has fallen. In contrast, a country with a small stock of foreign exchange reserves may be less able to mitigate the negative effects of an NDCTOT shock on its currency. This is because the central bank of this country may not have enough foreign exchange reserves to sell to support its currency. Subsequently, the currency of this country may depreciate more significantly than the currency of a country with a large stock of foreign exchange reserves. Another possibility is that foreign exchange reserves help to signal to investors that the country is financially sound and can manage its economy effectively. This can lead to increased foreign investment and capital inflows, which can also help to appreciate the nominal exchange rate.

Good GOVRNANC can act as a crucial conditional variable in mitigating the depreciating effect of declining CTOT on the exchange rate of narrow commodity-dependent exporting economies. While political stability focuses on the broad political climate, governance delves deeper into the effectiveness of institutions, policies, and regulations, further influencing exchange rate dynamics. First, transparent and accountable governance fosters predictability and investor confidence, attracting domestic and foreign investments. This upward demand for the domestic currency helps stabilize or appreciate the exchange rate, even when the NDCTOT decline puts downward pressure on it. Conversely, weak governance with corruption and unpredictable regulations scares away investors, leading to capital flight and reduced demand for the currency, amplifying the depreciation caused by falling NDCTOT. Second, well-functioning institutions in well-governed environments enable the formulation and implementation of sound economic policies in response to external shocks like declining NDCTOT. These policies can include, central banks can practice interest rate alterations to cope inflation and influence foreign capital flows, impacting the exchange rate; responsible fiscal management with balanced budgets and controlled deficits enhances confidence in the economy and reduces pressure on the currency; diversifying the economy away from narrow commodity dependence and promoting exports of non-resource goods can reduce vulnerability to NDCTOT fluctuations and stabilize the exchange rate. Weak governance often leads to policy inconsistencies and inefficient resource allocation, hindering effective responses to NDCTOT shocks and exacerbating exchange rate volatility. Third, strong institutions ensure transparency in financial markets and economic data, reducing speculation and panic selling of the domestic currency during periods of uncertainty caused by falling NDCTOT. Conversely, lack of transparency and weak institutions can fuel speculation and market panic, triggering self-fulfilling prophecies of currency depreciation. Finally, effective governance minimizes corruption and rent-seeking behavior that diverts resources away from productive investments and essential economic activities. This ensures efficient resource allocation for investments that can bolster the economy and support the exchange rate. Rampant corruption weakens economic fundamentals and erodes confidence in the government, exacerbating exchange rate pressures during the NDCTOT decline.

POLSTB can play a significant role in mitigating the depreciating effect of declining terms of trade (ToT) on the exchange rate of narrow commodity-dependent exporting economies. First, stable political environments foster investor confidence, attracting foreign direct investment (FDI) and portfolio inflows. This increases demand for the domestic currency, exerting upward pressure on exchange rates and offsetting some of the depreciation caused by falling NDCTOT. Conversely, political instability deters investors, leading to capital flight. This boosts the supply of the domestic currency and exerts downward pressure on the exchange rate, exacerbating the depreciation caused by the NDCTOT decline. Second, stable governments are better equipped to formulate and implement sound economic policies in response to falling NDCTOT. These policies can include, raising interest rates to entice foreign capital and boosting demand for the domestic currency, stabilizing the exchange rate; reducing government spending, and potentially raising taxes can improve the budget deficit, enhance assurance in the economy, and support the exchange rate; central banks can directly buy domestic currency using their reserves to stabilize the exchange rate, though this approach has limitations and potential risks. Political instability often leads to policy gridlock and inefficient resource allocation, hindering effective responses to external shocks like falling NDCTOT and amplifying the depreciation of the exchange rate. Finally, stable political systems with inclusive institutions and mechanisms for conflict resolution foster social stability and confidence in the government. This reduces the risk of panic selling of the domestic currency and helps manage inflationary pressures that can arise from depreciation. Political instability can fuel social unrest and expectations of further depreciation, leading to self-fulfilling prophecies and a downward spiral in the exchange rate.

Similarly, analogous deduction from models (3) in Table 2.12 and 2.13, the impact of these two NDCTOTs busts on the exchange rate in the presence of GOVTDEBT, becomes further worse in the form of depreciation as the level of GOVTDEBT increases from low to average and high level. This means the GOVTDEBT burden led to further worse off the situation of the already depreciated nominal exchange rate. Therefore, government spending at the cost of debt can act as a bumper against the effects of NDCTOT shocks. This could involve increasing government spending or reducing taxes. As a result, the impact of the NDCTOT shock on the nominal exchange rate would be smaller. But if a country has an excessive government debt means no fiscal space it would refrain because it will further worsen the existing situation.

2.5.2.7 Effects of Narrow Dependent Commodity Terms of Trade Booms and Busts on Government Expenditure

Table 2.24 indicates that the coefficients of NDCTOT, under low and high booms, take on a positive and significant impact on government expenditure in models (1) and (2). As expected, the effect on government expenditure under high NDCTOT booms, BOOMS_15%, as compared to low NDCTOT booms, BOOMS_25%, is more favorable in terms of magnitude. High and big commodity price booms often lead to a greater expansion and disproportionate increase in government expenditure compared to smaller booms. It is essential to weigh up several factors that can impact the outcome. Booming commodity prices translate to a sizable increase in export revenue for commodity-exporting countries. This windfall generates substantial extra resources for the government, leading to a temptation to increase spending across various sectors. Boom periods often witness increased public expectations for improved infrastructure, social programs, and government services. Political leaders might feel pressure to fulfill these demands and allocate more funds to public projects. The euphoria surrounding a boom can lead to an irony of its temporary nature and an overestimation of future revenue streams. This can encourage governments to increase spending commitments that become unsustainable when prices inevitably fall. Strong revenue inflows sometimes create a sense of complacency around fiscal management, leading to lax budgetary policies, relaxed borrowing constraints, and increased spending without proper planning or prioritization. The windfall from a big boom presents a more tempting opportunity for politicians to engage in pork-barrel projects, patronage, or simply increase bureaucratic budgets, further escalating overall spending. However, smaller booms allow for a more gradual increase in government revenue and provide an opportunity for sound fiscal planning and responsible allocation of resources. With a smaller boom, governments have more time to analyze the temporary nature of the revenue surge and implement sustainable spending plans aligned with long-term economic goals. Public expectations might be less inflated during smaller booms, offering politicians more space to resist excessive spending demands and prioritize essential expenditures. Moreover, our control variables are consistent with the ones we already discussed above.

As for the role of our conditional variables, GOVTDEBT, POLSTB, and GOVRNANC, in cases of small and large booms in NDCTOT. Therefore, based on our models (3) and (4) results in Tables 2.14 and 2.15, we assert that at the time of BOOMS_15% and BOOMS_25% in NDCTOT, the NDCTOTs increasing impact on government expenditure become large to larger when the POLSTB, GOVRNANC, conditional variables, are increasing from low to medium to high level, respectively. These conditional variables further reinforce the NDCTOTs boom increasing the effect on government expenditure. Similarly, analogous deduction from the model (2) in Tables 2.14 and 2.15, the impact of these two NDCTOTs thresholds on government expenditure is decreasing, as the level of GOVTDEBT burden increases from low to average and high level. Because the windfall gains are diverted to free and release the GOVTDEBT burden.

Table 2.24 indicates that the coefficients of NDCTOT, under low and high busts, take on a negative and significant impact on government expenditure in models (3) and (4). Compared to smaller busts, high and big commodity price busts tend to lead to a greater contraction of government expenditure. The impact depends on several factors, leading to a potential decrease in government expenditure. Falling commodity prices lead to a sharp decline in export revenue for exporting countries. This significantly shrinks government budgets, forcing reductions in expenditures across various sectors. The fall in revenue creates immediate pressure on governments to balance their budgets, often leading to austerity measures or cuts in discretionary spending. Busts can raise concerns about government debt sustainability, especially if large deficits were accumulated during the previous boom. This incentivizes expenditure cuts to stabilize finances and rebuild fiscal credibility. In a bust environment, public expectations for government services and infrastructure projects tend to decrease. This provides some justification for governments to reduce spending without significant political backlash. With severely depleted resources, governments often have limited alternative options other than cutting spending to bring budgets under control and manage the financial crisis. However, Smaller busts allow for a more gradual decline in government revenue and provide an opportunity to adjust spending without resorting to drastic cuts. Smaller busts offer governments more flexibility in managing the situation through borrowing, implementing targeted budget adjustments, or focusing cuts on less essential programs. Smaller busts might necessitate some spending reductions but wouldn't necessarily require large-scale austerity measures, minimizing the immediate impact on public services and social programs. Moreover, our control variables are consistent with the ones we already discussed above, except GOVTREVNUE in models (3) and (4) in Table 2.24, with a negative impact on government expenditure due to negative NDCTOTs busts.

As for the role of our conditional variables, GOVTDEBT, POLSTB, and GOVRNANC, in cases of small and large busts in NDCTOT. Therefore, based on our models (3) and (4) results in Tables 2.14 and 2.15, we assert that at the time of BUSTS_15% and BUSTS_25% in NDCTOT, the negative impact of NDCTOTs on government expenditure become smaller to small when the POLSTB and GOVRNANC, conditional variables, are increasing from low to medium to high level. Both POLSTB and GOVRNANC worked in the opposite direction to NDCTOTs busts to decrease the negative effect on government expenditure.

Table 2.24: Effects of Narrow Dependent Commodity Terms of Trade Booms and Busts on Government Expenditure_Estimations Based on Fixed Effect

Independent Variables	Model (1) BOOMS_15%	Model (2) BOOMS_25%	Model (3) BUSTS_15%	Model (4) BUSTS_25%
NDCTOT	0.0283*	0.0495*	-0.0321	-0.0365*
	(0.0154)	(0.0254)	(0.0195)	(0.0202)
GOVTREVNUE	0.0198	0.0638	-0.140**	-0.230**
	(0.0622)	(0.0775)	(0.0638)	(0.0963)
GOVTDEBT	0.0181	0.0221	-0.0106	-0.00579
	(0.0240)	(0.0326)	(0.0252)	(0.0256)
SAVINGS	-0.147***	-0.0257	-0.103***	-0.286***
	(0.0259)	(0.0258)	(0.0249)	(0.0489)
INF	0.00113*	0.000387	0.0958**	0.123***
	(0.000667)	(0.000471)	(0.0479)	(0.0321)
POLSTB	-0.319***	-0.136	-0.205***	-0.243***
	(0.0557)	(0.0821)	(0.0469)	(0.0719)
Constant	-0.182	7.269***	6.054***	7.254***
	(1.588)	(2.581)	(1.979)	(2.038)
Year Dummies	Yes	Yes	Yes	Yes
No. of Observations	280	156	340	157
No. of Groups	41	38	40	33
R-squared	29.91	21.37	34.53	30.16

Notes: This table, models (1)-(4), is estimated through fixed effect (FE). The dependent variable is the government expenditure (GOVTEXPND). The independent variables are narrow dependent commodity terms of trade (NDCTOT), government revenue (GOVTREVNUE), government debt (GOVTDEBT), savings (SAVINGS), inflation (INF), political stability (POLSTSB), and governance (GOVRNANC). All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Similarly, models (1) and (2) show results of the same base model but with different threshold levels of NDCTOT i.e., booms_25% and booms_15% respectively. Additionally, models (3), and (4) show results of the same base model but with different threshold levels of NDCTOT i.e., busts_25% and busts_15% respectively.

POLSTB can indeed show a fundamental role in diminishing the negative effects of declining NDCTOT on government expenditure in narrow commodity-dependent exporting economies. First, stable political environments foster investor confidence, attracting domestic and foreign direct investments (FDI). This increases economic activity and tax revenue, providing the government with more resources for expenditure. Conversely, political instability deters investors, leading to lower economic activity and tax revenue, forcing the government to cut expenditures due to reduced resources. Second, stable governments are better equipped to formulate and implement sound fiscal policies in response to falling

NDCTOT. These policies can include, reducing dependence on commodity-related taxes and exploring alternative sources like income taxes or value-added taxes can make government revenue more resilient to NDCTOT fluctuations; focusing on critical areas like healthcare, education, and infrastructure ensures efficient use of limited resources and maintaining essential services despite reduced income; stable governments can negotiate better terms with creditors for restructuring sovereign debt, freeing up resources for essential expenditures. Political instability often leads to policy gridlock and inefficient resource allocation, hindering effective responses to NDCTOT shocks and forcing deeper cuts in government spending. Third, stable political systems with inclusive institutions and mechanisms for conflict resolution allow for open dialogue and public understanding of the challenges caused by falling NDCTOT. This fosters acceptance of necessary austerity measures like reduced government spending, allowing for more sustainable fiscal adjustments. Political instability can fuel social unrest and resistance to spending cuts, making it harder to manage fiscal deficits and potentially leading to even deeper expenditure reductions.

GOVRNANC acts as a conditional variable in alleviating the negative effects of declining CTOT on government spending in commodity-dependent economies. First, transparent and accountable governance facilitates the formulation and implementation of evidence-based fiscal policies tailored to address the specific challenges posed by falling NDCTOT. These policies can include, strong institutions that enable research and implementation of alternative revenue sources like service taxes, property taxes, or efficient resource management to reduce dependence on volatile commodity-related taxes; efficient allocation of resources guided by cost-benefit analysis ensures essential services like healthcare and education are maintained even with reduced budgets; combating corruption minimizes wasteful spending and ensures resources reach intended beneficiaries, maximizing the impact of government expenditure. Weak governance often leads to policy inconsistencies, inefficient resource allocation, and corruption, further straining public finances during NDCTOT decline and necessitating deeper expenditure cuts. Second, inclusive institutions and transparent communication foster trust and understanding among citizens about the challenges caused by falling NDCTOT and the need for adjustments. This fosters acceptance of necessary spending cuts and promotes social cohesion, allowing for more sustainable fiscal adjustments. Widespread distrust and lack of transparency in governance can lead to social unrest and resistance to austerity measures, further hindering government efforts to manage fiscal deficits and potentially forcing even deeper expenditure reductions. Third, well-functioning institutions ensure efficient budgeting, procurement, and debt management. This minimizes unnecessary costs and maximizes the value obtained from each expenditure, allowing for better management of limited resources under challenging economic conditions. Weak institutions with bureaucratic inefficiencies and short-sighted planning often lead to wasteful spending and unsustainable debt accumulation, making it harder to weather the storm of declining NDCTOT without drastic expenditure cuts.

Similarly, analogous deduction from a model (2) in Tables 2.14 and 2.15, the impact of these two NDCTOTs busts on government expenditure in the presence of GOVTDEBT, is negative and becomes worse, as the level of GOVTDEBT increases from low to average and high level. Because the GOVTDEBT burden further reinforces the adverse impact of NDCTOTs busts on government expenditure. Therefore, at a low level of GOVTDEBT, the Government can help to cushion the blow of negative shocks to NDCTOT by providing a source of fiscal stimulus. For example, if NDCTOT falls, the government can increase spending or cut taxes to offset the decline in aggregate demand and employment. This is particularly important when government debt is low, as the government has more fiscal space to respond to shocks otherwise cannot afford to spend from its treasury.

2.5.2.8 Effects of Narrow Dependent Commodity Terms of Trade Booms and Busts on Income Inequality

Table 2.25 indicates that the coefficients of NDCTOT, under low and high booms, take on a negative/decreasing and significant impact on income inequality in models (1) and (2). As expected, the effect on income inequality under high NDCTOT booms, BOOMS_15%, as compared to low NDCTOT booms, BOOMS_25%, is more favorable in terms of magnitude. While high and big commodity price booms lead to a greater decrease in income inequality compared to smaller booms. It is essential to study several factors that can persuade the outcome. In some cases, a big boom can lead to a trickle-down effect, where increased government revenue from booming exports gets used to finance investments in social programs, infrastructure, and education. This can benefit low-income groups and promote upward mobility, ultimately reducing inequality. Strong demand for resources during a boom can push up wages, particularly in the mining and extraction sectors. If these wage increases spread to other sectors through wage bargaining mechanisms, it can lead to an overall reduction in income inequality. Booming resource sectors can stimulate broader economic activity, creating new jobs and opportunities across the economy. This can benefit low-skilled workers and those previously unemployed, potentially pushing inequality downwards. However, large booms can lead to Dutch disease, where the appreciation of the real exchange rate due to improved terms of trade makes other sectors uncompetitive. This can lead to job losses in manufacturing and agriculture, disproportionately impacting low-skilled and rural workers, and worsening inequality. Booming resource sectors can attract rent-seeking behavior and corruption, where wealth concentrates in the hands of a few elites and doesn't trickle down to the broader population. This can significantly increase inequality. Even with increased revenue, if governments lack the capacity to effectively manage and distribute the boom's benefits, inequality can still rise. For example, inadequate infrastructure improvements might not reach rural areas, leaving disadvantaged communities behind. However, smaller booms offer a more gradual increase in revenue and economic activity, allowing for better planning and distribution of benefits, potentially leading to a more equitable outcome. Countries with strong institutions like transparent governance, fair labor practices, and robust social safety nets are better equipped to manage a boom and ensure that the benefits are shared more widely, reducing inequality. Government policies like taxes on resource rents, reinvestment in social programs, and targeted support for vulnerable groups can play a critical role in easing the inequality-increasing tendencies of big booms. Moreover, our control variables are consistent with the ones we already discussed above.

As for the role of our conditional variables, GOVTSIZE, GOVRNANC, POLSTB, and GOVTDEBT, in cases of small and large booms in NDCTOT. Therefore, based on our models (2), (3), and (4) results in Tables 2.16 and 2.17, we assert that at the time of BOOMS_15% and BOOMS_25% in NDCTOT, the CTOTs' negative and increasing impact on income inequality become large to larger when the GOVTSIZE, POLSTB, GOVRNANC, conditional variables, are increasing from low to medium to high level, respectively. As these conditional variables further reinforce the NDCTOTs booms favorable effects on decreasing income inequality. Similarly, in an analogous deduction from a model (5) in Tables 2.16 and 2.17, the impact of these two NDCTOT thresholds on income inequality decreases, as the level of GOVTDEBT burden increases from low to average and high level. Because the windfall gains are diverted to free and release the GOVTDEBT burden and not increasing government expenditure.

Table 2.25 indicates that the coefficients of NDCTOT, under low and high busts, take on a positive/increasing and significant impact on income inequality in models (3) and (4). High and big commodity price busts tend to exacerbate income inequality more than smaller busts. The impact depends on several factors, leading to a potential increase in income inequality. Busts lead to sharp declines in export revenue and economic activity. This triggers job losses, particularly in resource-dependent sectors, disproportionately impacting low-skilled workers and minorities. Additionally, wage cuts become common as businesses try to remain competitive, further widening the income gap.

Governments facing a financial crisis may be forced to cut back on social programs and safety nets, leaving vulnerable populations like the poor, elderly, and disabled with less support and protection. This exacerbates existing inequalities. The negative impacts of the bust often concentrate on specific regions or communities heavily reliant on the resource sector. This can create pockets of extreme poverty and hardship, widening the regional and local disparities in income distribution. As revenue plummets, governments may implement austerity measures like tax increases or budget cuts. These measures can disproportionately burden low-income groups, who lack the savings or resources to absorb the shock.

Table 2.25: Effects of Narrow Dependent Commodity Terms of Trade Booms and Busts on Income Inequality_ Estimations Based on Fixed Effect

Independent Variables	Model (1) BOOMS_15%	Model (2) BOOMS_25%	Model (3) BUSTS_15%	Model (4) BUSTS_25%
NDCTOT	-0.0125**	-0.0204***	0.0102**	0.0171**
	(0.00588)	(0.00596)	(0.00466)	(0.00707)
UNEMPLMNT	-0.00775	0.0121	0.00900	0.0489**
	(0.0135)	(0.0154)	(0.0113)	(0.0200)
HUCPTL	0.0191	0.0284	-0.0314*	0.0255
	(0.0182)	(0.0234)	(0.0171)	(0.0291)
ECGROWTH	0.00293	0.00122	0.00102	-0.000488
	(0.00438)	(0.000768)	(0.00388)	(0.00106)
GOVTSIZE	-0.0535***	-0.0220	-0.0297**	0.0148
	(0.0157)	(0.0148)	(0.0146)	(0.0246)
Constant	5.089***	5.761***	2.670***	1.816**
	(0.599)	(0.593)	(0.473)	(0.713)
Year Dummies	Yes	Yes	Yes	Yes
No. of Observations	204	116	256	129
No. of Groups	36	33	36	32
R-squared	32.22	27.61	40.80	30.66

Notes: This table, models (1)-(4), is estimated through fixed effect (FE). The dependent variable is the income inequality (INCINEQ). The independent variables are narrow dependent commodity terms of trade (NDCTOT), unemployment (UNEMPLMNT), human capital (HUCPTL), economic growth (ECGROWTH), government size (GOVTSIZE), governance (GOVRNANC), political stability (POLSTB), and government debt (GOVTDEBT). All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Similarly, models (1) and (2) show results of the same base model but with different threshold levels of NDCTOT i.e., booms_25% and booms_15% respectively. Additionally, models (3), and (4) show results of the same base model but with different threshold levels of NDCTOT i.e., busts_25% and busts_15% respectively.

Severe busts can trigger social unrest and political instability, further hindering economic recovery and potentially exacerbating already existing inequalities. However, smaller busts allow for a more gradual decline in economic activity and job losses, giving individuals and businesses more time to adjust and seek alternative opportunities, potentially limiting the immediate impact on income inequality. Smaller busts provide governments with more flexibility in managing the situation through emergency measures, targeted support programs, and adjustments to fiscal policies, potentially mitigating the inequality-increasing tendencies. Smaller busts might still impact specific sectors and regions but are less likely to trigger widespread poverty and social unrest, potentially limiting the overall increase in income inequality. Moreover, our control variables are consistent with the ones we already discussed above.

As for the role of our conditional variables, GOVTSIZE, GOVRNANC, POLSTB, and GOVTDEBT, in cases of small and large busts in NDCTOT. Therefore, based on our models (2), (3), and (4) results in Tables 2.16 and 2.17, we assert that at the time of BUSTS_15% and BUSTS_25% in CTOT, the negative impact of NDCTOTs on income inequality become smaller to small when the GOVTSIZE, POLSTB, and GOVRNANC, conditional variables, are increasing from low to medium to a high level. These conditional variables worked in an opposite direction to NDCTOTs busts to decrease the adverse effect on income inequality. For instance, increased GOVTSIZE can counter these negative effects by injecting additional funds into the economy. That is higher spending directly boosts aggregate demand, stimulating consumption and investment. This can help offset the decline in private-sector activity. Additionally, increased spending on unemployment benefits and social programs can alleviate the hardship faced by households affected by job losses and reduced income. Likewise, investing in infrastructure projects and public services can initiate jobs, fuel demand, and improve long-term productivity.

POLSTB can act as a crucial conditional variable in mitigating the impact of NDCTOT on income inequality in narrowly commodity-dependent exporting economies. First, stable political environments enable governments to formulate and implement evidence-based policies tailored to address income inequality concerns during the NDCTOT decline. These can include, implementing fair and progressive tax systems that can generate revenues to fund social safety nets and targeted welfare programs for vulnerable populations disproportionately affected by NDCTOT shocks; prioritizing public investments in education, healthcare, and skills training to equip individuals with the skills needed to adapt to changing economic conditions and secure better-paying jobs, reducing income inequality in the long run; establishing fair minimum wages, protecting worker rights, and enforcing anti-discrimination laws can help ensure equitable distribution of economic gains and prevent exploitation of vulnerable groups. Political instability often leads to policy gridlock and inefficient resource allocation, hindering effective responses to NDCTOT-driven inequality and potentially exacerbating the issue. Second, stable political systems with inclusive institutions and mechanisms for peaceful conflict resolution foster social dialogue and compromise between different income groups. This allows for more equitable distribution of the burden of economic adjustments and reduces the risk of social unrest fueled by widening income inequality. Political instability can create an environment of social tension and distrust, making it harder to address income inequality concerns and potentially leading to violent conflicts that further harm the most vulnerable. Third, stable political environments attract domestic and foreign investments, fostering economic diversification beyond narrow commodity dependence. This creates new job opportunities in various sectors, potentially reducing income inequality by offering alternative income sources beyond volatile commodity sectors. Political instability deters investors, hindering economic diversification and perpetuating dependence on volatile commodity exports, leaving economies vulnerable to NDCTOT shocks, and exacerbating income inequality.

GOVRNANC acts as a conditional variable in mitigating the negative impacts of declining NDCTOT on income inequality in economies heavily reliant on commodity exports. First, transparent, and accountable governance facilitates the design and implementation of equitable and evidence-based policies to address income inequality during NDCTOT decline. These can include, implementing fair and progressive tax systems to ensure wealthy individuals and corporations contribute more, generating revenue for targeted social programs that support vulnerable groups disproportionately affected by NDCTOT shocks; expanding access to healthcare, education, and unemployment benefits to provide a safety net for those most impacted by economic downturns, reducing income inequality; prioritizing public investments in education, skills training, and research promotes equal access to opportunities and equips individuals to adapt to changing economic landscapes, leading to long-term reductions in income inequality. Weak governance often leads to inefficient resource allocation, opaque policies, and corruption, hindering effective responses to NDCTOT-driven inequality and potentially exacerbating the issue. Second, inclusive institutions with strong representation of diverse groups foster participation and meaningful dialogue on issues of income inequality. This allows for policies that address the concerns of different income groups and prevent policies that disproportionately benefit the wealthy. Lack of inclusivity and weak institutions can lead to exclusion and marginalization of vulnerable groups, further widening the income gap and fueling social unrest. Third, combating corruption and strengthening the rule of law ensures resources meant for social programs and infrastructure development are used effectively and reach their intended beneficiaries. This prevents the wealthy from capturing disproportionate benefits from resource wealth, reducing inequality. Rampant corruption diverts resources away from essential services and infrastructure, disproportionately impacting the poor and widening the income gap. Finally, good governance promotes long-term planning and investment in economic diversification beyond narrow commodity dependence. This creates new job opportunities in various sectors, offering alternative income sources and reducing reliance on volatile commodity sectors, ultimately contributing to more equitable income distribution. Short-sighted policies and lack of focus on diversification leave economies vulnerable to NDCTOT shocks and perpetuate income inequality associated with dependence on a few resource-based sectors.

Similarly, analogous deduction from model (5) in Tables 2.16 and 2.17, the impact of these two NDCTOTs busts on income inequality in the presence of GOVTDEBT, is negative but decreases worse, as the level of GOVTDEBT increases from low to average and high level. Because the GOVTDEBT burden further reinforces the adverse impact of NDCTOTs busts on government expenditure. However, at a low level of GOVTDEBT, the Government can help to cushion the blow of negative shocks to NDCTOT by providing a source of fiscal stimulus. For example, if NDCTOT falls, the government can increase spending or cut taxes to offset the decline in aggregate demand and employment. This is particularly important when government debt is low, as the government has more fiscal space to respond to shocks otherwise cannot afford to spend from its treasury.

2.6 Conclusion and Policy Recommendations

The sharp commodities price fluctuations are seen numerously as an influential cause of business cycle fluctuations across the world. Over the last four decades, commodity price shocks have presented intricate challenges, particularly for economies heavily reliant on commodity exports for their foreign exchange earnings (Collier, 2012; IMF, 2016), leading to macroeconomic mismanagement in export-dependent economies. The fluctuations of macroeconomic activities have long received significant attention in the world economies. Because a sudden exogenous small or large shock(s), may be positive or negative, export prices in the international markets tend to increase or decrease export earnings in the domestic economy, which in turn could have serious micro and macro level consequences for the respective economy**.** In this context, various studies have explored the importance of terms of trade or export prices for many macroeconomic indicators. For instance, economic growth (Hamilton, 1983; Deaton and Miller, 1995; Dehn, 2000; Raddatz, 2007; Bruckner and Ciccone, 2010; Collier and Goderis, 2012), business cycle fluctuations (Mendoza, 1995; Kose, 2002; Aghion et al., 2010; Schmitt-Grohe and Uribe, 2018), real exchange rate movements (Chen and Rogoff, 2003; Ricci et al., 2013), implications for current balances (Blanchard and Milesi-Ferretti, 2009; Arezki and Hasanov, 2013), inflation (Cody and Mills, 1991; Garner, 1985; Webb, 1989; Kugler, 1991; Bloomberg and Harris, 1995; Trivedi and Hall, 1995), international reserves (Aizenman et al., 2012), consumption, exports and imports (Andrews and Rees, 2009), etc.

However, existing literature suggests that the macroeconomic evaluation of commodity price exposure hinges on whether the standard terms of trade (TOT) or the commodity terms of trade (CTOT) are utilized as an exposure metric. Instead of the more theoretically appropriate country-specific gauge of commodity price booms and slumps, which is contingent on the configuration of a country's commodity export and import baskets, the use of standard TOT and CTOT as indicators of commodity price exposure in an era marked by frequent commodity price fluctuations has sparked renewed interest. This is because these conventional commodity price exposure measures fail to encompass and consider the significance of commodity dependence, particularly for economies that produce and export commodities. Hence, we advocate for the utilization of the well-known CTOT index, along the routes of Spatafora and Tytell (2009) among others but factoring in and controlling for the substantial role of strong and narrowly export-dependent commodities in export-driven economies to analyze the unforeseen impacts of global trade prices on macroeconomic performance in export-dependent economies. Furthermore, we investigate the macroeconomic performance under an asymmetric response to commodity export price shocks. Most of the existing empirical research concentrates on the direct effects, overlooking the influence of potential conditional factors, as certain barriers prevalent in all countries hold greater importance than others. As macroeconomic response to exported commodities price booms and busts are not the same, rather they are heterogeneous across the countries (IMF, 2016). Therefore, the macroeconomic response to commodity price soars and bursts depends mainly on two things; i) the structural characteristics of the economy and ii) the policy framework that is in place (Cespedes and Velasco, 2012). To ensure consistent estimates, this study employs the dynamic fixed-effect within the instrumental variable method as an estimator to assess the macroeconomic ramifications of narrowly dependent commodity terms of trade (NDCTOT) over the period from 1995 to 2021.

We present evidence indicating that enhancements in NDCTOT yield beneficial outcomes on output, unemployment, external balance, exchange rate, government expenditure, and income inequality while exerting unfavorable effects on investment and inflation. The positive effects of NDCTOT on output, government expenditure, exchange rate, inflation, unemployment, and income inequality are further bolstered by political stability and effective governance. However, the conditional impact on external balance is positive but diminishes. Conversely, the negative impact of NDCTOT on investment decreases with improved political stability. Moreover, a heavy debt burden weakens the positive influence of NDCTOT on exchange rates, government expenditure, and income inequality. Additionally, fluctuations in exchange rates amplify both the negative and positive effects of NDCTOT on investment and inflation respectively. Foreign exchange reserves also reduce the positive impact of NDCTOT on exchange rate appreciation and external balance. Similarly, openness in the capital account diminishes the promising impact of NDCTOT on external balance, while an increase in government size leads to a reduction in income inequality. Likewise, financial advancements also mitigate the negative and positive impact of NDCTOT on investment and output. The asymmetric outcomes of NDCTOT reveal that the influence of NDCTOTBOOMS_25% on these macroeconomic factors, excluding inflation, is significantly more positive in terms of magnitude than NDCTOTBOOMS_15%. Conversely, the impact of NDCTOTBUSTS_25% is notably more unfavorable compared to NDCTOTBUSTS_15%. Regarding inflation, the effect is more adverse during NDCTOTBOOMS_25% than NDCTOTBOOMS_15%, while it is more favorable during NDCTOTBUSTS_25% than NDCTOTBUSTS_15%.

Our findings suggest that the influence of external price shocks, whether positive or negative, on NDCTOT can present a significant risk of macroeconomic mismanagement, contingent upon a country's net commodity trade position. It is crucial for nations heavily reliant on commodity exports to broaden their economic base by diversifying across different commodity sectors, reducing dependency on a single commodity. Relying too heavily on NDCTOT can expose economies to vulnerabilities. Promote diversification of exports beyond limited commodities. The favorable impacts of NDCTOT are enhanced by political stability and effective governance. Emphasize transparency, anti-corruption efforts, and robust institutions to maximize benefits. Excessive debt weakens the positive effects of NDCTOT; hence, it is advisable to adopt fiscal discipline and debt reduction measures. A resilient financial sector mitigates the adverse effects of NDCTOT on investment and output while magnifying its positive outcomes. Encourage financial inclusivity, enhance credit accessibility, and bolster financial infrastructure. Enact policies to manage exchange rate fluctuations that can amplify both positive and negative repercussions of NDCTOT. A larger government size can reduce income inequality. Therefore, explore targeted social initiatives and progressive taxation to further address income disparity, while considering the implications on government expenditure.

Appendices

Appendix A2

Table A2.1: Summary Statistics_Output

Variable	Obs	Mean	Std. Dev.	Min	Max
Output	1334	1.04e+11	2.43e+11	1.14e+08	1.52e+12
NDCTOT	1377	1.000	0.021	0.941	1.089
HUCPTL	1026	2.420	1.541	0.087	6.806
INVSTMN	1026	22.435	7.922	2.000	64.009
INF	1263	97.077	50.415	6.080	492.357
FDI	1333	4.304	5.930	-28.307	57.877
TRDOPNES	1146	74.247	34.808	16.352	225.023
GOVTSIZE	1254	19.473	12.290	0.003	107.424
POLSTB	1377	0.482	0.196	-0.101	0.893
GOVRNANC	1377	0.460	0.155	0.117	0.889
FDEVLP	1274	0.227	0.175	0.000	0.967

Notes: The dependent variable is Y and the independent variables are NDCTOT, HUCPTL, INVSTMN, INF, FDI, TRDOPNES, GOVTSIZE, POLSTB, GOVRNANC, and FDEVLP. All variables are in their original form, which means they are non-log transformed.

Table A2.2: Summary Statistics_Investment

Variable	Obs	Mean	Std. Dev.	Min	Max
INVSTMN	1026	22.435	7.922	2.000	64.009
NDCTOT	1377	1.000	0.021	0.941	1.089
SAVINGS	1095	21.133	18.768	-63.893	75.550
INTRATE	962	6.956	11.039	-81.132	54.678
INF	1263	97.077	50.415	6.080	492.357
FDI	1333	4.304	5.930	-28.307	57.877
REMITTANCES	1191	3.209	4.455	0.000	26.837
FDEVLP	1274	0.227	0.175	0.000	0.967
EXCRATE	1352	4972954.000	1.83e+08	o.0086752	6.72e+09
POLSTB	1377	0.482	0.196	-0.101	0.893

Notes: The dependent variable is INVSTMN and the independent variables are NDCTOT, SAVINGS, INTRATE, INF, FDI, REMITTANCES, FDEVLP, EXCRATE, and POLSTB. All variables are in their original form, which means they are non-log transformed.

Table A2.3: Summary Statistics_Unemployment

Variables	Obs	Mean	Std. Dev.	Min	Max
UNEMPLMNT	1306	6.820	4.819	0.100	31.840
NDCTOT	1377	1.000	0.021	0.941	1.089
OUTPUT	1334	1.04e+11	2.43e+11	1.14e+08	1.52e+12
INF	1263	97.077	50.415	6.080	492.357
FDI	1333	4.304	5.930	-28.307	57.877
POPULATN	1377	1.77e+07	3.12e+07	55800.000	2.13e+08
GOVTDEBT	1335	53.750	46.338	0.000	388.401
POLSTB	1377	0.482	0.196	-0.101	0.893
GOVRNANC	1377	0.460	0.155	0.117	0.889

Notes: The dependent variable is UNEMPLMNT and the independent variables are NDCTOT, OUTPUT, INF, FDI, POPULATN, GOVTDEBT, POLSTB, and GOVRNANC. All variables are in their original form, which means they are non-log transformed.

Table A2.4: Summary Statistics_External Balance

Variable	Obs.	Mean	Std. Dev	Min.	Max.
EXTBL	1146	-4.731	19.430	-96.956	50.685
NDCTOT	1377	1.000	0.021	0.941	1.089
TRDOPNES	1146	74.247	34.808	16.352	225.023
EXCRATE	1352	4972954	1.83e+08	.00868	6.72e+09
SAVINGS	1095	21.133	18.768	-63.893	75.550
OUTPUT	1334	1.04e+11	2.43e+11	1.14e+08	1.52e+12
FDI	1333	4.304	5.930	-28.307	57.877
FEXCRESERS	1305	2.02e+10	7.45e+10	149801.300	7.32e+11
POLSTB	1377	0.482	0.196	-0.101	0.893
KAOPNES	1256	0.085	1.526	-1.927	2.311

Notes: The dependent variable is EXTBL and the independent variables are NDCTOT, TRDOPNES, EXCRATE, SAVINGS, OUTPUT, FDI, FEXCRESERS, POLSTB, and KAOPNES. All variables are in their original form, which means they are non-log transformed.

Table A2.5: Summary Statistics_Inflation

Variables	Observations	Mean	Std. Dev	Min	Max
INF	1263	97.077	50.415	97.077	50.415
NDCTOT	1377	1.000	0.021	0.941	1.089
UNEMPLMNT	1306	6.820	4.819	0.100	31.840
MS	1204	43.172	25.078	5.143	151.549
EXCRATE	1352	4972954.000	1.83e+08	0.0086752	6.72e+09
TRDOPNES	1146	74.247	34.808	16.352	225.023
GOVTSIZE	1254	19.473	12.290	0.003	107.424
GOVTDEBT	1335	53.750	46.338	0.000	388.401
GOVRNANCE	1377	0.460	0.155	0.117	0.889
POLSTB	1377	0.482	0.196	-0.101	0.893

Notes: The dependent variable is INF and the independent variables are NDCTOT, UNEMPLMNT MS, EXCRATE, TRDOPNES, GOVTSIZE, GOVTDEBT, GOVRNANCE, and POLSTB. All variables are in their original form, which means they are non-log transformed.

Table A2.6: Summary Statistics_Exchange Rate

Variables	Observations	Mean	Std. Dev	Min	Max
EXCRATE	1352	4972954.000	1.83e+08	0.0086752	6.72e+09
NDCTOT	1377	1.000	0.021	0.941	1.089
CABALNCE	1162	-3.448	12.823	-52.518	48.792
INF	1263	97.077	50.415	6.080	492.357
INTRATE	962	6.956	11.039	-81.132	54.678
FEXCRESERS	1305	2.02e+10	7.45e+10	149801.3	7.32e+11
ECNGROWTH	1350	3.968	5.156	-33.493	43.480
GOVTDEBT	1335	53.750	46.338	0.000	388.401
POLSTB	1377	0.482	0.196	-0.101	0.893
GOVRNANCE	1377	0.460	0.155	0.117	0.889

Notes: The dependent variable is EXCRATE and the independent variables are NDCTOT, CABALNCE, INF, INTRATE, FEXCRESERS, ECNGROWTH, GOVTDEBT, GOVRNANCE, and POLSTB. All variables are in their original form, which means they are non-log transformed.

Table A2.7: Summary Statistics_Government Expenditure

Variables	Observations	Mean	Std. Dev	Min	Max
GOVTEXPND	1254	19.473	12.290	0.003	107.424
NDCTOT	1377	1.000	0.021	0.941	1.089
GOVTREVNUE	1291	27.357	16.793	0.000	164.054
GOVTDEBT	1335	53.750	46.338	0.000	388.401
SAVINGS	1095	21.133	18.768	-63.893	75.550
INF	1263	97.077	50.415	6.080	492.357
GOVRNANC	1377	0.460	0.155	0.117	0.889
POLSTB	1377	0.482	0.196	-0.101	0.893

Notes: The dependent variable is GOVTEXPND and the independent variables are NDCTOT, GOVTREVNUE, GOVTDEBT, SAVINGS, INF, GOVRNANC, and POLSTB. All variables are in their original form, which means they are non-log transformed.

Table A2.8: Summary Statistics_Income Inequality

Variables	Observations	Mean	Std. Dev	Min	Max
INCINEQ	966	41.184	7.153	24.200	56.000
NDCTOT	1377	1.000	0.021	0.941	1.089
UNEMPLMNT	1306	6.820	4.819	0.100	31.840
HUCPTL	1026	2.420	1.541	0.087	6.806
ECGROWTH	1284	3.979	5.056	-33.493	43.480
GOVTSIZE	1254	19.473	12.290	0.003	107.424
GOVRNANC	1377	0.460	0.155	0.117	0.889
POLSTB	1377	0.482	0.196	-0.101	0.893
GOVTDEBT	1335	53.750	46.338	0.000	388.401

Notes: The dependent variable is INCINEQ and the independent variables are NDCTOT, UNEMPLMNT, HUCPTL, ECGROWTH, GOVTSIZE, GOVRNANC, POLSTB and GOVTDEBT. All variables are in their original form, which means they are non-log transformed.

Appendix B2

Table B2.1: Correlation Matrix_Output

Variable	Y	NDCTOT	HUCPTL	INVSTMN	INF	FDI	TRDOPNES	GOVTSIZE	POLSTB	GOVRNANC	FDEVLP
Y	1.000										
NDCTOT	-0.052	1.000									
HUCPTL	0.504	-0.061	1.000								
INVSTMN	0.074	0.301	0.174	1.000							
INF	0.075	0.161	0.095	0.226	1.000						
FDI	-0.100	0.170	0.055	0.310	0.114	1.000					
TRDOPNES	-0.160	-0.010	0.239	0.258	-0.008	0.324	1.000				
GOVTSIZE	0.223	-0.016	0.089	0.068	0.021	0.061	0.134	1.000			
POLSTB	0.102	0.174	0.402	0.150	0.034	0.098	0.351	0.156	1.000		
GOVRNANC	0.351	0.148	0.492	0.147	0.024	0.005	0.171	0.339	0.748	1.000	
FDEVLP	0.758	0.080	0.657	0.128	0.083	-0.025	0.046	0.406	0.489	0.798	1.000

Notes: The dependent variable is Y and the independent variables are NDCTOT, HUCPTL, INVSTMN, INF, FDI, TRDOPNES, GOVTSIZE, POLSTB, GOVRNANC, and FDEVLP. All variables are in their original form, which means they are non-log transformed.

Table B2.2: Correlation Matrix_Investment

Variable	INVSTMN	NDCTOT	SAVINGS	INTRATE	INF	FDI	REMITTANCES	FDEVLP	EXCRATE	POLSTB
INVSTMN	1.000									
NDCTOT	0.229	1.000								
SAVINGS	0.369	0.091	1.000							
INTRATE	0.041	-0.013	-0.287	1.000						
INF	0.005	0.125	-0.002	-0.028	1.000					
FDI	0.404	0.157	-0.013	0.102	-0.032	1.000				
REMITTANCES	0.007	-0.207	-0.415	0.256	0.070	0.049	1.000			
FDEVLP	0.050	0.215	0.314	-0.180	0.009	-0.061	-0.272	1.000		
EXCRATE	-0.201	-0.072	-0.315	0.074	0.118	-0.135	-0.026	-0.152	1.000	
POLSTB	0.177	0.334	0.163	0.009	-0.063	0.093	-0.068	0.489	-0.393	1.000

Notes: The dependent variable is INVSTMN and the independent variables are NDCTOT, SAVINGS, INTRATE, INF, FDI, REMITTANCES, FDEVLP, EXCRATE, and POLSTB. All variables are in their original form, which means they are non-log transformed.

Table B2.3: Correlation Matrix_Unemployment

Variables	UNEMPLMNT	NDCTOT	OUTPUT	INF	FDI	POPULATN	GOVTDEBT	POLSTB	GOVRNANC
UNEMPLMNT	1.000								
NDCTOT	0.105	1.000							
OUTPUT	-0.063	-0.051	1.000						
INF	-0.137	0.109	0.079	1.000					
FDI	0.243	0.098	-0.123	-0.003	1.000				
POPULATN	-0.087	-0.068	0.533	0.175	-0.145	1.000			
GOVTDEBT	0.235	0.162	-0.230	-0.189	0.006	-0.155	1.000		
POLSTB	-0.013	0.173	0.018	-0.073	0.122	-0.487	-0.007	1.000	
GOVRNANC	0.032	0.178	0.270	-0.030	0.064	-0.276	-0.099	0.757	1.000

Notes: The dependent variable is UNEMPLMNT and the independent variables are NDCTOT, OUTPUT, INF, FDI, POPULATN, GOVTDEBT, POLSTB, and GOVRNANC. All variables are in their original form, which means they are non-log transformed.

Table B2.4: Correlation Matrix_External Balance

Variable	EXTBL	NDCTOT	TRDOPNES	EXCRATE	SAVINGS	OUTPUT	FDI	FEXCRESERS	POLSTB	KAOPNES
EXTBL	1.000									
NDCTOT	-0.103	1.000								
TRDOPNES	0.088	0.078	1.000							
EXCRATE	-0.052	0.035	0.033	1.000						
SAVINGS	0.822	-0.001	0.261	-0.087	1.000					
OUTPUT	0.300	-0.048	-0.177	-0.015	0.290	1.000				
FDI	-0.269	0.192	0.368	-0.016	-0.016	-0.105	1.000			
FEXCRESERS	0.258	-0.034	-0.041	-0.010	0.287	0.606	-0.074	1.000		
POLSTB	0.212	0.220	0.394	-0.036	0.299	0.056	0.074	-0.070	1.000	
KAOPNES	0.298	0.142	0.260	-0.042	0.340	0.241	0.008	0.134	-0.042	1.000

Notes: The dependent variable is EXTBL and the independent variables are NDCTOT, TRDOPNES, EXCRATE, SAVINGS, OUTPUT, FDI, FEXCRESERS, POLSTB, and KAOPNES. All variables are in their original form, which means they are non-log transformed.

Table B2.5: Correlation Matrix_Inflation

Variables	INF	NDCTOT	UNEMPLMNT	MS	EXCRATE	TRDOPNES	GOVTSIZE	GOVTDEBT	GOVRNANCE	POLSTB
INF	1.000									
NDCTOT	0.151	1.000								
UNEMPLMNT	-0.139	0.152	1.000							
MS	0.200	0.031	0.033	1.000						
EXCRATE	0.003	-0.048	-0.015	-0.268	1.000					
TRDOPNES	-0.015	0.021	0.016	0.472	-0.359	1.000				
GOVTSIZE	-0.024	0.030	0.000	0.465	-0.143	0.249	1.000			
GOVTDEBT	-0.166	0.123	0.155	-0.024	0.037	0.058	0.236	1.000		
GOVRNANCE	0.016	0.246	-0.077	0.628	-0.158	0.212	0.303	-0.097	1.000	
POLSTB	-0.025	0.195	-0.176	0.485	-0.330	0.397	0.258	-0.041	0.756	1.000

Notes: The dependent variable is INF and the independent variables are NDCTOT, UNEMPLMNT MS, EXCRATE, TRDOPNES, GOVTSIZE, GOVTDEBT, GOVRNANCE, and POLSTB. All variables are in their original form, which means they are non-log transformed.

Table B2.6: Correlation Matrix_Exchange Rate

Variables	EXCRATE	NDCTOT	CABALNCE	INF	INTRATE	FEXCRESERS	ECNGROWTH	GOVTDEBT	POLSTAB	GOVRNANC
EXCRATE	1.000									
NDCTOT	-0.113	1.000								
CABALNCE	-0.050	-0.047	1.000							
INF	-0.054	0.072	0.123	1.000						
INTRATE	-0.244	0.009	0.057	-0.031	1.000					
FEXCRESERS	0.171	-0.033	-0.039	0.138	-0.126	1.000				
ECNGROWTH	0.002	0.053	0.041	-0.154	0.039	-0.066	1.000			
GOVTDEBT	-0.397	0.205	-0.108	-0.214	0.111	-0.213	-0.109	1.000		
POLSTAB	-0.006	0.231	-0.430	-0.053	0.019	-0.146	-0.078	0.095	1.000	
GOVRNANC	0.046	0.242	-0.173	-0.078	-0.032	-0.059	-0.088	-0.021	0.772	1.000

Notes: The dependent variable is EXCRATE and the independent variables are NDCTOT, CABALNCE, INF, INTRATE, FEXCRESERS, ECNGROWTH, GOVTDEBT, GOVRNANCE, and POLSTB. All variables are in their original form, which means they are non-log transformed.

Table B2.7: Correlation Matrix_Government Expenditure

Variables	GOVTEXPND	NDCTOT	GOVTREVNUE	GOVTDEBT	SAVINGS	INF	GOVRNANC	POLSTB
GOVTEXPND	1.000							
NDCTOT	0.023	1.000						
GOVTREVNUE	0.682	0.042	1.000					
GOVTDEBT	0.099	0.162	-0.159	1.000				
SAVINGS	-0.295	-0.045	0.111	-0.248	1.000			
INF	-0.069	0.152	-0.058	-0.067	0.041	1.000		
GOVRNANC	0.265	0.233	0.438	-0.056	0.269	-0.068	1.000	
POLSTB	0.337	0.188	0.432	-0.031	0.228	-0.113	0.759	1.000

Notes: The dependent variable is GOVTEXPND and the independent variables are NDCTOT, GOVTREVNUE, GOVTDEBT, SAVINGS, INF, GOVRNANC, and POLSTB. All variables are in their original form, which means they are non-log transformed.

Table B2.8: Correlation Matrix_Income Inequality

Variables	INCINEQ	NDCTOT	UNEMPLMNT	HUCPTL	ECGROWTH	GOVTSIZE	GOVRNANC	POLSTB	GOVTDEBT
INCINEQ	1.000								
NDCTOT	-0.036	1.000							
UNEMPLMNT	0.153	0.105	1.000						
HUCPTL	-0.537	-0.105	0.098	1.000					
ECGROWTH	0.086	0.078	-0.024	-0.085	1.000				
GOVTSIZE	-0.100	0.181	0.111	-0.122	-0.055	1.000			
GOVRNANC	-0.518	0.094	-0.157	0.467	-0.011	0.163	1.000		
POLSTB	-0.381	0.233	-0.298	0.340	0.089	0.025	0.731	1.000	
GOVTDEBT	0.137	0.212	0.177	-0.339	-0.154	0.185	-0.089	-0.066	1.000

Notes: The dependent variable is INCINEQ and the independent variables are NDCTOT, UNEMPLMNT, HUCPTL, ECGROWTH, GOVTSIZE, GOVRNANC, POLSTB and GOVTDEBT. All variables are in their original form, which means they are non-log transformed.

Appendix C2

List of Export-Dependent Economies

Table C2: List of Selected Countries along with their Major Commodities Shares in Total Exports

S. No.	Country Name	Commodities	Share of Major Commodities in Total Exports during this Study Time i.e., 1995--2021
1	Algeria	Petroleum	43.73
		Natural Gas	38.51
2	Armenia	Distilled Alcoholic Beverages	13.75
		Copper	21.87
3	Australia	Iron	18.43
		Coal	17.12
4	Azerbaijan	Petroleum	62.69
		Natural Gas	3.86
5	Benin	Edible nuts	9.90
		cotton	56.31
6	Brunei	Petroleum	52.32
		Natural Gas	46.41
7	Burkina Faso	Edible nuts	5.01
		Cotton	55.69
8	Burundi	Coffee	58.29
		Tea	9.27
9	Belize	Sugar	21.73
		Petroleum	29.73
10	Cabo Verde	Fish	38.57
		Bananas	4.65
11	Cameroon	Cocoa beans	10.23
		Petroleum Oil	28.01

12	Chile	Copper	47.40
		Fish	5.37
13	Colombia	Coal	11.74
		Petroleum	28.68
14	Cote d'Ivoire	Cocoa beans	34.92
		Petroleum	6.39
15	Ecuador	Bananas	15.33
		Petroleum	40.86
16	Ethiopia	Beans	6.85
		Coffee	37.14
17	Fiji	Sugar	22.50
		Fish	13.62
18	Gambia, The	Groundnuts peanuts	35.37
		Groundnut /peanut/ oil	37.63
19	Ghana	Cocoa beans	29.96
		Petroleum Oil	54.65
20	Greenland	Fish	55.09
		Lead	4.39
21	Grenada	Fish	15.68
		Wheat	19.65
22	Guyana	Sugar	18.41
		Rice	18.51
23	Honduras	Bananas	10.13
		Coffee	26.00
24	Iceland	Aluminium	25.36
		Fish	45.11
25	Kuwait	Petroleum	65.21
		Natural Gas	5.61
26	Kazakhstan	Petroleum	50.69

		Copper	5.33
27	Kiribati	Coconut copra oil	22.06
		Fish	23.42
28	Mali	Buffaloes	10.64
		Cotton	63.39
29	Mozambique	Coal	7.33
		Aluminium	36.28
30	Mauritania	Fish	14.76
		Petroleum	26.37
31	Maldives	Fish	77.66
		Petroleum	4.81
32	Malawi	Sugar	7.73
		Tobacco	56.24
33	Niger	Uranium	46.50
		Palm oil	4.02
34	Nigeria	Petroleum	86.46
		Natural Gas	5.08
35	Norway	Petroleum	35.90
		Natural Gas	19.13
36	Oman	Petroleum	66.86
		Natural Gas	8.93
37	Qatar	Petroleum	38.30
		Natural Gas	53.84
38	Russian Federation	Petroleum	26.74
		Natural Gas	11.77
39	Rwanda	Coffee	19.52
		Tea	18.57
40	Seychelles	Fish	78.19
		Petroleum	7.37

41	St. Vincent and the Grenadines	Wheat	21.49
		Bananas	22.49
42	Sao Tome and Principe	Cocoa beans	84.21
		Fish	4.15
43	Saudi Arabia	Petroleum	77.47
		Fertilizer	
44	Trinidad and Tobago	Petroleum	13.06
		Natural Gas	22.11
45	Togo	Natural phosphates	20.31
		Cotton	15.11
46	Uganda	Fish	9.44
		Coffee	30.71
47	United Arab Emirates	Petroleum	36.41
		Aluminium	16.13
48	Venezuela	Petroleum	70.84
		Aluminium	8.22
49	Yemen, Rep.	Petroleum	62.51
		Natural Gas	4.70
50	Zambia	Zinc	5.69
		Copper	70.38
51	Zimbabwe	Tobacco	23.99
		Nickel	17.87

Chapter #03

Government Policy Response to Commodity Price Booms and Busts

Abstract

Over the past four decades commodity price shocks have posed complex challenges especially, for those economies that are narrowly dependent on commodity export for their foreign exchange earnings as one of the major income streams as it led to mismanagement of export-dependent economies which in turn led to pose challenges for sound economic policies especially, fiscal, and monetary. Fiscal and monetary policies both play a crucial role in reducing the instability caused by significant trade shocks affecting countries that heavily rely on commodity exports. Some literature is relevant for assessing what the optimal fiscal and monetary policy reaction of these countries to such shocks should be. However, much of the previous literature has focused on the response of fiscal and monetary variables, not direct policy responses, to changes in the standard terms of trade (TOT) and commodity terms of trade (CTOT) as an exposure variable to accommodate commodity price shocks. Instead of the theoretically more applicable country-specific measure of commodity price fluctuations, which relies on the composition of a specific country's commodity export and import baskets, using standard TOT and CTOT as a commodity price exposure indicator in the era of frequently fluctuating commodity prices has triggered renewed interest because these previous commodity price exposure indicators do not capture and account the role of commodity dependence for especially producing and exporting economies. Moreover, most of the existing empirical literature focuses on the direct effects, ignoring the role of possible conditional factors as some obstacles that exist in all countries are far more important than others. Therefore, we argue that using the recently well-known CTOT index but accounting and controlling for the strong and narrow export-dependent commodities' role in export-dependent economies to study the unanticipated effects of world trade prices on the response of fiscal and monetary policies. In order to obtain reliable estimates, this research employs the benefits of the fixed-effect logit and probit method as an estimator to assess the impact of fiscal and monetary policies on changes in narrow dependent commodity terms of trade (NDCTOT), both directly and indirectly, throughout the period from 1995 to 2021. We show that as NDCTOT improves, the likelihood of choosing a tight fiscal policy increase, while the likelihood of choosing a tight monetary policy decreases. Additionally, the probability of opting for a countercyclical fiscal policy rises with increased interest rates, economic growth, inflation, and government debt, but decreases with rising unemployment. Conversely, an improvement in NDCTOT leads to a reduced likelihood of choosing a tight monetary policy. Moreover, the probability of avoiding a tight monetary policy decreases with higher government expenditure, inflation, and exchange rate depreciation, but increases with rising economic growth and unemployment. Our findings suggest that implementing accommodative fiscal and monetary policies can help mitigate the impact of both positive and negative external exportable commodity price fluctuations on the narrow export-dependent economy.

3.1 Introduction

This section is split into three sub-sections. Section one deals with the background of the study, while the gap in the literature is explained in section two. The objectives of the study are described in section three in detail.

3.1.1 Background of the Study

Macroeconomic policies are concerned with the performance of the well-established economy. These policies intend to produce a steady economic environment that is likely to encourage strong and sustainable economic growth, create wealth, generate employment opportunities, and hence improve the living standards of a country's individuals and households. However, in comparison to other macroeconomic policies, like exchange rate, trade, and sectoral policies, etc., fiscal and monetary policies are the most important macroeconomic policies. Because close coordination of both monetary and fiscal policies is a key to sound macroeconomic management (Tang, 2008). These policies are very important as policymakers react to cyclical fluctuations or business cycles originating within the domestic economy or transforming from outside the foreign economy(s). Compared to developed countries, developing countries are more prone to experience large, frequent, and more pronounced business cycle fluctuations which are attributed to commodity price booms and busts (Perry, 2009), because developing countries are more commodity export dependent. There is consensus, among economists and scholars, about the fluctuations of primary export commodities prices that they are harmful for both developed and developing countries. These commodities price fluctuations generate uncertainty in export revenues, which can negatively affect export export-dependent economy. For example, the commodities market plays a significant role by emitting business cycle fluctuations and thus affecting inflation rates and hence industrialized nations (Beckerman and Jenkinson, 1986). The great recent growth of emerging market economies increases the world's hunger for primary export commodities. Before the reduction of primary export commodities these emerging market economies saw a buoyed domestically. The narrow and specific export commodities dependence of these economies led them to most likely the world market fluctuations. This commodities price volatility and hence fluctuations in export revenues forces governments, both emerging and more diversified market economies, and more specifically policymakers to react with this situation on policy variables like exchange rate, interest rate, inflation, government spending, and taxes, etc. to manage and run well-functioning their economies. These cyclical fluctuations are inevitable up to some extent, however, their impact can be mitigated through well-chosen fiscal and monetary policy regimes (Frankel, 2011). For instance, booms and busts in commodity prices often result in cost-push inflation and deflation which does on occasion tend to induce a tightening and loosening of monetary and fiscal policies Phelps (1978). Similarly, Ocran and Biekpe (2007) show that an increase in commodity prices may prompt policymakers to react to these commodity price changes, which means that these policies are endogenous to business cycles or cyclical fluctuations across domestic and foreign economies.

3.1.1.1 Fiscal Policy and Commodity Prices

Standard economic theory posits that fiscal policy should be countercyclical. According to Barro's (1979)—neoclassical smoothing model—a government should run most favorably surpluses and deficits in good times and bad times respectively.[62] Moreover, in the standard Keynesian or neo-Keynesian framework, government should do the same, although for different reasons. However, in the real world governments and policymakers repeatedly follow and implement procyclical fiscal policies. For instance, Cuddington (1989), Talvi and Vegh (2005), Sinnott (2009), and others show that during booms or prosperity periods governments spend more rather than save or they save very little because government revenues from tax receipts and royalties rise in boom periods. Even though some governments saved a significant amount of cheerful revenues and accrued financial assets, while others used revenue windfalls to fuel growing government spending (Medina, 2010). This procyclicality is more evident and powerful in countries that hold natural resources and income gained from these resources dominates the business cycle (Gelb, 1986; Cuddington, 1989; Gavin et al., 1996; Gavin and Perotti, 1997; Calderon and Schmidt-Hebbel, 2003; Perry 2003; Medas and Zakharova, 2009; Villafuerte et al., 2010). This government spending can spur economic growth and hence create employment opportunities and thus improve the living standards of individuals and households. In addition, Vander Ploeg and Poelhekke (2009) show that oil and non-oil price fluctuations mitigate economic growth and promote the so-called resource curse. It means that commodities price fluctuation is large enough by any measure.[63] As commodities price volatility causes output volatility which further makes revenues quite volatile and hence can be government spending and fiscal balance. These results create the possibility that if government spending reacts more than proportionally to government revenue increase then the fiscal balance can move with the cycle.

Commodity prices are notable drivers of fiscal policy and business cycles in many export-dependent developed, developing, and emerging market economies. For example, a positive/negative

[62] This holds true if the fluctuations are anticipated to be temporary rather than permanent.

[63] Mendoza (1995) reveals that in both developed and developing countries, approximately half of the output variation is linked to TOT shocks. Similarly, Kose (2002) indicates that nearly all output fluctuations in small open developing countries can be attributed to TOT shocks. Shousha (2016) suggests that changes in real commodity export prices contribute to about 23% of output fluctuations in emerging economies. Schmitt-Grohé and Uribe (2018) state that TOT shocks account for roughly 10% of aggregate activity variations in developing and emerging economies, while Fernandez et al. (2018) propose a model attributing 42% of income variance to commodity shocks.

commodity price shock abroad generates two broad revenue effects domestically, one is direct, and the other one is indirect. On the direct effect, the commodity-connected windfall gains/revenues from corporate income tax, personal income tax, profit, royalties, and export duties and taxes in these economies may make a large part of government revenues (See, Sinnott, 2009; Tanzi, 1983). In addition to the initial impact on tax revenues, surges in commodity prices can also lead to an expansion in economic activity within a country, resulting in secondary effects on tax revenue (Tanzi, 1983). Moreover, these economic interactions further create and generate changes in output, wages, income, inflation, and other aspects of the macroeconomy. That is for these nations, the commodity price serves as a cornerstone, with its connection to the economy extending beyond being just a financial asset. Generally, tax revenue and expenditure have a positive correlation with commodity prices when prices are rising. However, in some cases, these associations tumble with falling commodity prices, even become negative, showing non-reversal of spending patterns during commodity price slumps, because the government tends to increase its spending more swiftly during the boom phase, capitalizing on the increased revenue than it reduces it during the subsequent downturn when revenues revert to their usual levels (see to Gupta and Miranda, 1991; Chu, 1987).

Therefore, the problem of procyclicality looks to be especially critical for commodity-rich economies that are heavily dependent on to certain extent on commodity revenues to finance their budgets which in turn have a direct impact on public spending. For example, the Russian budget will be in balance only if its major export commodities, oil, and natural gas, price will be sufficiently high, otherwise its gross domestic product will be affected negatively (Hegerty, 2016). The mounting reliance of fiscal revenues on commodity prices turns public finances susceptible to precarious external factor shocks that are predominantly beyond the control and management of policymakers. Changes in commodity prices impact the economy by influencing government budget limitations and the government's access to credit in international financial markets (Lopez-Martin et al., 2019). Nevertheless, primary commodity prices inherently exhibit higher volatility compared to manufactured goods (Dossani and Elder, 2020; Radetzki and Wårell, 2016; Jacks et al., 2011), leading to significant fluctuations in export revenue, particularly for countries reliant on commodity exports. Consequently, events such as the commodity price booms of 1970, the 2008 global financial crisis (GFC), and the ongoing COVID-19 pandemic have posed both opportunities and challenges for nations heavily dependent on a limited range of key commodities. For example, in more than twenty economies, revenue from hydrocarbons contributes to over 70% of total fiscal revenue (IMF, 2007). Likewise, the International Monetary Fund (2024) reports that in emerging markets and developing economies, government gross debt as a percentage of GDP climbed from 77.9% in 2008 to 124.1% in 2020, while in advanced economies, it rose from 38.6% to 61.4% over the same period. This pattern holds particular significance for commodity-rich economies. Consequently, many governments are forced down to adjust their fiscal balance through increases and decreases in government spending or decreases and increases in tax rates to stabilize and stimulate the domestic economy. In times of prosperity with rising commodity prices, revenues increase, leading to prolonged spending habits, and vice versa. For instance, during the commodity price boom of the 1970s, countries like Algeria, Nigeria, and Venezuela succumbed to overly optimistic expenditure practices. These nations utilized current and anticipated revenues to fund various development projects (Brown et al., 2008). However, during challenging periods such as the Global Financial Crisis (GFC) and the COVID-19 pandemic, governments find it arduous to scale back spending on these projects, making them unsustainable. Consequently, governments are compelled to complete these projects through deficit financing. This has resulted in a significant rise in external debt as a percentage of GDP for many countries over the past decade. As fiscal deficits increase, governments resort to borrowing from international financial markets, thereby escalating the country's debt levels (Brown and Gibson, 2006). The sustainability of external debt may deteriorate if the debt-to-GDP ratio becomes excessively high. This situation reduces governments' ability to meet debt obligations, raising the likelihood of default (Pattillo et al., 2002).

However, the existing institutional setup and prevailing policies may affect the government policy decision regarding public finances and economic stability in the face of commodity price fluctuations. For instance, monetary policy's role as an interest rate may influence the effect of commodity price surges and bursts on fiscal balance and hence on government fiscal policy decisions. This indicates that an accommodating monetary policy could prove effective in mitigating the positive or negative impact of fluctuations in commodity prices on the fiscal balance. During periods of commodity price booms or busts, the Central Bank (CB) can adjust the nominal interest rate downward or upward to stimulate the domestic economy through government spending and taxation, as well as to encourage increased private investment. Empirical findings indicate that a decrease or increase in the nominal interest rate results in a corresponding decrease or increase in the real interest rate in the short term. A lower or higher interest rate reduces or increases the cost of capital, thereby stimulating or dampening investment, and affecting aggregate demand, employment, and income levels. Consequently, the fiscal position either improves or deteriorates as the tax base expands or contracts, particularly for countries with a progressive tax system (refer to, for example, Majumder et al., 2022; Dogrul and Soytas 2010).

Additionally, during periods of high growth, governments might choose to tighten fiscal policy (reduce spending) even with favorable terms of trade to avoid overheating the economy. On the contrary, during slow growth, terms of trade improvements might be used to support spending and stimulate growth (Hausmann and Rigobon, 2003; Blanchard and Perotti, 2002). Similarly, high unemployment might encourage expansionary fiscal policy, even with good terms of trade, to stimulate job creation and vice versa (Blanchard and Perotti, 2002; Rodrik, 1998). Moreover, the domestic economy's debt level may play a significant role in the procyclicality of fiscal policy in the face of commodity price surges and bursts. As commodity price revenues represent a windfall for governments, they have the option to either spend it when the debt level is relatively low or save it to repay debt in case of an already alarming situation (Tanner and Restrepo, 2011; Tanzi, 1986). Furthermore, higher inflation reduces the purchasing power of government revenue which in turn buys fewer goods and services with the same amount of money, effectively reducing the real value of its expenditure. If a significant portion of government expenditure goes towards goods and services whose prices are highly sensitive to inflation then rising inflation will disproportionately impact those areas, potentially requiring adjustments to other spending categories (see, Alesina and Drazen, 1991; Auerbach and Gale, 2009).

3.1.1.2 Monetary Policy and Commodity Prices

Economists have proposed various approaches to define the factors influencing monetary policy in order to find an optimal solution to this complex issue. Some well-known examples in the literature include the Friedman rule, the Taylor rule, and more recently, central bank independence and inflation targeting (Bernanke and Mishkin, 1997). In recent decades, the primary objective of monetary policy has been to achieve low and stable prices by controlling inflation (Svensson, 2002). This goal is pursued by using policy tools, such as the policy interest rate, to influence inflation through the transmission mechanism. Understanding the transmission mechanism and how the policy interest rate impacts the real and nominal aspects of the economy is crucial in crafting monetary policy (Svensson, 2002). However, due to the continual impact of unpredictable shocks on the economy, central banks' control over inflation and output remains imperfect.

Throughout the past four decades, economists have debated the role of assets and commodity prices in shaping and implementing monetary policy. Equity and housing prices can influence demand through direct and indirect wealth effects. For example, fluctuations in equity and real estate prices impact consumer wealth, potentially prompting changes in consumer spending patterns (Modigliani, 1974). There is now sizable evidence in the literature suggesting that commodity prices can serve as indicators of future economic trends, making them valuable in the formulation of monetary policy. It has been suggested that commodity prices might offer early insights into the current economic conditions, as these prices are typically determined in efficient continuous auction markets with readily available information (refer to, for instance, Olivera, 1970; Garner, 1989; Marquis and Cunningham, 1990; Cody and Mills, 1991; Awokuse and Yang, 2003; Bhar and Hamori, 2008; De Gregorio, 2012). Hence, Cecchetti et al. (2000) and Goodhart (2001) advocate for a direct monetary policy response to asset price movements that deviate from perceived fundamentals. Asset prices provide valuable insights into future demand conditions and disregarding them not only results in the loss of this information but may also introduce significant biases in empirical models used for monetary policy analysis (Chen et al., 2014; Goodhart and Hofmann, 2001). Therefore, aligning monetary policy with asset price misalignments could enhance macroeconomic performance (Cecchetti et al., 2002). Some influential policymakers have also been early proponents of using commodity prices as leading indicators of inflation and have supported policy suggestions that utilize commodity prices as a reference to adjust short-term money growth targets (Christiano et al., 1994; Garner, 1989). An increase in commodity prices may signal to policymakers that the economy is expanding too rapidly, and inflation is likely to rise. In such instances, the monetary authority may observe the escalating commodity prices and respond by raising interest rates to tighten the money supply.

While there is criticism that commodity prices may not be effectively utilized in shaping monetary policy due to significant market-specific shocks that may lack macroeconomic implications (Marquis and Cunningham, 1990; Cody and Mills, 1991). Fuhrer and Moore (1992) argued against reacting to asset market prices, cautioning that it could compromise inflation control. Likewise, Gertler (1998) and Bernanke and Gertler (1999, 2001) express skepticism by contending that monetary policy should not adjust to asset price changes unless they reflect inflationary expectations, as distinguishing between fundamental shifts and speculative bubbles in asset prices is challenging. The repercussions of directly responding to asset prices are typically examined using calibrated models (refer to, for instance, Bernanke and Gertler, 1999). Currently, the prevailing consensus suggests that central banks should only react to asset price fluctuations if they are anticipated to impact future inflation and the output gap (Bernanke and Gertler, 1999). Furthermore, alongside interest rates, the exchange rate is commonly regarded as a key determinant of aggregate demand and a crucial channel for transmitting monetary policy in open economies.[64] Similarly, starting from the mid-2000s, all commodity prices experienced a sharp and sustained increase, reaching unprecedented levels. The unexpected magnitude and persistence of the surge in commodity prices indicate that it is no longer viable to operate monetary policy under the assumption that the shock is temporary. It is now more prudent to operate under the assumption that there has been a lasting shift in the relative prices of commodities (for example, refer to De Gregorio, 2012). More recently, around late 2008, as global commodity prices plummeted and deflationary pressures intensified due

[64] In the early to mid-1990s, several central banks implemented a Monetary Conditions Index (MCI), a weighted average of the short-term interest rate and the exchange rate, either as an operating target (Bank of Canada, Reserve Bank of New Zealand) or as an indicator (Swedish Riksbank, Bank of Norway, Bank of Finland, Bank of Iceland) for monetary policy. For a comprehensive discussion, see Bean (2004).

to a severely weakened global economy, policymakers took aggressive measures to prevent further economic and financial deterioration (Tang, 2008). Frankel (2011) suggests that as a policymaker, it would be better to tighten and ease monetary policy to allow some currency appreciation and depreciation in commodities price exports booms and busts respectively. Likewise, McLeay et al., (2020) suggest that in the face of commodity booms, in an export-dependent economy, it is optimal to hike the nominal interest rate to lean against the inefficient boom.[65]

More recently, the windfall gain from dependent commodity trade exporters increases the foreign exchange reserves which in turn leads to increased stock of domestic money and as a result, it is expected to upsurge domestic price level and inflation rate (Tang, 2008). Foreign exchange reserves compelled the Central Bank to put more local currency against each foreign currency (Shou-feng and Lang-nan, 2011), consequently, the increase in the base currency or money supply leads to a corresponding rise in the inflation rate (Zhou and Yang, 2014; Terada-Hagiwara, 2005). This is why Milton Friedman famously stated that "inflation is always and everywhere a monetary phenomenon." Global commodity prices significantly influence the currency value of many major commodity-exporting nations, with currency reactions often being swift and nearly simultaneous, leading to exchange rate pass-through effects on consumer prices over time (refer to Chen and Rogoff, 2003; Amano and van Norden, 1993). For instance, during the 2001-2008 boom period, fixed-rate oil-producing countries like Saudi Arabia and the Gulf Emirates experienced real appreciation due to inflows of money and resulting inflation. On the one hand, increased foreign demand for domestic commodities generates foreign exchange reserves which in response create a wealth effect in the form of increased household income and consumption demand.[66] On the other hand, export commodity price boom by foreign exogenous shock put upward pressure on domestic inputs and raw materials demand of that commodity along with resource allocation between domestic economy sectors. In response both these effects led to creating an output gap in the production of goods and services and resulting in an upturn in the domestic price level and inflation rate along with appreciation of nominal and real exchange rate. The economy experiences overheating due to an inefficient expansion and misallocation of resources resulting from the commodity price shock.[67] Meanwhile, during a boom period, domestic firms borrowing conditions

[65] There is a body of literature that examines monetary policy concerning commodity importers, particularly in the context of oil imports. Refer to works such as Kormilitsina (2011) and Natal (2012) for further insights.

[66] In addition, these economic dynamics lead to shifts in output, real wages, and various macroeconomic aspects. In these nations, commodities play a pivotal role, and their connection to the economy extends beyond being solely a financial asset.

[67] By illustrating the impact of the commodity sectors on overproduction, the model simplifies the potential for inefficient reallocations akin to the "Dutch disease," as discussed in the influential work by Corden and Neary (1982).

improves which in turn may increase the credit from abroad (for instance see, McLeay et al., 2020; Fernandez et al., 2018; Shousha, 2016; Bastourre et al. 2012). During commodity price booms, lenders tend to be more inclined to extend loans compared to periods of decline. As a result, more foreign currency credit and domestic money supply and further possibility of exchange rate appreciation, and more surge in the inflation rate. However, the level of lending credit and its return may depend on the political environment of the domestic economy, for instance, windfalls from resources can contribute to political instability and strengthen autocratic regimes, leading to negative economic repercussions (refer to Caselli and Tesei, 2016) and related sources).

Therefore, the consensus in theoretical and empirical literature worldwide supports the central bank's role as a policy maker, emphasizing price stability (inflation targeting) as the prime objective of monetary policy to foster sustainable economic growth (Taylor, 1993), a concept pioneered by the Reserve Bank of New Zealand in 1990. In basic backward-looking structural models of the economy (refer to, for example, Rudebusch and Svensson, 1999; Svensson, 1997), the optimal interest rate rule links the policy rate to current and past inflation rates as well as current and past output gaps. This is because current and lagged inflation rates and output gaps serve as adequate indicators for predicting future inflation rates and output gaps, which are the focal points for central bank targeting. As advocated by Trichet (2008), President of the European Central Bank, it is advisable to act promptly to prevent the potential nominal second-round effects of inflation from materializing by anchoring inflation expectations, before price setters and social partners perceive transient price increases as permanent.[68]

However, the reaction of the interest rate by a monetary policy authority to fluctuations in commodity prices is contingent upon the structural characteristics and institutional framework of an economy (McLeay et al., 2020; Gelos and Ustyugova, 2017; Tang, 2008). Apart from the interest rate, the exchange rate is typically regarded as the primary determining factor of aggregate demand and a key channel for transmitting monetary policy in open economies (Goodhart and Hofmann, 2001). For instance, according to McLeay et al. (2020), in response to commodity price surges, the optimal policy involves allowing the exchange rate to appreciate and increasing interest rates, with a larger appreciation necessary as borrowing conditions become more relaxed. Consequently, higher interest rates and a stronger exchange rate dampen household demand for domestic consumption, thereby curbing undesirable rises in domestic output and inflation. However, fixed-exchange-rate pegs pose significant challenges for commodity exporters, amplifying inefficient fluctuations in commodity production. The fixed exchange rate system exacerbates the impact of commodity price

[68] For even more strong view on this issue see King (2010), Governor of Bank of England.

shocks, as evidenced during the Argentine currency and debt crisis in 2001–2002 (Majumder et al., 2022; Edwards and Yeyati 2005). Under a fixed exchange rate regime, economic stability is hindered, requiring adjustments in nominal wages, commodity prices, or heightened output and employment volatility. On the contrary, a floating exchange rate system can enhance a country's economic stability by responding to commodity price shocks through exchange rate adjustments. This argument aligns with the principles of floating exchange rate regimes advocated by Friedman (1953) and Mundell (1961), asserting that floating exchange rates are better equipped to absorb external shocks swiftly compared to fixed exchange rates (for empirics see, Majumder et al., 2022; Dąbrowski and Wroblewska, 2016; Edwards and Yeyati, 2005; Ghosh et al., 1997; Flood and Rose, 1995; Baxter and Stockman, 1989). Furthermore, surges in commodity prices often lead to cost-push inflation (Phelps 1978), occasionally prompting a need for monetary and fiscal policy tightening. A robust fiscal position enables the government to implement appropriate measures to tackle escalating prices. Evidence indicates that fiscal factors can impact inflation expectations in emerging markets (refer to Celasun et al., 2004). In the event of a commodity price boom, the fiscal authority should consider reducing labor subsidies. In cases of fiscal dominance, it can be challenging for monetary policy to achieve its inflation targets (McLeay et al., 2020). A well-coordinated fiscal policy, as proposed by Hevia and Nicolini (2013), can dynamically respond to commodity price shocks over time. Likewise, during high growth, central banks might use tight monetary policy to prevent overheating even with favorable terms of trade. Conversely, slow growth might necessitate an easier policy to support economic activity, even if terms of trade are moderate (Hausmann and Rigobon, 2003; Blanchard and Perotti, 2002). Similarly, high unemployment might encourage easier monetary policy to stimulate growth and job creation, even with good terms of trade. On the contrary, low unemployment might allow for tighter policies to focus on price stability (Blanchard & Perotti, 2002; Rodrik, 1998).

3.1.2 Gap in the Literature

The purpose of this study is to find out how a country's narrow dependent commodities terms of trade play a key role, at the time of export price shock, in a country's prevailing macroeconomic policies survival—fiscal and monetary. The economic repercussions of the 2008 global financial crisis (GFC), the COVID-19 pandemic, Russia's aggression against Ukraine, and other ongoing macroeconomic factors have contributed to heightened volatility in commodity prices. This increased volatility in commodity prices presents challenges in crafting and executing effective fiscal and monetary policies.

The literature examined in the context of fiscal policy and commodities prices, most of these studies have worked on the procyclicality of fiscal policy (see, Cuddington, 1989; Mendoza, 1995; Gavin et al., 1996; Gavin and Perotti, 1997; Stein et al., 1999; Arreaza et al., 1999; Kose, 2002; Lane, 2003; Talvi and Vegh, 2005; Ilzetski and Vegh, 2008; Sinnott, 2009) but rather than fiscal variables, their main focus was on the output cycle. The literature has predominantly focused on examining how fiscal positions respond to the output cycle rather than directly to commodity price cycles. This means that the connection between commodity price fluctuations and fiscal outcomes is typically indirect, often assessed through their potential impact on gross domestic product (GDP). This oversight can be significant for certain commodity-exporting nations where the volatility of total fiscal revenue primarily stems from movements in commodity prices rather than the output cycle. Furthermore, there are studies available that explore the influence of commodity prices on fiscal balance. While rising commodity prices tend to enhance the government's fiscal balance in commodity-exporting countries (Kumah and Matovu, 2007; Bleaney and Halland, 2016; Murphy et al., 2010; Sinnott, 2009; Bower et al., 2007; Cespedes and Velasco, 2014), it is not always the case that commodity price booms lead to larger fiscal surpluses in developing nations (Bjornland and Thorsrud, 2018; Bova et al., 2018; Kaminsky, 2010; Medina, 2010). Additionally, Majumder et al. (2022) demonstrate that commodity price volatility tends to reduce the fiscal balance as a percentage of gross domestic product. All these recent studies indicate that the assessment of commodity price exposure relies on whether the standard terms of trade (TOT), the commodity terms of trade (CTOT), and more narrowly a single exported commodity are used as the exposure variable. Moreover, most of these studies have missed out on the important role of conditioning or moderating variables.

However, our study is different and contributes to the existing literature in the following directions. First, unlike previous studies, we take and use government expenditure as an endogenous variable to represent the stance of fiscal policy in response to our newly constructed narrow dependent commodity terms of trade. Prior research relying on the total fiscal balance presents challenges in comprehending the implications of an external shock. When a positive shock occurs, government revenues rise promptly and automatically (without discretionary policy intervention), potentially leading to a corresponding increase in discretionary expenditure. Merely examining the overall fiscal balance in such scenarios may incorrectly imply that external shocks do not affect fiscal positions. In truth, these shocks impact both revenues (automatically through export taxes) and expenditures (discretionary), as highlighted by Medina (2010). Along with that, previous studies have used their fiscal variables in a single continuous form which can only provide a basic overview of fiscal policy stance regardless of a true picture of expansion and contraction in the face of commodity price fluctuations. Therefore, to overcome this gap we construct our fiscal policy representative variable asymmetrically to truly capture fiscal policy reaction in response to the windfall gains from exporting commodities in export-dependent economies. So, analyzing the asymmetries, in the form of fiscal policy, in government spending offers a more nuanced and informative approach, especially when studying the response to windfall gains from commodity price export revenues. This approach helps capture the dynamic nature of government behavior and identify potential risks and opportunities associated with such windfalls. That is, it highlights how governments might react differently to increases and decreases in revenue. For instance, during periods of windfall gains, governments often face pressure to increase spending on social programs, infrastructure projects, or public sector wages. This can lead to asymmetrical increases in government expenditure compared to normal periods. Additionally, it can help identify potential risks of overspending and unsustainable fiscal positions in the future. For example, the windfall might be temporary, and governments might be hesitant to commit to permanent spending increases based on uncertain future revenues. This can lead to slower adjustments in expenditure compared to revenue increases. Similarly, adjusting spending downward after a period of increased expenditure can be politically challenging and face institutional hurdles. This can lead to asymmetrical decreases in government expenditure compared to increases. Moreover, some governments might choose to save a portion of the windfall gains for future generations or to invest in long-term projects. This would lead to asymmetrical changes in government revenue and expenditure, with revenue increasing more significantly than spending.

Second, we are examining the behavior of fiscal policy under the response of exporting country's narrow dependent commodity terms of trade booms and busts.[69] Thus, these narrow export-dependent economies run their domestic industry and draw down foreign exchange reserves from this one or a few major export commodities as they are one of the main income streams. As Collier and Goderis (2012) emphasized, the reliance on commodities is closely connected to the significance of government in low-income countries. These economies primarily rely on a small number of commodities for the majority of their export earnings. Developing countries, in particular, heavily depend on primary commodities for export revenues (Brown, 2008). For these countries, especially those whose main source of foreign exchange earnings is the export of primary commodities, fluctuating commodity prices lead to macroeconomic instability and complicate macroeconomic management. Unpredictable price movements result in unstable export revenue, and instability in foreign exchange reserves, and are strongly linked to growth volatility. The more an economy depends on commodities – meaning the higher the proportion of primary goods in a country's exports – the more susceptible it is to commodity price shocks. Given their dependence on very few major

[69] For construction of this newly developed variable see, data and methodology section.

and vastly unpredictable sources (commodity) of revenue, these economies confront a substantial challenge in terms of their capacity to smooth fiscal policy performance especially. Therefore, fiscal outcomes could become highly precarious and pose challenges for long-term fiscal stability if caution is not exercised in spending during commodity price booms and busts. In these economies, the significant volatility in commodity prices necessitates flexibility in the design and implementation of medium-term budget frameworks, where fiscal policy addresses adverse external shocks by streamlining discretionary expenditures. Without fiscal adjustments, the terms of trade shock unequivocally led to growing fiscal deficits and, consequently, twin deficits. In this context, Kumah and Matovu (2007) proposed that the sequencing of expenditure and tax policies is crucial for fiscal performance. Therefore, in this situation, we argue that using the recently well-known CTOT index, along the lines of Spatafora and Tytell (2009) among others, but accounting and controlling for the strong and narrow export-dependent commodities' role in export-dependent economies to study the unanticipated effects of world trade prices on the fiscal policy performance in only export-dependent economies. [70] We anticipate that this variable more accurately reflects the impacts of commodity price fluctuations in the group of export-dependent economies, as opposed to the standard TOT and CTOT index.

Third, the macroeconomic response to exported commodities price booms and busts are not the same, rather they are heterogeneous across the countries (IMF, 2016) and depend mainly on two things; i) the structural characteristics of the economy and ii) the policy framework that is in place (Cespedes and Velasco, 2012). That is why in some instances, these price explosions and busts have translated fully to exporting economies, while on other occasions they have partially translated to exporting commodities-dependent countries. Therefore, fiscal authority's response would be different accordingly and based on these structural characteristics of the economy and the policy framework, both of which may also be called conditioning or moderating variables, that is in place. Because it is expected that the institutional framework and policy rules ought to matter in reaction to fiscal policy to commodity price fluctuations (Gelos and Ustyugova, 2017; Medina, 2010). Hence, we investigate some of these key conditioning variables' roles for the fiscal policy response to our newly developed narrow dependent commodity terms of trade (NDCTOT). Various studies have

[70] We typically classify commodity dependence into three levels: no dependence, commodity dependence, and strong commodity dependence (Nkurunziza, 2021). According to the United Nations Conference on Trade and Development (UNCTAD 2019) report on commodity dependence, a country is classified as commodity dependent if over 60% of its total merchandise exports are composed of commodities during the period 2013–2017. However, we have further refined this categorization to include only two commodities that collectively make up at least 35% of its total merchandise exports. For detailed information, please consult the data and methodology section. Commodity dependence is commonly evaluated based on (a) the proportion of export earnings from the top single commodity (or top three export commodities) in GDP, total merchandise exports, and total agricultural exports; (b) the percentage of the population engaged in commodity production; or (c) the contribution to government revenue (South Centre 2005).

suggested the role of mediating or conditional variables in the effect of commodity price surges and bursts on fiscal policy. For instance, monetary policy response/regimes (Majumder et al., 2022; Dogrul and Soytas 2010; Malawi and Bader 2010), economic growth (for instance, Hausmann & Rigobón, 2003; Blanchard & Perotti, 2002 and among others), unemployment rate (See, Blanchard & Perotti, 2002; Rodrik, 1998), inflation rate and domestic economy existing debt level (Reinhart and Rogoff, 2011; Tanner and Restrepo, 2011; Tanzi, 1986). These interactions and effects are explained in the theoretical section of the study.

On the response of monetary policy to commodity prices, most of the existing studies have conducted causal relationships, particularly the inflation rate or general price levels and commodity prices under the general framework of the Granger causality test (like Bessler, 1984; Garner, 1989; Marquis and Cunningham, 1990; Cody and Mills, 1991; Sephton, 1991; Hua, 1998; Awokuse and Yang, 2003; Bhar and Hamori, 2008; Belke et al., 2010a; Belke et al., 2010b; Chen et al., 2014 and among others). Moreover, the majority of previous studies have focused on assessing the domestic inflationary effects of imported commodities within the domestic basket of goods and services (such as Garner, 1989; Marquis and Cunningham, 1990; Codey and Mills, 1991; Bernanke, 2008; Gospodinov and Ng, 2013). These studies have explored the significance of commodity prices or commodities in the consumer price index (CPI) as essential components for policymakers in shaping monetary policy to address inflation and evaluating the economic condition based on the CPI basket of goods. However, there are relatively few studies that have investigated the domestic inflationary impact concerning exported commodities, as seen in works by Chen et al., 2014; Sek et al., 2015; McLeay et al., 2020, and potentially others. However, these studies have some limitations. Rather than investigating the impact of commodity prices on interest rates or money supply directly as a monetary policy instrument, these studies have investigated the commodity price impact on inflation variables. All these studies show that the assessment of commodity price exposure relies on whether the standard terms of trade (TOT), the CTOT, and more narrowly a single exported commodity are used as the exposure variable. Fourth, these studies did not account for the institutional and policy factors as a conditioning variable for the effect of commodity price on the monetary policy response.

However, our study is different and contributes to the existing literature in the following directions. First, unlike, previous studies we take and use the interest rate as an endogenous variable to represent the stance of monetary policy in response to our newly constructed narrow dependent commodity terms of trade. Along with that, previous studies have used their monetary variables as in a single continuous form which can only provide a basic overview of monetary policy stance regardless of a true picture of expansion and contraction in the face of commodity price fluctuations. Therefore, to overcome this gap we construct our monetary policy representative variable asymmetrically to truly capture monetary policy reaction in response to the windfall gains from exporting commodities in export-dependent economies. Thus, analyzing the asymmetries, in the form of tight and easy monetary policy, in government spending offers a more nuanced and informative approach, especially when studying the response to windfall gains from commodity price export revenues. This approach helps capture the dynamic nature of the government's central bank's behavior and identify potential risks and opportunities associated with such windfalls. That is, it highlights how monetary authority might react differently on his multiple objectives, including controlling inflation, maintaining financial stability, and promoting economic growth in the face of increases and decreases in commodity price booms and busts. During periods of windfall gains, these objectives can create conflicting pressures. Inflation concerns: for instance, increased export revenue can lead to higher aggregate demand and inflationary pressures. Central banks might respond by raising interest rates more aggressively than they would for a similar increase in domestic demand to curb inflation. This creates an asymmetry in the interest rate response. Similarly, to prevent excessive appreciation of the domestic currency due to increased export earnings, central banks might resist increasing interest rates as much as they would in normal circumstances. This creates an asymmetry in the interest rate response compared to inflation concerns alone. Moreover, in some cases, central banks might be hesitant to increase money supply significantly even with windfall gains, fearing asset bubbles and potential financial instability later. This creates an asymmetry in the money supply response compared to purely stimulating economic growth.

Second, we use the recently well-known CTOT index, along the lines of Spatafora and Tytell (2009) among others, but accounting and controlling for the strong and narrow export-dependent commodities' role in export-dependent economies to study the unanticipated effects of world trade prices on the monetary policy performance in only export-dependent economies.[71] We anticipate that this variable more accurately reflects the impacts of commodity price fluctuations in the group of export-dependent economies, as opposed to the standard TOT and CTOT indices.

Third, as the macroeconomic response to exported commodities price booms and busts are not the same, rather they are heterogeneous across the countries (IMF, 2016) and depend mainly on two things; i) the structural characteristics of the economy and ii) the policy framework that is in place (Cespedes and Velasco, 2012). That is why in some instances, these price explosions and busts have translated fully to exporting economies, while on other occasions they have partially translated to exporting commodities-dependent countries. Therefore, the monetary authority's response would be different accordingly and based on these structural characteristics of the economy and the policy framework in place. Because it is expected that the institutional framework and policy rules ought

[71] Ibid., 70.

to matter in the reaction of monetary policy to commodity price fluctuations (McLeay et al., 2020; Gelos and Ustyugova, 2017; Tang, 2008). Hence, we investigate some of these key conditioning variables' roles for the monetary policy response to our newly developed narrow dependent commodity terms of trade (NDCTOT). Various studies have suggested the role of mediating or conditional variables in the effect of commodity price surges and bursts on monetary policy. For instance, fiscal policy response/regimes (McLeay et al., 2020; Hevia and Nicolini, 2013; Reinhart and Rogoff, 2011; Celasun et al., 2004; Blanchard & Perotti, 2002), exchange rate regimes (Majumder et al., 2022; Dabrowski and Wroblewska, 2016; Edwards and Yeyati, 2005; Goodhart and Hofmann, 2001; Ghosh et al., 1997; Flood and Rose, 1995; Masson and Melitz, 1991; Aghevli et al., 1991; Baxter and Stockman, 1989; Giavazzi and Pagano, 1988; Mundell, 1961; Friedman, 1953), economic growth (for instance, Berg, 2010; Hausmann & Rigobón, 2003; Blanchard & Perotti, 2002 and among others), unemployment rate (See, Blanchard & Perotti, 2002; Rodrik, 1998), inflation rate (Berg, 2010; Phelps, 1978; Blanchard & Perotti, 2002; Hausmann & Rigobon, 2003). The theoretic relations and justifications of these interactions and effects are explained in the theoretical section of the study.

3.1.3 Objectives of the Study

This study investigates the following objectives.

1. To investigate the impact of narrow dependent commodity terms of trade on fiscal and monetary policies.
2. To investigate the conditional impact of economic growth, unemployment, inflation, government debt, exchange rate flexibility, and monetary and fiscal policies on the effects of narrow dependent commodity terms of trade on fiscal and monetary policies.

We present evidence of the countercyclicality of fiscal policy, where improvements in narrow dependent commodity terms of trade (NDCTOT) lead to an increased likelihood of choosing a tight fiscal policy, and vice versa. The probability of opting for countercyclical fiscal policy is further heightened when interest rates, economic growth, inflation, and government debt increase from low to high levels, but decreases when unemployment rises from low to high levels. Conversely, an improvement in NDCTOT reduces the likelihood of choosing a tight monetary policy. The probability of not choosing a tight monetary policy decreases when government expenditure, inflation, and exchange rate depreciation increase from low to high levels, but increases when economic growth and unemployment rise from low to high levels, and vice versa. Our findings suggest that implementing accommodative fiscal and monetary policies may help mitigate the impacts of both positive and negative external exportable commodity price fluctuations in narrow export-dependent economies.

The rest of the chapter is organized as follows. In section 3.2, we summarize the previously available literature, while section 3.3 explains the theoretical framework of the study. In addition, in section 3.4, we present information regarding data and methodology. Further, section 3.5, analyzes results and discussions, while in the last section, we conclude our work and suggest some policy(s) recommendations.

3.2 Literature Review

This essay aims to investigate the government policy choice—fiscal and monetary policies—to commodity price fluctuations. In this regard, we provide a brief but comprehensive overview of the available literature. Therefore, we divide this section into two sub-sections, such as fiscal policy choice and monetary policy choice in the face of commodities price booms and bursts.

3.2.1 Fiscal Policy and Commodity Price Fluctuations

Normally, in the real world it is seen that whenever there are commodity price booms in the world market for some specific commodities, a domestic country experiences a large foreign reserves inflow, for example, the oil boom of 2000-2008 in the Gulf countries. In contrast, in the commodities price busts phase foreign reserves outflow, for instance, Ecuador, Indonesia, Mexico, Nigeria, and Russia face the experience of the 1990s oil price bust. The surge/bursts in world export commodity(es) price of a narrowly dependent commodity-exporting economy lead the domestic economy revenues from its exported commodity(es), directly or indirectly in the form of foreign exchange reserves, increase/decrease.

Fluctuations in global commodity prices directly affect economies that depend on commodity exports. For example, a positive/negative commodity price shock abroad generates two broad revenue effects domestically, one is direct, and the other one is indirect. On the direct effect, the commodity-connected windfall gains/revenues from corporate income tax, personal income tax, profit, royalties, and export duties and taxes in these economies may make a large part of government revenues (See Sinnott, 2009; Tanzi, 1983). Furthermore, beyond the initial impact on tax revenues, surges in commodity prices can stimulate economic growth within a country, leading to secondary effects on tax revenues (Tanzi, 1983). For example, in over twenty economies, revenues from hydrocarbons contribute to more than 30% of total fiscal revenue (IMF, 2007). These economic dynamics also trigger shifts in output, wages, income, inflation, and other macroeconomic aspects.

Therefore, for these nations, commodity prices play a crucial role and are intricately linked to the economy beyond being just a financial asset.

Commodity prices are notable drivers of fiscal policy and business cycles in many export-dependent developed, developing, and emerging market economies. Generally, tax revenue and expenditure have a positive correlation with commodity prices when prices are rising. However, in some cases, these associations tumble with falling commodity prices and even convert to negative, showing non-reversal spending patterns during commodity price slumps. Although, the conventional wisdom is that fiscal policy should be countercyclical. In situations like these, for instance, Barro's (1979) neoclassical smoothing model and the standard Keynesian or neo-Keynesian framework suggest that if fluctuations in commodity prices are anticipated to be temporary and not permanent then a government should optimally run surpluses in good times and deficits in bad times. However, in practice, governments frequently seem to follow a procyclical fiscal policy.[72] Accordingly, governments often save modest or even dissave in commodity price booms (Sinnott, 2009; Talvi and Vegh, 2005; Cuddington, 1989 among others). Even though some governments saved a significant portion of their robust revenues and accumulated financial assets, others utilized revenue windfalls to drive increased government spending (Medina, 2010). During a boom period, the government increases its expenditure quickly, capitalizing on the revenue windfall, but it tends to adjust its spending downward at a slower pace once the boom subsides and revenues normalize (refer to Gupta and Miranda, 1991; Chu, 1987). Therefore, the problem of procyclicality looks to be especially critical for commodity-rich economies as many economies heavily depend on to certain level of commodity revenues to finance their budgets which in turn has a direct impact on public spending.

Given their dependence on a vastly unpredictable source of revenue, these economies face a substantial challenge in terms of their capacity to smooth fiscal policy performance especially and instabilities in economic activities particularly (For details see Shousha, 2016; Fernandez et al., 2018; Schmitt-Grohé and Uribe, 2018; Kose, 2002; Mendoza, 1995; among others). Nonetheless, fiscal outcomes could become significantly challenging and pose risks to longer-term fiscal performance if caution is not exercised in spending during commodity price booms and busts. In these economies, the high volatility of commodity prices necessitates flexibility in the design and implementation of medium-term budget frameworks, where fiscal policy addresses the adverse external shock by streamlining discretionary expenditures. In the absence of fiscal adjustment, the

[72] For empirical evidence see, Fernandez et al. (2018), Cespedes and Velasco (2014), Frankel et al. (2013), Spatafora and Samake (2012), Medina (2010), Villafuerte and Lopez-Murphy (2010), Ilzetzki and Vegh (2008), Talvi and Vegh (2005) and references therein.

terms of trade shock unequivocally result in swelling fiscal deficits and, consequently, twin deficits. Therefore, Kumah and Matovu (2007) suggested that the sequencing of expenditure and tax policies is crucial for fiscal performance. Instead of allowing revenue targets to be determined by expenditure obligations, it is more prudent and likely for economies to adopt a more conservative tax regime to achieve fiscal targets. Moreover, an active tax policy may require additional financing, the source of which could lead to macroeconomic instability, resulting in higher shortfalls in the long run and increased output volatility.

Therefore, the existing structural characteristics along with institutional setup and the government's prevailing policies may affect the government policy decision regarding public finances and economic stability in the face of commodity price fluctuations. That is the institutional framework which may include, the efficient application of fiscal rules during political promises and high standards of transparency that should matter in reaction to commodity price fluctuations (Gelos and Ustyugova, 2017; Medina, 2010). For instance, various commodity republic economies are recommended to adopt some type of fiscal spending rule, which, if driven countercyclically, should cover the economy from commodity price instabilities and avert reckless spending on the part of the government (see Cespedes and Velasco, 2014; Portes and Wren-Lewis, 2014; Barro, 1979 and among others). Numerous commodities exporting countries like Nigeria (Okonjo-Iweala, 2008) and Russia (Balassone et al., 2006) have effectively implemented this fiscal rule. However, the adoption of fiscal rule does not guarantee that fiscal policy would work to shelter the domestic economy from commodity price booms and busts (Bjornland and Thorsrud, 2018; Tanner and Restrepo, 2011). A fiscal rule cannot eradicate the underlying factors that frequently lead to less prudent fiscal practices, such as short-sighted governments prioritizing current voters' interests and burdening future generations with the consequences (Ajayi, 2000). Amid commodity price booms, increasing expenditure is good (Di Bella et al., 2009), but when the price surge slows down and disappears, it would be very challenging, due to political constituents' pressure to keep on spending, credit rationing restraints, disinvesting the costs of firing people and the consequences of partial indebtedness, to retrieve the expansionary policy of public finances (Boccara, 1994, for details). The political economy possibly evolves differently under distinctive political institutions. Evidence suggests that better-performing institutions and higher political quality features along with less binding financial restrictions are linked with lesser cyclicality of fiscal policy. However, a political system in which power is disseminated among several agents has a decentralized basis, which in turn produces a higher intensity of fiscal procyclicality relative to a centralized system. Various interest groups or lobbyists struggle for their stake in a fiscal prize, from commodity price booms, which leads them to break down standard smoothing behavior. (See, Cespedes and Velasco, 2014; Talvi and Vegh 2005; Lane, 2003; Stein et al., 1999; Tornell and Lane, 1999; Lane and Tornell, 1996; Tornell and Velasco, 1992). Similarly, rent-seeking activities contribute to political instability and distortion. During periods of economic booms, voters in commodity-rich countries often demand immediate benefits such as public goods or reduced tax rates out of concern that corrupt governments may misuse additional revenue as 'political rent' or engage in 'rent-seeking' behaviors. Corrupt governments, to meet voters' demands like salary increases, cannot save surplus income from commodity windfalls and instead increase spending to appease voters and avoid losing popularity and power (refer to Caselli and Tesei, 2016; Duncan, 2014; Frankel, 2011; Alesina et al., 2008). Governments may utilize revenue windfalls to prolong their tenure or boost their reputation by directing funds toward the population or the bureaucracy (Gupta and Miranda, 1991). Once a project is initiated, it becomes challenging for the government to scale back its expenditure on it. Particularly with capital projects, halting them midway poses difficulties due to political, technological, and economic considerations. Consequently, over the past decade, many countries have experienced a significant rise in external debt as a percentage of GDP. As fiscal deficits increase, governments resort to borrowing from international financial markets, leading to elevated levels of national debt (Brown and Gibson, 2006).

Furthermore, revenues from commodity prices present a windfall for governments, offering the choice to either spend the funds or save them to reduce debt. Consequently, the existing debt situation of an economy can influence the cyclical nature of commodity price booms and busts. For example, in cases where the domestic economy's debt level is manageable, windfall gains from a surge in commodity prices may lead to increased government spending and possibly a reduction in existing tax rates to benefit the local population. Conversely, in scenarios with low debt levels, a government could opt to allocate a portion of the additional revenue from commodity windfalls toward debt repayment (refer to Tanner and Restrepo, 2011; Tanzi, 1986). Moreover, the role of monetary policy, particularly through interest rate adjustments, can impact the effects of commodity price surges and declines on fiscal balance and subsequently influence government fiscal policy decisions. This suggests that an accommodating monetary policy could prove effective in mitigating the positive or negative impact of fluctuations in commodity prices on the fiscal balance. During periods of commodity price booms or busts, the Central Bank (CB) can adjust the nominal interest rate downward or upward to stimulate the domestic economy through government spending and taxation, as well as to encourage increased private investment. The findings from empirical studies indicate that a decrease/increase in the nominal interest rate results in a corresponding decrease/increase in the real interest rate in the short term. A lower/higher interest rate reduces/increases the cost of capital, stimulating/restricting investment, and impacting aggregate demand, leading to changes in employment and income levels. Consequently, the fiscal position may improve/deteriorate as the tax base expands/contracts, particularly in countries with a progressive tax system (refer to Majumder et al., 2022; Dogrul and Soytas, 2010; Malawi and Bader, 2010). Similarly, exchange rate regimes can significantly influence the transmission mechanisms of commodity price fluctuations to the domestic economy. A floating exchange rate system, advocated by Friedman (1953) and Mundell (1961), can swiftly absorb external shocks compared to fixed exchange rates (Dąbrowski and Wroblewska, 2016; Edwards and Yeyati, 2005; Ghosh et al., 1997; Flood and Rose, 1995; Baxter and Stockman, 1989). This flexibility allows for a quicker adjustment of relative prices and quantities to stabilize the economy. Moreover, under flexible exchange rate systems coupled with higher interest rates, there is a potential for currency appreciation, leading to decreased competitiveness of domestic exports in the global market. Consequently, government export revenues decline when interest rates are raised (Majumder et al., 2022). On the contrary, a fixed exchange rate regime amplifies the impact of commodity price shocks, as evidenced during the Argentine currency and debt crisis in 2001–02 (Edwards and Yeyati, 2005). Within this framework, achieving economic stability is paused, awaiting adjustments in nominal wages, commodity prices, or an escalation in output and employment volatility. Nonetheless, a fixed exchange rate system instils greater fiscal discipline, particularly in light of loose fiscal policies prevalent in developing nations (Masson and Melitz 1991; Aghevli et al., 1991; Giavazzi and Pagano, 1988).

However, certain governments may have genuinely perceived the commodity boom as a lasting phenomenon, prompting them to increase current expenditures or even initiate more rapid and ambitious government-funded development projects. Additionally, our model accounts for temporary shocks to the price of a resource expected to remain available for the foreseeable future. Should there be a permanent alteration in the commodity price or a resource nearing depletion, adjustments to the model would be necessary. Initially linking expenditure to a long-term commodity price could serve as an initial measure to mitigate economic volatility and shield citizens from its impact (Tanner and Restrepo, 2011).

3.2.2 Monetary Policy and Commodity Prices

Economists have proposed various approaches to define the factors influencing monetary policy in order to find an optimal solution to this complex issue. Some well-known examples in the literature include the Friedman rule, the Taylor rule, and more recently, central bank independence and inflation targeting (Bernanke and Mishkin, 1997). In recent decades, the primary objective of monetary policy has been to achieve low and stable prices by controlling inflation (Svensson, 2002). This goal is pursued by using policy tools, such as the policy interest rate, to influence inflation through the transmission mechanism. Understanding how the policy interest rate impacts the real and nominal aspects of the economy through the transmission mechanism is a critical aspect of monetary policy design (Svensson, 2002). As unexpected shocks consistently impact the economy, central banks' control over inflation and output will always be imperfect (Svensson, 2002). Nonetheless, research indicates that strict adherence to this policy could potentially destabilize the economy. In addition to the objective of price stability, an increasing number of central banks are openly stating their efforts to stabilize output. These dual objectives of monetary policy are commonly known as flexible inflation targeting. While monetary policy can aim for a long-term goal of maintaining low average inflation, it is unrealistic to expect it to achieve a long-term growth target for the economy (Svensson, 2002). Long-term economic growth, such as potential output growth, is determined by factors beyond the control of monetary policy. A sound monetary policy should focus on establishing a stable environment for the real economy. Considering the destabilizing impact of high and volatile inflation, monetary policy should establish a nominal anchor for inflation expectations (Svensson, 2002). This nominal anchor serves as a reference point for economic actors, indicating that average inflation should align with the central bank's official inflation target (Sorensen and Whitta-Jacobsen, 2005). In cases where average inflation deviates from the target due to unexpected economic shocks, economic agents anticipate a return to the target over the long term. By effectively anchoring inflation expectations, monetary policy can prevent escalating inflation and maintain a stable macroeconomic environment. According to Svensson (2002), there is a consensus that this approach is commonly adopted by central banks in industrialized nations. Many countries opt to anchor inflation expectations within a range of 2-2.5 percent, a choice that aligns with the consensus among inflation-targeting nations (Sorensen and Whitta-Jacobsen, 2005). As a result, the emphasis on inflation targeting as a key objective of monetary policy, combined with the volatility of asset prices, periodic stock market bubbles, and recent fluctuations in commodity price cycles, has prompted discussions on the appropriate response of monetary policy to signals from asset and commodity markets.

The inflationary challenges posed by escalating commodity prices present a significant dilemma for monetary policy. While rising commodity prices lead to inflationary pressures, they also have adverse effects on economic activity. Unlike demand shocks, the implications of commodity price shocks are more complex. For instance, a positive demand shock that boosts inflation and output typically necessitates monetary tightening to stabilize both factors. However, the ramifications of commodity price shocks are not as straightforward (De Gregorio, 2012). In the past four decades, economists have debated the role of asset and commodity prices in shaping and implementing monetary policy. Asset prices, such as equity and housing prices, can influence demand through direct and indirect wealth effects. Changes in equity and property prices impact consumer wealth, potentially altering consumer spending patterns (Modigliani, 1974). Another indirect wealth effect of changes in asset prices operates through the balance sheets of households and firms. Due to information asymmetry in the credit market leading to issues of adverse selection and moral hazard, households and firms may face borrowing constraints. Consequently, they can only access credit when they provide collateral, making their borrowing capacity dependent on their net worth, which is influenced by asset valuations. Real estate prices often serve as a more dependable indicator of the private sector's borrowing capacity, as a substantial portion of private sector credit is backed by real estate collateral. Therefore, from a theoretical standpoint, there is a compelling case for considering property and stock prices as factors that influence aggregate demand, implying a direct impact of monetary policy on fluctuations in these asset prices. There is considerable evidence in the literature supporting the idea that commodity prices can serve as signals for future economic movements, thereby aiding in the design and preparation of monetary policy. It has been suggested that commodity prices could act as early indicators of the current economic conditions, as they are typically determined in efficient continuous auction markets with access to timely information (refer to Olivera, 1970; Garner, 1989; Marquis and Cunningham, 1990; Cody and Mills, 1991; Awokuse and Yang, 2003; Bhar and Hamori, 2008; De Gregorio, 2012). Therefore, Cecchetti et al. (2000) and Goodhart (2001) argue in favor of a direct monetary policy response to asset price movements that deviate from perceived fundamentals. Asset prices provide valuable insights into future demand conditions and disregarding them not only results in the loss of this information but can also introduce significant biases in empirical models used for monetary policy analysis (Chen et al., 2014; Goodhart and Hofmann, 2001). Targeting monetary policy toward correcting misalignments in asset prices could potentially enhance macroeconomic performance (Cecchetti et al., 2002). Certain researchers, like Christiano et al. (1994), propose including commodity prices as an explanatory variable in monetary VAR models. Early advocates among influential policymakers have also endorsed the use of commodity prices as a leading indicator of inflation and have supported policy recommendations that utilize commodity prices to adjust short-term money growth target ranges (Garner, 1989). A rise in commodity prices may indicate to policymakers that the economy is growing too quickly, potentially causing inflationary pressures. In such situations, the monetary authority may observe the increase in commodity prices and respond by raising interest rates to tighten the money supply.

However, there is critique of the notion that commodity prices can effectively guide monetary policy formulation due to their susceptibility to significant, market-specific shocks that may not necessarily have broader macroeconomic repercussions (Marquis and Cunningham, 1990; Cody and Mills, 1991). Fuhrer and Moore (1992) have cautioned against reacting to asset market prices, warning that such actions could compromise inflation control. Similarly, Gertler (1998) and Bernanke and Gertler

(1999, 2001) express skepticism by arguing that monetary policy should not be swayed by changes in asset prices unless they mirror inflationary expectations, as distinguishing between a fundamental shift in asset prices and a speculative bubble can be challenging. The potential outcomes of a direct monetary policy response to asset prices are typically examined using calibrated models (refer to Bernanke and Gertler, 1999). Moreover, in line with the conventional monetarist perspective, several other researchers (like, Bessler, 1984; Pindyck and Rotemberg, 1990; Hua, 1998) contend that movements in commodity prices are influenced, at least to some degree, by macroeconomic and monetary factors, suggesting that causation should flow from macroeconomic and monetary variables to commodity prices. Notably, a recent study by Barsky and Kilian (2001) indicates that monetary policy played a role in driving commodity price inflation during the 1970s. Ultimately, settling this debate requires empirical testing. Presently, the predominant perspective indicates that central banks should only respond to asset price changes if they are expected to affect future inflation and the output gap (Bernanke and Gertler, 1999). Furthermore, in addition to interest rates, the exchange rate is widely considered a significant determinant of aggregate demand and a crucial channel for transmitting monetary policy in open economies.[73]

In a similar vein, starting from the mid-2000s, all commodity prices experienced a significant surge. Initially, policymakers and academics deliberated on how to respond to what seemed like a temporary shock in commodity prices. There were valid arguments suggesting that a brief price shock might not necessitate immediate policy action. However, the unfolding reality diverged from these expectations. Commodity prices continued to climb to unprecedented levels, displaying an unexpected persistence. Given the enduring and substantial nature of the surge in commodity prices, it is no longer prudent to operate under the assumption that the shock is transitory. It is now more appropriate to acknowledge and address the sustained shift in the relative prices of commodities (for example, refer to De Gregorio, 2012). More recently, around late 2008, as global commodity prices plummeted and inflationary pressures decreased due to a relentlessly deteriorated global economy, policymakers took assertive measures to prevent further economic and financial worsening (Tang, 2008). Frankel (2011) suggests that as a policy maker, it would be better to tighten and ease monetary policy to let and permit some currency appreciation and depreciation in commodities price exports booms and busts respectively. Likewise, McLeay et al., (2020) suggest that in the face of commodity booms, in an export-dependent economy, it is optimal to hike the nominal interest rate to lean against

[73] In the early to mid-1990s, several central banks adopted a Monetary Conditions Index (MCI), a weighted average of the short-term interest rate and the exchange rate, either as an operating target (Bank of Canada, Reserve Bank of New Zealand) or as an indicator (Swedish Riksbank, Bank of Norway, Bank of Finland, Bank of Iceland) for monetary policy. For a thorough examination of the discussion, consult Bean (2004).

the inefficient boom.[74] In the scenario of an affirmative demand shock, increased spending drives actual output above its potential level, leading to higher inflation. In response to higher output and inflation, implementing a tighter monetary policy (or an expansionary policy in the case of an adverse demand shock) serves to lower both, thereby stabilizing inflation and output simultaneously. However, there can be instances where a dilemma arises. This dilemma emerges because while a tighter monetary policy effectively reduces inflation, it also dampens economic activity, which policymakers aim to avoid. Many central banks faced uncertainty on how to navigate this challenge, which presented a novel experience. Contrary to intuition, research utilizing new Keynesian models demonstrates that stabilizing inflation adds to overall economic stability (refer to Mishkin 2008; Woodford 2003).

The windfall gain from commodity trade export increases the foreign exchange reserves which in turn leads to an increased stock of domestic money and as a result, it is expected to upsurge domestic price level and inflation rate (Tang, 2008). Foreign exchange reserves compelled the Central Bank to put more local currency against each foreign currency (Shou-feng and Lang-nan, 2011), As a result, the quantity of the base currency or money supply increases, leading to a rise in the inflation rate. This concept is famously expressed by Milton Friedman as "inflation is always and everywhere a monetary phenomenon." Global commodity prices significantly influence the currency value of major commodity-exporting nations. The currency responses are often rapid, with exchange rate changes eventually affecting consumer prices. This event and happening is referred to as the "commodity currency" effect. For instance, during the period of economic growth from 2001 to 2008, countries like Saudi Arabia and the Gulf Emirates experienced real appreciation due to inflows of money and inflation, particularly in fixed-rate oil-producing nations. On the one hand, increased foreign demand for domestic commodities generates foreign exchange reserves which in response create a wealth effect in the form of increased household income and consumption demand.[75] However, there is a possibility that households may export some of inflation abroad by sending some of their income to purchase foreign assets. On the other hand, the export commodity price boom caused by foreign exogenous shock put upward pressure on domestic inputs and raw materials demand of that commodity along with resource allocation between domestic economy sectors. In response both these effects led to creating an output gap in the production of goods and services and stemming in an upturn in the domestic price level and inflation rate along with appreciation of

[74] There is a body of literature that delves into monetary policy concerning commodity importers, particularly in the context of oil imports (refer to works such as Kormilitsina, 2011; and Natal, 2012).

[75] In addition, these economic dynamics lead to alterations in output, real wages, and various macroeconomic facets. In these nations, commodity prices play a fundamental role, and their connection to the economy goes beyond being solely a financial asset.

nominal and real exchange rates. The economy experiences inefficiencies and resource misallocations during an "overheating" phase brought on by a shock in commodity prices. It is crucial to note that the movement in the real exchange rate not only decreases the demand for inputs from commodity producers more than it affects consumption but also helps counterbalance the initial shift towards producing commodity inputs. A stronger exchange rate (terms of trade) leads to a decrease in domestic consumption demand from households, as household consumption of domestic goods moves in tandem with the terms of trade under perfect risk-sharing conditions and in the absence of global output shocks. The real price of commodities can be expressed as a function of the real price of foreign currency commodities. Meanwhile, during a boom period, domestic firms borrowing conditions improves which in turn may increase the credit from abroad (for instance see, McLeay et al., 2020; Fernandez et al.., 2018; Shousha 2016; Bastourre et al. 2012). During periods of booming commodity prices, lenders tend to be more inclined to extend loans compared to downturns. This increased willingness to lend results in higher availability of foreign currency credit and domestic money supply, potentially leading to exchange rate appreciation and further inflationary pressures. However, the extent of credit lending and its outcomes can be influenced by the political landscape of the domestic economy. For instance, windfalls from resources can contribute to political instability and strengthen autocratic regimes, which may subsequently result in negative economic outcomes (refer to Caselli and Tesei, 2016 and related sources for more information on this topic).

Hence, there is a widespread agreement in both theoretical and empirical literature worldwide regarding the central bank's role as a policy maker, emphasizing the importance of price stability (inflation targeting) as the key objective of monetary policy to foster sustainable economic growth. This approach gained prominence following its introduction by the Reserve Bank of New Zealand in 1990. In basic backward-looking economic models (such as those by Rudebusch and Svensson, 1999; Svensson, 1997), the optimum interest rate policy links the policy rate to current and past inflation rates as well as current and past output gaps. This is because current and lagged inflation rates and output gaps serve as key indicators for predicting future inflation rates and output gaps, which are the central bank's targets. As highlighted by Trichet (2008), President of the European Central Bank, it is advisable to act swiftly to prevent inflation expectations from becoming unmoored, thereby averting potential secondary inflation effects from materializing before price setters and other stakeholders perceive temporary price increases as permanent.[76]

[76] For even more strong view on this issue see King (2010), Governor of Bank of England.

However, the response of interest rate, by a monetary policy authority, to commodity price surges and bursts depends on the structural characteristics and the institutional framework of an economy (McLeay et al., 2020; Gelos and Ustyugova, 2017; Tang, 2008). In addition to interest rates, the exchange rate is typically regarded as a key factor influencing aggregate demand and serving as a crucial channel for transmitting monetary policy in open economies (Goodhart and Hofmann, 2001). For instance, according to McLeay et al. (2020), during commodity price booms, the optimal approach involves allowing the exchange rate to appreciate and raising interest rates, with a more significant appreciation necessary when borrowing conditions are relaxed. Consequently, higher interest rates and a stronger exchange rate dampen household consumption demand, curbing unwanted increases in domestic output and inflation. However, maintaining exchange-rate pegs is highly disadvantageous for commodity-exporting nations, exacerbating inefficient fluctuations in commodity production. A fixed exchange rate system amplifies the impact of commodity price shocks, as evidenced by the Argentine currency and debt crisis of 2001–2002 (Majumder et al., 2022; Edwards and Yeyati 2005). Under a fixed exchange rate regime, economic stability is delayed until adjustments are made to nominal wages, and commodity prices, or when output and employment volatility increase. The findings indicate that policies aimed at reducing exchange rate volatility through pegs are likely to underperform, particularly in the presence of a significant financial channel. On the contrary, a floating exchange rate system can contribute to a country's economic stability by adjusting to commodity price shocks through exchange rate fluctuations. This argument supports the floating exchange rate frameworks advocated by Friedman (1953) and Mundell (1961), which suggest that floating exchange rates are better equipped to absorb external shocks promptly compared to fixed exchange rates. Empirical evidence supporting this view can be found in studies by Majumder et al. (2022), Dąbrowski and Wroblewska (2016), Edwards and Yeyati (2005), Ghosh et al. (1997), Flood and Rose (1995), and Baxter and Stockman (1989). The flexibility of floating exchange rates allows for quicker adjustments in relative prices and quantities. Research by Dabrowski and Wroblewska (2016), Edwards and Yeyati (2005), Ghosh et al. (1997), Flood and Rose (1995), and Baxter and Stockman (1989) empirically demonstrate that floating exchange rates can respond more rapidly to external shocks compared to fixed exchange rates. Despite the prevalence of managed exchange rate systems in emerging and developing commodity-exporting economies, traditional arguments against such regimes are being challenged. Both the BIS and the IMF have indicated that more active exchange rate management may be necessary in certain emerging markets facing volatile financial flows (Carstens 2019). It is recognized that even with optimal implementation, monetary policy alone cannot completely stabilize the inefficient macroeconomic fluctuations resulting from the distorting effects of commodity trade on domestic resource allocation.

Likewise, when central banks counterbalance foreign exchange reserves by increasing the issuance of bills, the government is required to pay higher interest on these notes (Calvo and King, 1998). While higher interest rates can help manage demand pressures, they may also attract more capital inflows, leading to increased money supply and inflation in the domestic economy. This underscores the significance of capital account openness in commodity-exporting economies. Efforts would then be directed towards sterilizing these inflows through central bank bills and/or allowing the currency to adjust. However, the challenge lies in the difficulty and inability to fully sterilize these inflows, which could fuel inflationary pressures on goods, services, and assets. This situation also poses a risk of significant fluctuations in capital flows, destabilizing the financial system and causing considerable disruptions in the export sector, all without necessarily eliminating expectations of currency appreciation (Tang, 2008). Furthermore, surges in commodity prices frequently trigger cost-push inflation (Phelps 1978), prompting occasional tightening of both monetary and fiscal policies. A strong fiscal position enables the government to implement appropriate measures to address escalating prices. There is evidence suggesting that fiscal factors can impact inflation expectations in emerging markets (refer to Celasun et al., 2004). In the event of a commodity price boom, the fiscal authority should consider reducing labor subsidies. In cases of fiscal dominance, monetary policy may struggle to achieve its inflation targets (McLeay et al., 2020). A well-coordinated fiscal policy, as proposed by Hevia and Nicolini (2013), can dynamically adapt to commodity price shocks over time. In emerging and developing economies, where commodity exports play a vital role, fiscal policy may face significant constraints. Notably, these economies often exhibit a highly pro-cyclical fiscal policy, potentially exacerbating fluctuations in commodity price cycles. This underscores how political regimes can influence decisions made by the fiscal authority. Recent research indicates that windfalls from resources can lead to political instability and strengthen autocratic regimes, resulting in adverse economic outcomes (refer to Caselli and Tesei, 2016).

3.3 Theoretical Framework of the Study

In practical terms, it is commonly observed that during periods of commodity price booms in the global market for specific commodities, a significant inflow of foreign reserves occurs in the domestic country. For instance, the oil boom from 2000 to 2008 in the Gulf countries exemplifies this phenomenon. On the other hand, during phases of commodity price busts, countries like Ecuador, Indonesia, Mexico, Nigeria, and Russia faced outflows of foreign reserves, as seen during the oil price downturn in the 1990s. These fluctuations in the world market prices of exported commodities directly or indirectly impact the export revenue of a narrowly dependent commodity-exporting economy, often reflected in changes in foreign exchange reserves. This is represented by measuring the national output of the booming or declining commodity in foreign currency terms.

$$\Delta FCV = \Delta P(EXP) * EXP \qquad (3.3)$$

where FCV represents the foreign currency value of the national output of the primary commodity, P(EXP) denotes the world price of the commodity, and EXP indicates the volume of commodity exports, with Δ representing the difference operator.[77]

Thus, fluctuations in international commodity prices have a direct impact on the commodity-dependent exporting economies as a positive/negative commodity price shock abroad generates two broad revenue effects domestically, one is direct, and the other one is indirect. On the direct effect, the commodity-connected windfall gains/revenues from corporate income tax, personal income tax, profit, royalties, and export duties and taxes in these economies may be made a large part of government revenues (See Sinnott, 2009; Tanzi, 1983). Furthermore, in addition to the initial impact on tax incomes, commodity booms can lead to increased economic activity within a nation, giving rise to secondary or indirect effects on tax revenues (Tanzi, 1983). These economic dynamics also trigger alterations in output, wages, income, inflation, and various other aspects and standpoints of the macroeconomy. For such countries, the price of commodities is a cornerstone that goes beyond being just a financial asset. Ultimately, government revenues are assessed as:

$$\Delta GR = \gamma EXC * \Delta FCV \qquad (3.3.1)$$

where GR represents government revenues in local currency, EXC denotes the nominal exchange rate expressed as the amount of domestic currency per unit of foreign currency, and γ represents the share of the foreign exchange windfall directly obtained by the government, with $0 < \gamma < 1$.[78]

Therefore, equation (3.3.1) shows that commodity prices are a notable driver of fiscal policy and business cycle in many export-dependent developed, developing, and emerging market economies. Generally, tax revenue and expenditure have a positive correlation with commodity prices when prices are rising. However, in some cases, these associations tumble with falling commodity prices and even become negative, showing non-reversal spending patterns during commodity price slumps. Although, the conventional and orthodox wisdom is that fiscal policy should be countercyclical. In situations like these, for instance, Barro's (1979) neoclassical smoothing model and the standard Keynesian or neo-Keynesian framework suggest that if fluctuations in commodity prices are

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[77] As previously mentioned, EXP is determined by previous plantings or discoveries, and it is presumed that all production is earmarked for export.

[78] If additional revenues were considered, γ could surpass 1—this could occur, for instance, if the economic upswing resulting from the boom led to an increase in revenues from other tax resources.

anticipated to be temporary and not permanent then a government should optimally run surpluses in good times and deficits in bad times. However, in practice, governments frequently seem to follow a procyclical fiscal policy.[79] Accordingly, governments often save modest or even dissave in commodity price booms (Sinnott, 2009; Talvi and Vegh, 2005; Cuddington, 1989 among others). While some governments opted to save a substantial portion of their robust revenues and build up financial reserves, others utilized windfall gains to support expanding government expenditures (Medina, 2010). During boom periods, governments tend to increase their spending levels more rapidly in response to the revenue windfall, compared to the slower adjustment downward in the post-boom phase when revenues normalize (refer to Gupta and Miranda, 1991; Chu, 1987). Consequently, the issue of procyclicality appears particularly significant for commodity-rich economies, as many rely to a certain degree on commodity revenues to fund their budgets, directly impacting public expenditure.

Hence, the above discussion indicates that commodity price booms and busts are most likely to cause macroeconomic fluctuations and mismanagement of the domestic economy and consequently unemployment, destabilizes prices and wages, and economic growth deviation from its target levels. So, it is possible that by now already applied fiscal policy may not be well appropriate, and according to the current situation to survive on its predefined target level. Hence, to maintain the economy on the new and sustainable equilibrium level of stable prices and a moderate level of economic growth and full employment, it is expected that fiscal policy authority may respond by increasing or decreasing the level of government spending and tax rates to retarget the level of employment, prices and wages and economic growth. Given their dependence on a vastly unpredictable source of revenue, these economies face a substantial challenge in terms of their capacity to smooth fiscal policy performance especially and instabilities in economic activities particularly.[80] However, fiscal outcomes would become highly tricky and may make challenges for longer-term fiscal performance if prudence is not exerted in spending during commodity price booms and busts. In these economies, high volatility in commodity prices bids for flexibility in the design and conduct of medium-term budget frames, where fiscal policy corrects the unfavourable external shock through restructuring of dispensable expenditures. Without fiscal alteration, the terms of trade shock render unequivocally into swelling fiscal deficits, and thus twin deficits. Therefore, Kumah and Matovu (2007) suggested that the sequencing of expenditure and tax policies is decisive for fiscal performance. Therefore, instead of letting revenue targets be defined and determined by expenditure obligations, it is better

[79] For empirical evidence see, Fernandez et al. (2018), Cespedes and Velasco (2014), Frankel et al. (2013), Spatafora and Samake (2012), Medina (2010), Villafuerte and Lopez-Murphy (2010), Ilzetzki and Vegh (2008), Talvi and Vegh (2005) and references therein.

[80] For detail see Shousha (2016), Fernandez et al. (2018), Schmitt-Grohé and Uribe (2018), Kose (2002), Mendoza (1995) among others.

and highly probabilistic for economies to follow a more conservative tax regime to achieve fiscal targets. In Addition, active tax policy could necessitate supplementary financing, the resource of which might lead to macroeconomic instability, as it produces loftier shortfalls in the long run and boosts output volatility.

However, the existing institutional setup and prevailing policies may affect the government policy decision regarding public finances and economic stability in the face of commodity price fluctuations. For instance, monetary policy's role as an interest rate may influence the impact of commodity price surges and bursts on fiscal balance and hence on government fiscal policy decisions. This indicates that an accommodating monetary policy could effectively mitigate the adverse/advantageous effect of commodity price fluctuations on the fiscal balance. During periods of commodity price booms/busts, the Central Bank (CB) can decrease/increase the nominal interest rate to accelerate the domestic economy through government expenditures and taxes, as well as an uptick in private investments. Empirical findings indicate that a decrease/increase in the nominal interest rate results in a decrease/increase in the real interest rate in the short term. A lower/higher interest rate reduces/increases the cost of capital, stimulating/restricting investment and boosting/reducing aggregate demand, thereby influencing employment and income levels. Consequently, the fiscal position either improves or deteriorates as the tax base expands/contracts, particularly for nations with a progressive tax system (refer to, for example, Majumder et al., 2022; Dogrul and Soytas 2010). Additionally, during periods of high growth, governments might choose to tighten fiscal policy (reduce spending) even with favorable terms of trade to avoid overheating the economy. On the contrary, during slow growth, terms of trade improvements might be used to support spending and stimulate growth (Hausmann and Rigobon, 2003; Blanchard & Perotti, 2002). Similarly, high unemployment might encourage expansionary fiscal policy (increased spending), even with good terms of trade, to stimulate job creation. Conversely, low unemployment might allow for tighter fiscal policy to focus on debt reduction or avoiding inflation (Blanchard & Perotti, 2002; Rodrik, 1998).

Moreover, higher inflation reduces the purchasing power of government revenue. This means the government can buy fewer goods and services with the same amount of money, effectively reducing the real value of its expenditure. This can be particularly problematic if the terms of trade deteriorate, further squeezing the government's resources. If a significant portion of government expenditure goes towards goods and services whose prices are highly sensitive to inflation (e.g., healthcare, energy), then rising inflation will disproportionately impact those areas, potentially requiring adjustments to other spending categories. Some government expenditures, like social security benefits, might be indexed to inflation, meaning they automatically adjust to maintain purchasing power. This can help mitigate the negative impact of inflation on specific groups but can also put additional strain on the budget (Alesina and Drazen, 1991). Inflation can sometimes lead to increased tax revenue due to the "bracket creep" phenomenon, where individuals are induced into higher tax groups owing to nominal wage increases, not necessarily real income growth. However, this is not a sustainable solution and can create distortions in the tax system (Auerbach and Gale, 2009). Additionally, revenues from commodity prices present a windfall for governments, offering the option to either spend, save, or reduce debt. Consequently, the existing debt situation in an economy can influence the cyclicality of commodity price booms and busts. For instance, if the domestic economy's debt level is moderate, windfall gains from a surge in commodity prices may lead to increased government spending and possibly a reduction in existing tax rates to benefit the local population. Conversely, in the scenario of low debt levels, a government could choose to allocate a slice of the additional revenue from commodity boons towards repaying its debt (refer to Reinhart and Rogoff, 2011; Tanzi, 1986).

Similarly, the windfall profits generated from commodity trade exports contribute to the growth of foreign exchange reserves, subsequently increasing the domestic money supply. This influx of money is expected to elevate domestic price levels and inflation rates (Tang, 2008). For instance, during the economic boom period from 2001 to 2008, countries such as Saudi Arabia and the Gulf Emirates, which heavily rely on fixed-rate oil production, experienced real appreciation due to inflows of money and inflation. To counter these effects, the concerned Central Bank must put more local currency against foreign currency (Shou-feng and Lang-nan, 2011), as a result, the amount of the base currency/money supply in the domestic economy increases (Zhou and Yang, 2014; Terada-Hagiwara, 2005). This is why Milton Friedman famously stated, "Inflation is always and everywhere a monetary phenomenon." Global commodity prices significantly influence the currency value of many major commodity-exporting nations, with currency reactions often swift and immediate, leading to exchange rate effects that eventually impact consumer prices over time (refer to Chen and Rogoff, 2003; Amano and van Norden, 1993 for insights on the "commodity currency" phenomenon). For example, China experienced rapid growth in its foreign exchange reserves, with trade exports increasing from $165.574 billion at the end of 2000 to $3.181148 trillion in 2011.[81] Meanwhile, domestic firms of export commodities may increase the credit from abroad due to improvements in borrowing conditions (for instance, McLeay et al., 2020; Fernandez et al., 2018; Shousha, 2016; and Bastourre et al., 2012) have shown that lenders are more inclined to lend during commodity price booms than in downturns. Consequently, this influx of credit and money into the

[81] After the reform of China's foreign exchange system in 1994.

economy may lead to increased inflation. Therefore, the overall impact of monetary changes is manifested as:

$$\Delta M = EXC^{*}\Delta NFA + \Delta CD \qquad (3.3.2)$$

Here, M represents the total money supply in the economy, NFA denotes the net foreign asset position of the central bank, and CD indicates the government's credit flow. When ΔNFA is not equal to zero, changes in the central bank's net foreign asset position resulting from reserve accumulation ($\Delta NFA > 0$) or depletion ($\Delta NFA < 0$) impact the money supply. Additionally, the flow of credit to the government influences the money supply. Therefore, establishing $\Delta M = 0$ establishes a condition where the money supply remains constant, leading to price level stability in the economy.

On the one hand, increased foreign demand for domestic commodities generates foreign exchange reserves which in response create a wealth effect in the form of increased household income and consumption demand.[82] However, there is a possibility that households may export some of the inflation abroad by sending some of their income to purchase foreign assets. On the other hand, the export commodity price boom by foreign exogenous shock put upward pressure on domestic inputs and raw materials demand of that commodity along with resource allocation between domestic economy sectors. In response both these effects led to creating an output gap in the production of goods and services and lead to in an upturn in the domestic price level and inflation rate along with appreciation of nominal and real exchange rates. The economy experiences an inefficient expansion and resource reallocation when it "overheats," often triggered by a commodity price shock.[83] Notably, movements in the real exchange rate reduce commodity producers' demand for inputs more significantly than consumption, helping counterbalance the initial shift towards commodity input production. A stronger exchange rate (terms of trade) diminishes domestic household consumption demand, as household consumption of domestic goods typically aligns directly with terms of trade in the absence of global output shocks. The actual commodity price can be expressed as a function of the real foreign currency commodity price. During periods of economic booms, domestic firms' borrowing conditions improve, potentially leading to increased credit from abroad (refer to, for instance, McLeay et al., 2020; Shousha 2016; Bastourre et al., 2012). Lenders tend to be more willing to extend credit during commodity price booms than during downturns. Consequently, there

[82] In addition, these economic dynamics contribute to shifts in output, real wages, and various facets of the macroeconomy. In these nations, commodity prices are fundamental, and their connection to the economy extends beyond being solely a financial asset.

[83] By illustrating how the commodity sectors influence overproduction, the model represents, in a simplified manner, the potential for inefficient reallocations resembling the "Dutch disease," as discussed in the influential work by Corden and Neary (1982).

is an increase in foreign currency credit and the domestic money supply, along with the possibility of exchange rate appreciation and increased inflation. However, the extent of credit lending and its outcomes may be influenced by the political environment of the domestic economy; for example, windfalls from resources can trigger political instability and strengthen autocratic regimes, resulting in adverse economic effects (refer to Caselli and Tesei, 2016 and related sources).

Thus, the above arguments indicate that in simple, commodity price booms and busts are most likely to cause macroeconomic fluctuations and mismanagement of the domestic economy and consequently inflation and economic growth deviation from its target levels. Therefore, it is possible that by now already applied monetary policy may not be well appropriate, and according to the current situation to survive on its predefined target level. Hence, to maintain the economy on the new and sustainable equilibrium level of stable prices and a moderate level of economic growth, it is expected that monetary policy authority may respond by increasing or decreasing the level of interest rate to retarget the level of inflation and economic growth. Hence, the central bank's role as a policy maker, focusing on price stability (inflation targeting) as the principal objective of monetary policy for sustainable economic growth, has garnered widespread agreement in theoretical and empirical literature worldwide. This approach, pioneered by the Reserve Bank of New Zealand in 1990, is supported by scholars such as Taylor (1993). In basic backward-looking economic models, the optimal interest rate rule links the policy rate to current and past inflation rates, as well as current and past output gaps. This is because current and lagged inflation rates and output gaps serve as key indicators for predicting future inflation rates and output gaps, which are the central bank's targets. As recommended by Trichet (2008), President of the European Central Bank, it is advisable to act preemptively by detaching inflation expectations to prevent potential secondary effects of inflation before price setters and stakeholders perceive temporary price increases as permanent.[84] Frankel (2011) suggests that as a policy maker, it would be better to tighten and ease monetary policy to let some currency appreciation and depreciation in commodities price exports booms and busts respectively. Likewise, McLeay et al., (2020) suggest that in the face of commodity booms, in an export-dependent economy, it is optimal to hike the nominal interest rate to lean against the inefficient boom.[85]

However, the response of the interest rate by a monetary policy authority to commodity price surges and downturns is induced by the structural characteristics and institutional framework of an economy (McLeay et al., 2020; Gelos and Ustyugova, 2017; Tang, 2008). Alongside interest rates,

[84] For even more strong view on this issue see King (2010), Governor of Bank of England.

[85] There is a body of literature that examines monetary policy for commodity importers, particularly in the context of oil imports (refer to works such as Kormilitsina, 2011; Natal, 2012) for further insights.

the exchange rate is typically deemed the primary determining factor of aggregate demand and a key channel for monetary policy transmission in open economies (Goodhart and Hofmann, 2001). For instance, research by McLeay et al. (2020) indicates that during commodity price booms, an optimal policy involves allowing the exchange rate to appreciate and raising interest rates, with a more significant appreciation needed as borrowing conditions ease. This leads to higher interest rates and a stronger exchange rate, which in turn dampens household demand for domestic consumption, thereby curbing undesirable rises in domestic output and inflation. On the other hand, fixed exchange rate regimes are often suboptimal for commodity-exporting nations, exacerbating inefficient fluctuations in commodity production. The rigidity of fixed exchange rates can amplify the impact of commodity price shocks, as evidenced by events like the Argentine currency and debt crisis in 2001–2002 (Majumder et al., 2022; Edwards and Yeyati 2005). In contrast, a flexible exchange rate system can contribute to a country's economic stability by adjusting to commodity price tremors through exchange rate movements. This argument aligns with the views of Friedman (1953) and Mundell (1961), who argue that floating exchange rates are better equipped to absorb external shocks compared to fixed exchange rates (for example, Majumder et al., 2022; Dąbrowski and Wroblewska, 2016; Edwards and Yeyati, 2005; Ghosh et al., 1997; Flood and Rose, 1995; Baxter and Stockman, 1989).

Moreover, a robust fiscal position enabled the government to implement effective measures to tackle escalating prices. Research indicates that fiscal factors often impact inflation expectations in emerging markets (see, Celasun et al., 2004). A well-coordinated fiscal strategy can dynamically adapt to commodity price shocks, as proposed by Hevia and Nicolini (2013). In the event of a commodity price boom, the fiscal authority should consider reducing labor subsidies. In cases of fiscal dominance, achieving inflation objectives through monetary policy may prove challenging (McLeay et al., 2020). High pre-existing government expenditure might restrict the room for expansionary monetary policy even when terms of trade improve. Conversely, low expenditure might create space for easier policy to stimulate the economy (Blanchard and Perotti, 2002; Reinhart and Rogoff, 2011). Expansionary fiscal policy can put upward pressure on inflation, requiring central banks to increase interest rates to sustain price stability and vice versa (Blanchard and Perotti, 2002). Likewise, during high growth, central banks might use tight monetary policy to prevent overheating even with favorable terms of trade. Conversely, slow growth might necessitate an easier policy (lower rates) to support economic activity, even if terms of trade are moderate (Hausmann and Rigobon, 2003; Blanchard and Perotti, 2002). Similarly, high unemployment might encourage easier monetary policy to stimulate growth and job creation, even with good terms of trade. Contrary, low unemployment might allow for tighter policies to focus on price stability (Blanchard & Perotti, 2002; Rodrik, 1998). Furthermore, spikes in commodity prices frequently lead to cost-push inflation

(Phelps 1978), which at times can prompt a tightening of monetary policy and vice versa (Blanchard and Perotti, 2002; Hausmann and Rigobon, 2003).

However, overall, the net negative or positive effects on the domestic economy depend on the ownership and distribution of export revenues from commodity export price booms/busts, along with the structural characteristics of the domestic economy. Practically and possibly two distributions exist, that is all resources owned by a) domestic residents and b) partially by domestic and foreign residents. In the first category, there is again the problem of ownership. So, we come across three cases, that is i) owned by the private sector ii) by the government, or iii) partially by the government and private sector. In the first case, all gains will go to the household in the form of labour wages to capital rent and entrepreneurial profits except income tax and royalties that will belong to the government. In the second case, except labour wages and capital rents (if they belong to private ownership) all will go to the government. In the last case, profit will be distributed between private ownership while taxes and royalties will go to the government, and labour wage and capital rent will go to the household (if it belongs to private ownership). In the second broad category, foreigners will get their shares according to case (iii) while the domestic share will be distributed according to (i), (ii), or (iii), whichever is prevailing. The above discussion creates several possibilities, that is (a)(i), (a)(ii), (a)(ii), (b)(i), (b)(ii), and (b)(iii). But, as a real-world extreme practice, combination (a)(i), is more likely to prevail, while combination (b)(ii) is less likely to exist.[86]

3.4 Data and Methodology

This section incorporates three sub-sections. Section one comprises data nature and sources, while section two explains variables definition and construction and finally the last section explores in detail model specification and estimation method.

3.4.1 Data Nature and Source

This study identifies and uses a panel data set of those developed and developing countries that are export commodity-dependent purely based on the availability of data encompassing the period of 1995-2021. The list of selected export-dependent economies is presented in Appendix C2. The data set is collected from World Development Indicators (WDI), the International Monetary Fund (IMF), and United Nations Commodities Trade (COMTRADE).

[86] In some countries, it is assumed that the government owns the company responsible for exporting the commodity, directly tying public revenues to the commodity's performance (Tanner and Restrepo, 2011).

3.4.2 Variables Definition and Construction

This section explains how our dependent, independent, and conditional/moderating variables are defined and constructed. Whether a variable is measured by taking exact values of that variable or takes some proxy number to measure it or measured by some index number?

3.4.2.1 Dependent Variables

We have two dependent variables which are monetary policy choice and fiscal policy choice. The construction and definition of both variables are explained below in detail.

3.4.2.1.1 Defining Tight and Ease of Fiscal Policy Choice

Pursuing our analysis of investigating the responsiveness of fiscal policy to business cycles due to foreign commodity price shock(s) across the globe. That is whether fiscal policymakers would remain on their existing policy stance or move against or in the same view of commodity price booms and busts. Therefore, to measure the government's fiscal stance, we extract discretionary fiscal policy shocks while following standard economic literature on fiscal policy (like, Asandului et al., 2021; Kóczán, 2016; Badinger, 2009; Fatas and Mihov, 2003) to construct our econometric model below.[87]

$$\mathrm{FP}_{\mathrm{i,t}} = \beta_0 + \beta_1 \mathrm{FP}_{\mathrm{i,t-1}} + \beta_2 Y_{\mathrm{i,t}} + \beta'_3 \mathrm{CV}_{\mathrm{i,t}} + \epsilon_{\mathrm{i,t}} \quad \text{.....................................} \quad (3.1)$$

Where FP shows fiscal policy, instrumented as government expenditure and measured as general government final consumption expenditure as a percent of GDP (Kaminsky, 2005), and its lagged value. Y stands for real GDP, while CV denotes a list of control variables like unemployment, inflation, government debt, and government revenue.[88] In addition, i and t, show countries and time dimensions respectively. While, $\epsilon_{i,t}$ the error term is interpreted and captures discretionary fiscal shock (Asandului et al., 2021; Kóczán, 2016; Corsetti et al., 2012; Badinger, 2009; Neicheva, 2006; Fatas and Mihov, 2003). This error term is equal to, $\epsilon_{it} = \mu_{it} + \eta_i$ where μ_{it} is the time-variant fixed effect (FE) and η_i is an unobserved country-specific effect that is assumed to be the time-invariant, FE. Moreover, η_i captures the characteristics of an individual country that are not picked up by the regressors but are assumed to be time-invariant. ε is a stochastic error term that varies with the individual country and time dimension. It is assumed to be independent and identically distributed, $\epsilon_{it} \sim$ iid (0, σ2).

Therefore, to obtain discretionary fiscal policy shocks (tight and easy fiscal policy in our case) first we estimate equation (3.1) through such an estimator to obtain efficient and unbiased results for

[87] Blanchard and Perotti (2002) utilized similar frameworks with quarterly U.S. data, while Alesina et al. (2002) applied them using annual OECD data.

[88] These control variables are defined and measured in the control variable section, below.

each sample country separately. Thus, following Koczan (2016), Afonso et al. (2010), and Fatas and Mihov (2003) we estimate equation (3.1) through the Instrumental Variable (IV) estimator, due to the endogeneity problem. We use the lagged value of the dependent variable as an instrument for its previously lagged value, and for other endogenous variables, we employ their respective lags as instruments (refer to Fatas and Mihov, 2003). Therefore, this study leverages the dynamic fixed effect within the instrument (DFE-IV) method as an estimator, as recommended by Anderson and Hsiao (1981) and others, to obtain consistent and efficient estimates of Eq. (3.1) specifically. The validity of the instruments is demonstrated by the probability values of Hansen's (1982) J-statistic, which serves as a generalized version of Sargan's (1958) test. The probability values of Hansen's J-statistic confirm the validity of our employed instruments. However, due to space constraints, these overall results are not presented. After running equation (3.1) through the instrumental variable (IV) technique, we get the residuals for each country separately. Next, we extract the discretionary component of the fiscal variable for each of the sampled included countries, using the specific method proposed by Fatas and Mihov (2003) and employed in studies such as Neicheva (2006), Badinger (2009), and Koczan (2016). Moreover, we break down the residuals from the most fitting model into two distinct series according to their signs: the unexpected positive and negative reactions in FP. These residuals are determined by the variance between the FP instrument and the one forecasted by the model. Subsequently, in line with Gogas et al. (2018), Garibaldi (1997), and Morgan (1993), we define positive (easy) and negative (tight) FP responses, respectively as follows.

$$tight = \min(e_t, 0), \qquad (3.1.1)$$

and

$$easy = \max(e_t, 0) \qquad (3.1.2)$$

Therefore, we consider them as unanticipated fiscal policy shocks. The series of negative unanticipated fiscal policy shocks equals the actual fiscal policy shock if the latter is negative; otherwise, it is zero. This occurs when the expected government expenditure exceeds the target implemented by the fiscal authority, resulting in a negative residual in the equation. Consequently, the actual fiscal policy is contractionary than expected, indicating a negative fiscal shock. Conversely, the series of positive-signed fiscal shocks equals the actual monetary policy shock if it is positive; otherwise, it is zero. This situation arises when the expected government expenditure is lower than the realized target, suggesting a positive fiscal shock.

3.4.2.1.2 Defining Tight and Ease of Monetary Policy Choice

Pursuing our analysis of investigating the responsiveness of monetary policy to business cycles due to foreign commodity price shock(s) across the globe. That is whether monetary policymakers would remain on their existing policy stance or move against or in the same view of commodity price booms and busts. Therefore, to measure the monetary authority's stance, we extract discretionary fiscal policy shocks while following standard economic literature on monetary policy (like, Gogas et al., 2018; Garibaldi, 1997; Morgan, 1993 among others), we construct and estimate the MP equation below.

$$MP_{i,t} = \beta_0 + \beta_1 MP_{i,t-1} + \beta_2 \pi_{i,t} + \beta_3 \pi_{i,t-1} + \beta_4 Y_{i,t} + \beta_5 Y_{i,t-1} + \beta'_6 CV_{i,t} + \varepsilon_{i,t} \quad \text{........ (3.2)}$$

Where MP represents monetary policy, instrumented with the interest rate and measured as the real interest rate as a percentage, along with its lagged value. π and Y denote inflation and real GDP, respectively, including their lagged values. A CV includes a set of control variables such as unemployment, government debt, international reserves, exchange rate, and current balance.[89] Additionally, i and t indicate the countries and time dimensions, respectively. The error term, ε_{it} is interpreted as capturing a discretionary monetary shock (Gogas et al., 2018; Garibaldi, 1997; Morgan, 1993). This error term is defined as $\varepsilon_{it} = \mu_{it} + \eta_i$ where μ_{it} is the time-variant fixed effect (FE) and η_i is an unobserved country-specific effect assumed to be time-invariant (FE). Moreover, η_i captures the individual country characteristics that are not accounted for by the regressors but are assumed to be time-invariant. ε is a stochastic error term that varies with the individual country and time dimension, assumed to be independently and identically distributed, $\varepsilon_{it} \sim$ iid (0, σ2).

Therefore, to derive discretionary monetary policy shocks (tight and easy monetary policy in this context), we first estimate Equation (3.2) using an appropriate estimator to obtain efficient and unbiased results for each sampled country individually. Following the methodology of Koczan (2016), Afonso et al. (2010), and Fatas and Mihov (2003), we employ an Instrumental Variable (IV) estimator to address endogeneity issues. We use the lagged value of the dependent variable as an instrument for itself and the lagged values of other endogenous variables as instruments (Fatas and Mihov, 2003). This study applies the dynamic fixed effect within the instrument (DFE-IV) method, as recommended by Anderson and Hsiao (1981) and others, to obtain consistent and efficient estimates of Eq. (3.1) specifically. To assess the validity of our instruments, we examine the probability values of Hansen's (1982) J-statistic, which is a generalization of Sargan's (1958) test. The probability values of Hansen's J-statistic confirm the validity of our instruments. However, due to space constraints, we do not report these overall results here. After applying the instrumental variable (IV) technique to Equation (3.2), we obtain residuals for each country. We decompose these residuals from the best-fitted model into two series based on their signs: unanticipated positive and negative responses in monetary policy (MP). These residuals represent the difference between the actual MP instrument and the one predicted by the model. Following the approach of Gogas et al.

[89] These control variables are defined and measured in the control variable section, below.

(2018), Garibaldi (1997), and Morgan (1993), we define positive (easy) and negative (tight) MP responses, respectively, as follows.

$$easy = \min(e_t, 0), \tag{3.2.1}$$

and

$$tight = \max(e_t, 0) \tag{3.2.2}$$

Following Cover (1992), we derive the residuals from the best-fitted model and categorize them into two series based on their sign: a positive and a negative shock time series. These residuals represent the difference between the actual policy interest rate set by the monetary authority and the rate anticipated by the model. Therefore, we consider them as unanticipated monetary policy shocks. The series of negative unanticipated monetary policy shocks equals the actual monetary policy shock if the latter is negative; otherwise, it is zero. This occurs when the expected interest rate exceeds the rate implemented by the monetary authority, resulting in a negative residual in the Taylor rule equation. Consequently, the actual monetary policy is less contractionary than expected, indicating a positive monetary shock. Conversely, the series of positive-signed monetary shocks equals the actual monetary policy shock if it is positive; otherwise, it is zero. This situation arises when the expected interest rate is lower than the realized rate, suggesting a negative monetary policy shock.

However generated regressands in the form of dichotomous variables (0 and 1) can pose unique challenges in econometric analysis, such as endogeneity, measurement error, and model misspecification, which may lead to biased estimates. While careful econometric techniques like instrumental variables, logistic regression, probit models, and sensitivity analysis can help mitigate some of these issues, it is crucial to remain aware of the potential pitfalls. By applying the appropriate remedies, as we have done, we can ensure that the analysis is robust and the results are reliable.

3.4.2.2 Independent Variables

We have three types of independent variables. These independent variables are in the form of core, conditional, and control. We construct, define, and discuss them in detail one by one in the following.

3.4.2.2.1 Core Variable

3.4.2.2.1.1 Narrow Dependent Commodity Terms of Trade Index

To investigate the macroeconomic effects of commodities price fluctuations we used and developed a new measure of narrow dependent commodity terms of trade (NDCTOT) index. Following

Spatafora and Tytell (2009) and Aizenman et al., (2012) subject to a little bit of modification we construct our NDCTOT as follows.

$$NDCTOT_{jt} = \prod_i ({}^{P_{it}}/_{MUV_t})^{X_{ij}} / \prod_i ({}^{P_{it}}/_{MUV_t})^{M_{ij}}$$

Where $\mathrm{NDCTOT_{jt}}$ represents narrow dependent commodity terms of trade index at time t. $\prod$ i shows the product of commodities i. P_{it} is the price of individual commodity i at time t. MUV_t is a manufacturing unit value index at time t, used as a deflator, X_{ij} and M_{ij} are the share of exports and imports of commodity i in the country j's gross domestic product (GDP). Due to their nature, the weights X and M do not sum up to 1. This complicates the interpretation of the index, but it enables us to capture the relative exposure of each economy to changes in relative commodity prices. As highlighted by Spatafora and Tytell (2009), one of the desirable properties of NDCTOT is that, since Xij and Mij are averaged over time, the movements in NDCTOT remain unaffected by changes in export and import volumes in response to price fluctuations, thereby isolating the impact of commodity prices on a country's terms of trade. Rather than changes in the volume of exports and imports as a response to commodities price fluctuations, we kept the weights—export and import shares—are time-averaged and set to remain constant or fixed over time, so that any changes in the NDCTOT index reflect only changes in commodities prices (see, Deaton and Miller, 1995; Chen and Rogoff, 2003; Dehn, 2000; Cashin et al., 2004; Spatafora and Tytell, 2009; Collier and Goderis, 2012; Ricci et al., 2013).[90] As the weights are based on GDP, this index considers cross-country variations not only in the composition of commodity export and import baskets, but also in the significance of commodities to the overall economy.

In contrast to Spatafora and Tytell (2009) and others,[91] we define our narrow dependent commodity terms of trade (NDCTOT) by considering and including the top two major export commodities of export-dependent economies, which collectively account for at least 35% of its export basket. These commodities are selected from different industries at the digit 4 level in the SITC Revision 1 classification. This approach is more theoretically relevant as it offers a country-specific measure of susceptibility to commodity price fluctuations, determined by the composition of the country's commodity exports.

[90] Gruss (2014) creates commodity terms-of-trade indices by employing time-varying weights. These weights are derived from three-year rolling averages of trade values to mitigate fluctuations and are lagged to ensure that changes in the index reflect variations in commodity prices rather than endogenous changes in volumes.

[91] They Specifically, construct their country specific commodity terms of trade (CSCTOT) index from the prices of 32 individual commodities: Shrimp; Beef; Lamb; Wheat; Rice; Corn (Maize); Bananas; Sugar; Coffee; Cocoa; Tea; Soybean Meal; Fish Meal; Hides; Soybeans; Natural Rubber; Hardlog; Cotton; Wool; Iron Ore; Copper; Nickel; Aluminum; Lead; Zinc; Tin; Soy Oil; Sunflower Oil; Palm Oil; Coconut Oil; Gold; Crude Oil.

Commodity dependence, as outlined by the South Centre (2005), is usually assessed through a range of factors, including the proportion of export earnings from the top single commodity or top three export commodities in GDP, total merchandise exports, and total agriculture exports, as well as the percentage of people involved in commodity production, or the share of commodity exports in government revenue. According to UNCTAD (2019), a country is classified as commodity-dependent if over 60% of its total merchandise exports comprise commodities during the period 2013–2017. Following the approach of the South Centre (2005) and aiming to achieve a reasonable number of observations with meaningful implications for export-dependent economies, we classify a country as commodity-dependent if its top two export commodities collectively represent at least 35% of its total merchandise exports.

3.4.2.2.2 Control Variables

Government spending is a key instrument of fiscal policy and is significantly influenced by numerous economic factors such are economic growth (ECNG), unemployment (UNEMPL), inflation (INF), government debt (DEBT), and government revenue (REVENUE). All these variables collectively play an important role in output determination. For instance, ECNG creates higher tax revenue for the government, allowing for increased spending on infrastructure, social programs, or deficit reduction. However, excessive focus on growth might lead to unsustainable debt if spending expands too rapidly. During periods of low or negative growth, expansionary fiscal policy might involve increased government spending to stimulate the economy. This could entail infrastructure projects, job creation programs, or direct transfers to households. We use GDP growth as an annual percent to consider its effect on the exchange rate. In addition, high unemployment signifies underutilized resources and potential economic loss. It also decreases tax revenue and increases social spending needs. Governments might use counter-cyclical fiscal policy by increasing spending on job training, public works programs, or unemployment benefits to combat high unemployment. However, these policies can strain public finances if not calibrated carefully. This study uses unemployment, total as a percent of the total labour force, to capture the effects of unemployment. Similarly, excessive inflation reduces purchasing power and discourages savings, harming economic stability. Moderate inflation (around 2%) is generally considered healthy. To control inflation, governments might adopt tight fiscal policy, which often involves reduced spending. However, excessive cuts might dampen economic activity and negate intended inflation reduction benefits. We measure inflation as the consumer price index. Moreover, sustainable debt levels ensure manageable interest payments and future policy flexibility. High debt burdens limit governments' ability to respond to future crises and crowd out productive investments. Balancing growth and debt sustainability is crucial. Fiscal consolidation often involves spending cuts to decrease future interest payments and improve debt sustainability. However, these cuts can impact essential services and social programs in the short term. We use gross debt as a percent of GDP to measure debt and take its effect on unemployment. Furthermore, sufficient revenue supports public services, infrastructure, and social programs. Insufficient revenue limits the government's ability to fulfill its responsibilities and maintain economic stability. Tax systems and spending priorities determine revenue generation and allocation. Fiscal policy decisions influence the balance between taxes and spending, impacting economic activity and citizen well-being. Governments might increase spending if tax revenue grows but might need to cut spending if it falls. Following standard literature, we use revenue as a percent of GDP to consider its impact on the dependent variable.

Monetary policy, primarily wielded through interest rate adjustments, is a powerful tool for influencing economic activity. However, it must navigate a complex landscape of interacting factors, including economic growth (ECNG), unemployment (UNEMPL), inflation (INF), government debt (DEBT), and exchange rate (EXRATE). All these variables collectively play an important role in output determination. For instance, lower economic growth and output suggest potential underinvestment and slower inflation. Central banks might respond by decreasing interest rates to persuade borrowing and investment, promoting growth. Conversely, excessively high growth and output can trigger inflationary pressures, leading to interest rate hikes to cool the economy. The direction of interest rate changes hinges on central bank assessments of whether growth needs a boost or needs to be moderated. We use GDP growth as an annual percent to consider its effect on the exchange rate. In addition to that high unemployment indicates underutilized resources and potential social unrest. Central banks might implement expansionary monetary policy (lower interest rates) to stimulate job creation through increased business activity and investment. However, excessively loose policy can fuel inflation. Balancing low unemployment with controlled inflation is a key challenge. Interest rate adjustments aim to achieve this delicate balance. This study uses unemployment, total as a percent of the total labour force, to capture the effects of unemployment. Likewise, inflation erodes purchasing power and creates uncertainty, harming economic stability. Central banks primarily target specific inflation rates (usually around 2%). When inflation rises above the target, they typically raise interest rates, making borrowing more expensive and dampening inflationary pressures. Inflation is a major determinant of interest rate adjustments, with central banks aiming to sustain price stability through targeted inflation control. We measure inflation as the consumer price index. Similarly, high government debt raises concerns about future repayment abilities and potential crowding out of the private investment. Central banks might need to consider the impact of their policies on government debt sustainability. For example, lowering interest rates can reduce debt service costs, but excessive ease can create inflationary pressures that ultimately drive-up interest rates and debt burdens. Debt sustainability concerns can influence central bank decisions, sometimes making them cautious about overly expansionary policies even when other factors suggest lower rates. We use gross debt as a percent of GDP to measure debt and take its effect on unemployment. Moreover, exchange rate fluctuations affect import and export prices, impacting inflation and economic activity. Central banks might use interest rate alterations to affect the exchange rate, aiming to maintain competitiveness and price stability. If a currency weakens excessively, raising interest rates can attract foreign investment and strengthen the currency. When managing exchange rates, central banks need to balance their inflation target and other economic goals, potentially leading to adjustments that differ from what purely domestic factors might suggest. Empirical literature proxied official exchange rate as local currency unit per US dollar, period average.

3.4.2.2.3 Conditional Variables

It is theoretically well established in the literature that the macroeconomic effect of standard terms of trade and commodity terms of trade conditionally depends on the economic structure, institutional quality, and policy-related extraneous variables. So, this means that the impact of narrow dependent commodity terms of trade on fiscal and monetary policy choice changes as these moderating variables change (for more discussion see the theoretical section, above). Therefore, this study also uses some of the important conditional or moderating, or extraneous variables that may affect the response of fiscal and monetary policy to fluctuations in NDCTOT. That is, first for fiscal policy, interest rates (INTRATE), economic growth (ECNG), unemployment (UNEMPL), inflation (INF), and government debt (DEBT). Second, for monetary policy, they would be government expenditure (GOVNEXP), economic growth (ECNG), unemployment (UNEMPL), inflation (INF), government debt (DEBT), and exchange rate (EXRATE).

3.4.3 Model Specification and Estimation Method

This sub-section is further divided into two sub-sections. Section one describes model specification, while the estimation technique is discussed in the second section.

3.4.3.1 Models Specification

3.4.3.1.1 Models

Based on our theoretical motivation along with the nature and empirical construction of our dependent variables which are fiscal and monetary policy choices this study constructs and estimates the following econometric models.

3.4.3.1.1.1 Fiscal Policy Choice

$$\Pr\left(\mathrm{FPC_{it}} = 0,1 \middle| \mathrm{NDCTOT},\ \mathrm{X_{it}}, CF_{\mathrm{it}}, \mu_{\mathrm{it}}\right) = \frac{1}{1 + exp^{\left[-\left(\alpha_i NDCTOT_{it} + \beta'_i \mathrm{X}_{it} + \gamma_i (X * CF)_{it} + \mu_{it}\right)\right]}} \quad (3.3.1)$$

Around the mean of the linear predictor of equation (3.3.1), we can Taylor-expand the logistic function to obtain a linear approximation.

$$\mathrm{FPC_{it}} = \alpha_0 + \alpha_1 \mathrm{NDCTOT_{it}} + \beta'_i \mathrm{CF_{it}} + \gamma_i (\mathrm{NDCTOT} * \mathrm{CF})_{it} + \delta'_i \mathrm{CV_{it}} + \eta_i + \varepsilon_{it} \quad ..... (3.3.2)$$

Where $\Pr(\mathrm{FPC_{it}} = 0, 1)$ is the probability of country i experiencing outcome 1 at time t, exp is an exponential function. In addition to that FPC shows fiscal policy choice and X stands for our core and control variables (CV) which include narrow dependent commodity terms of trade (NDCTOT) on the one hand and economic growth, unemployment, inflation, government debt, and government revenue on the other hand, respectively. CF includes a list of conditional variables that as interest rate, economic growth, unemployment, inflation, and government debt. μ_{it} indicates an error term that is $\mu_{it} = \varepsilon_{it} + \eta_i$ where ε_{it} is the time-variant fixed effect (FE) and η_i is an unobserved country and economies specific/fixed effect that is assumed to be the time-invariant, FE. Moreover, η_i captures the characteristics of each country's fiscal policy choice variable that are not picked up by the regressors but are assumed to be time-invariant. μ_{it} is a stochastic error term that varies with the individual country and time dimension. i and t show cross section and time dimension, respectively.

The conditional role of interest rate (INTRATE), economic growth (ECNG), unemployment (UNEMPL), inflation (INF), and government debt (DEBT), for the effect of narrow dependent commodity terms of trade (NDCTOT) on fiscal policy choice (FPC) is given from the equation (3.3.2). That is:

$$\frac{\partial \mathrm{FPC_{it}}}{\partial \mathrm{NDCTOT_{it}}} = \alpha_1 + \gamma_1 \mathrm{INTRATE_{it}} + \gamma_2 \mathrm{ECNG_{it}} + \gamma_3 \mathrm{UNEMPL_{it}} + \gamma_4 \mathrm{INF} + \gamma_5 \mathrm{DEBT_{it}} \quad .....(3.3.2.1)$$

Equation (3.3.2.1) shows that the impact of narrow dependent commodity terms of trade (NDCTOT) on fiscal policy choice (FPC) changes as interest rate (INTRATE), economic growth (ECNG), unemployment (UNEMPL), inflation (INF), and government debt (DEBT) changes.

3.4.3.1.1.2 Monetary Policy Choice

$$\Pr\left(\mathrm{MPC_{it}} = 0, 1 \middle| \mathrm{NDCTOT},\ \mathrm{X_{it}}, CF_{\mathrm{it}}, \mu_{\mathrm{it}}\right) = \frac{1}{1 + exp^{[-(\alpha_i NDCTOT_{it} + \beta'_i \mathrm{X}_{it} + \gamma_i (X * CF)_{it} + \mu_{it})]}} \quad ...(3.4.1)$$

Around the mean of the linear predictor of equation (3.4.1), we can Taylor-expand the logistic function to obtain a linear approximation.

$$\mathrm{MPC_{it}} = \alpha_0 + \alpha_1 \mathrm{NDCTOT_{it}} + \beta'_i \mathrm{CF_{it}} + \gamma_i (\mathrm{NDCTOT} * \mathrm{CF})_{it} + \delta'_i \mathrm{CV_{it}} + \eta_i + \varepsilon_{it} \quad ... (3.4.2)$$

Where $\Pr(\mathrm{MPC_{it}} = 0, 1)$ is probability of country i experiencing outcome 0 or 1 at time t, exp is exponential function. In addition to that MPC shows monetary policy choice and X stands for our core and control variables (CV) which include narrow dependent commodity terms of trade (NDCTOT) on the one hand and economic growth, unemployment, inflation, government debt and exchange rate on the other hand, respectively. CF includes a list of conditional variables that is government expenditure, and exchange rate. interest rate, economic growth, unemployment, inflation and exchange rate. μ_{it} indicates an error term that is $\mu_{it} = \varepsilon_{it} + \eta_i$ where ε_{it} is the time-variant fixed effect (FE) and η_i is an unobserved countries and economies specific/fixed effect that is assumed to be the time-invariant, FE. Moreover, η_i captures the characteristics of each country's monetary policy choice variable that are not picked up by the regressors but are assumed to be time-invariant. μ_{it} is a stochastic error term that varies with the individual country and time dimension. i and t show cross section and time dimension, respectively.

The conditional role of government expenditure (GOVNEXP), economic growth (ECNG), unemployment (UNEMPL), inflation (INF), and exchange rate (EXRATE) for the effect of narrow dependent commodity terms of trade (NDCTOT) on monetary policy choice (MPC) is given from the equation (3.4.2). That is:

$$\frac{\partial \mathrm{MPC_{it}}}{\partial \mathrm{NDCTOT_{it}}} = \alpha_1 + \gamma_1 \mathrm{GOVNEXP_{it}} + \gamma_2 \mathrm{ECNG_{it}} + \gamma_3 \mathrm{UNEMPL_{it}} + \gamma_4 \mathrm{INF} + \gamma_5 \mathrm{EXRATE_{it}} \quad (3.4.2.1)$$

Equation (3.4.2.1) shows that the impact of narrow dependent commodity terms of trade (NDCTOT) on monetary policy choice (MPC) changes as government expenditure (GOVNEXP), economic growth (ECNG), unemployment (UNEMPL), inflation (INF), and exchange rate (EXRATE) changes.

3.4.3.1.2 Models Selection: Fixed Effects Logit or Random Effects Logit

Traditionally, when modeling panel data with a categorical dependent variable, two primary approaches are typically used: fixed effects logit (FEL) and random effects logit (REL). The FEL approach captures time-invariant unobservable effects for each cross-section, either explicitly using dummy variables or by removing them through time detrending. In contrast, the REL approach treats these time-invariant unobservable effects as part of the disturbances, assuming zero correlation with the regressors. Therefore, the REL approach provides efficient and unbiased estimators compared to the FEL approach, under the assumption of zero correlation. However, if this assumption does not hold, the FEL approach is more suitable. Since our dataset contains unobservable fixed effects, as indicated in the previous chapter, it is more appropriate to use the commonly used fixed effects logistic regression for Eq. (3.3.1) and (3.4.1), or more specifically (3.3.2) and (3.4.2), to obtain consistent and efficient results.

3.4.3.2 Estimation Technique

The dependent variables in our equations (3.3.1) and (3.4.1), or more specifically (3.3.2) and (3.4.2), are categorical, with categories 0 and 1. Traditional models and estimation techniques for continuous dependent variables cannot be used for these equations and models. The linear probability model is not suitable due to several reasons: i) it fails to constrain the probabilities between 0 and 1 and assumes non-normal error terms despite following the binomial distribution, ii) the disturbances are heteroskedastic, and iii) the coefficient of determination, R^2, from simple ordinary least squares (OLS) does not provide meaningful insights into the model's explanatory power. To address these issues, a widely used alternative is the logistic regression technique, which models the probability as a nonlinear function of the explanatory variables. The logistic regression model ensures that the probability is bounded between 0 and 1 and can be estimated using maximum likelihood. In our case, the standard logistic regression model is employed to model binary dependent variables, such as whether a policy (fiscal or monetary, in our case) remains tight=1 (the base category or outcome) or becomes easy=0 in response to booms and busts in narrow dependent commodity terms of trade (NDCTOT). The model assumes that the log odds of the dependent variable being 1 (tight in our case) is a linear combination of the independent variables. The logistic function is then used to transform this linear combination into a probability between 0 and 1.

However, our cross-sections, specifically countries or economies, exhibit unobserved heterogeneity, as represented by equations (3.3.1) and (3.4.1), or more specifically (3.3.2) and (3.4.2), as statistically demonstrated in Table 2.1 in Chapter 02. Unfortunately, the simple logit model does not address unobserved heterogeneity at the individual or group level, which is a significant limitation of the standard logit regression (Gangl, 2010; Bruderl and Ludwig, 2015). To overcome this limitation, alternative fixed-effects logit models, an extension of standard logistic regression, have become increasingly popular and powerful tools for analyzing binary dependent variables in panel data regression models. These models account for unobserved heterogeneity at the individual or group level (Cameron and Trivedi, 2005; Wooldridge, 2010; Greene, 2012). Unobserved heterogeneity refers to unmeasured factors that could influence the dependent variable but are not available to the researcher. The fixed effect (η_i) is not directly estimated, but its presence allows us to control for time-invariant characteristics of unit i that might influence the outcome. By controlling for these unobserved factors, the fixed effect logit model enables more accurate identification of the causal effects of interest. Estimation of the fixed effect logit model is typically done using maximum likelihood estimation (MLE). The goal is to find the coefficient values of unknown parameters that maximize the likelihood of observing the data given the model. The coefficients can be interpreted similarly to the standard logistic regression model, representing the marginal effects of the explanatory variables on the log odds of the dependent variable being 1, while holding all other factors constant.

3.4.4 Descriptive Statistics of Export Dependent Economies

The descriptive statistics that is summary statistics and correlation matrices are presented in Appendix A3 in detail.

3.5 Results and Discussion

In this section, we discuss our estimation results of fiscal and monetary policies response to narrow dependent commodity terms of trade fluctuations, respectively.

3.5.1 Fiscal Policy Response to Narrow Dependent Commodity Terms of Trade Fluctuations

Table 3.1 demonstrates that the probabilities of NDCTOT is reasonably high and manage to show the expected sign, and the relationship is statistically significant at the 1% level through in models (1)-(6) except in model (2) where the significance level is 10%. These results indicate that a more favorable NDCTOT leads to an increase in the likelihood of choosing the tight fiscal policy, on average.[92] Our findings are in line with the economic literature (Gylfason and Zoega, 2006; Mendoza and Ostry, 2008; Berg et al., 2012). Although implementing a more stringent fiscal policy may appear contradictory in light of current economic gains, it is actually a strategic approach to managing the windfall. The tightening of fiscal policy in response to an improvement in the terms of trade can be achieved through various mechanisms, such as generating higher government revenue. This increase in revenue can be attributed to greater earnings from exports, particularly in countries that heavily rely on commodity exports. By capitalizing on the opportunity presented by higher export revenues, economies can reduce their existing debt through the implementation of a more rigorous fiscal policy, thereby enhancing long-term fiscal sustainability. A study conducted by Gylfason and Zoega (2006) demonstrated that enhancements in the terms of trade can indeed result in higher government revenue, consequently reducing the necessity for borrowing and enabling the adoption of a stricter fiscal policy. Numerous studies have highlighted the potential of improvements in the terms of trade to alleviate the need for external financing. For instance, Berg et al. (2012) concluded that enhancements in the terms of trade can bolster a country's current account balance, thereby diminishing the need for external borrowing and fostering a more stringent fiscal stance.

Moreover, improvements in the terms of trade can also have an impact on inflationary pressures. Consequently, countries may opt to proactively tighten fiscal policy in order to counteract potential inflationary effects stemming from improved net domestic credit terms of trade. Cashin et al. (2014)

[92] Similar results can be found from our estimated fixed effect probit model in Table B3.1 in Appendix B.

conducted a study that revealed how improvements in the terms of trade can result in lower inflation rates, thereby reducing the necessity for expansionary fiscal policy and contributing to a more stringent fiscal stance. Improvements in the terms of trade may also enhance investor confidence, thereby resulting in an increase in private investment. This, in turn, can reduce the necessity for government stimulus spending and lead to a more stringent fiscal policy stance. According to a study conducted by Mendoza and Ostry (2008), enhancements in the terms of trade can lead to heightened investment, consequently decreasing the requirement for fiscal stimulus. Furthermore, improvements in the terms of trade can prompt governments to adopt a more cautious fiscal policy stance. Enhanced and narrowed dependent commodity terms of trade (NDCTOT) can generate fiscal surpluses. Consequently, economies reliant on exports may choose to save these windfalls through a stricter fiscal policy in order to prevent overheating or future budget deficits. For instance, a study by Ostry and Reinhart (2010) discovered that improvements in the terms of trade can result in increased savings, thereby enabling governments to invest in long-term growth and development. Moreover, when a resource sector experiences a boom due to improved terms of trade, it can displace other productive sectors, leading to long-term economic distortions. In order to mitigate this effect, it may be necessary to tighten fiscal policy and invest in sectors outside of the resource industry. Auty (2007) emphasizes the importance of diversifying the economy and avoiding reliance on specific commodities, potentially necessitating continued government expenditure. However, the impact of NDCTOT on the selection of fiscal policy could vary depending on the institutional framework and policy objectives of each individual country. For example, some countries may prioritize long-term fiscal sustainability over short-term increases in spending.

Moreover, we also include essential control variables in our models to investigate the response of fiscal policy to improvements in narrow dependent commodity terms of trade (see Table 3.1). For instance, the impact of economic growth (ECNG) on fiscal policy choice is positive and significant across models (1)-(6) except in model (3) where it is negative but insignificant as well. These results suggests that as ECNG increases, the probability of a tight fiscal policy also increases. This finding seems counterintuitive at first glance, as economic downturns are typically associated with tighter fiscal policy for stimulus. Nonetheless, during periods of high economic growth, governments pursue tight fiscal policy (reduced spending or increased taxes) for the following reasons. First, saving windfall revenues during good times creates buffers for future downturns or investments, promoting long-term fiscal sustainability. Second, tightening fiscal policy can help manage inflationary pressures and potential asset bubbles that might arise during rapid economic growth. Third, demonstrating commitment to fiscal prudence during good times strengthens investor confidence and potentially lowers borrowing costs in the future. Fourth, in periods of strong economic performance and public finances, governments might face less political resistance to tightening fiscal policy, as: i) tax increases or spending cuts might be more acceptable when the economy is doing well, ii) creditors and international organizations might exert less pressure for consolidation when debt levels are manageable (Alesina and Tabellini, 2008; Buchanan and Wagner, 1977).

Table 3.1: Fiscal Policy Response to Narrow Dependent Commodity Terms of Trade Fluctuations_ FE_LOGIT

Independent Variables	FISCAL POLICY CHOICE_GOVERNMENT EXPENDITURE: TIGHT=1, EASY=0					
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
NDCTOT	0.831*** (0.211)	0.546** (0.280)	0.746*** (0.205)	0.832*** (0.212)	0.798*** (0.209)	0.779*** (0.207)
ECNG	0.111*** (0.0240)	0.101*** (0.0293)	-0.00658 (0.0238)	0.112*** (0.0241)	0.115*** (0.0242)	0.117*** (0.0245)
UNEMPL	-0.585** (0.279)	-0.594* (0.357)	-0.651** (0.282)	0.348 (0.512)	-0.599** (0.280)	-0.596** (0.281)
INF	0.732** (0.314)	0.0233*** (0.00815)	0.660** (0.310)	0.744** (0.314)	0.871** (0.487)	0.710** (0.312)
DEBT	0.627*** (0.185)	0.620** (0.250)	0.624*** (0.186)	0.624*** (0.185)	0.604*** (0.187)	0.659*** (0.197)
REVENUE	-0.0696*** (0.0186)	-0.0493** (0.0223)	-0.933*** (0.396)	-0.0685*** (0.0187)	-0.928*** (0.439)	-0.898*** (0.441)
INTRATE		-0.0928*** (0.0185)				
NDCTOT x INTRATE		0.000271* (0.000139)				
NDCTOT x ECNG			0.00119*** (0.000252)			
NDCTOT x UNEMPL				-0.00905* (0.00453)		
NDCTOT x INF					0.0175* (0.00880)	
NDCTOT x DEBT						0.00687* (0.00341)
No. of Obs.	836	610	835	836	836	836
Pseudo R-squared (%)	11.25	19.35	11.01	11.31	11.25	11.31
Log-Likelihood	-513.923	-339.585	-514.687	-513.571	-514.897	-513.564
LR chi-squared test	130.29	163.00	127.31	130.99	130.34	131.00
Prob>chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note: This table consists of models (1)-(6) which are entirely estimated through fixed effect logistic (FEL) regression technique. The dependent variable is the fiscal policy choice that is tight = 1 otherwise 0. Independent variables are narrow dependent commodity terms of trade (NDCTOT), economic growth (ECNG), unemployment (UNEMPL), inflation (INF), government debt (DEBT), government revenue (REVENUE), and interest rate (INTRATE). All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Model (1) shows results of the base model solely, whereas models (2)-(6) indicate results of the base model with INTRATE, ECNG, UNEMPL, INF and DEBT as conditional variables and (NDCTOT x INTRATE), (NDCTOT x ECNG), (NDCTOT x UNEMPL), (NDCTOT x INF), and (NDCTOT x DEBT) are their interactive terms, respectively.

In contrast, the impact of unemployment (UNEMPL) on fiscal policy choice is negative and significant across models (1)-(6) (see Table, 3.1). These results suggest that as unemployment increases, the probability of a tight fiscal policy decreases. These findings might seem counterintuitive as tighter fiscal policy could potentially worsen unemployment in the short term. However, here are some possible explanations and considerations for governments during periods of high unemployment to pursue loose fiscal policy. First, increased government spending or lower taxes can inject money into the economy, encouraging businesses to invest and hire, ultimately reducing unemployment. Second, loose fiscal policy can help mitigate the negative effects of recessions and promote economic recovery. Third, increased spending on unemployment benefits or social programs can support individuals and families impacted by job losses. Fourth, in times of high unemployment, governments might face pressure from voters and social groups to prioritize policies that alleviate economic hardship. Thus, loose fiscal policy can be seen as a more politically palatable option compared to austerity measures (Alesina and Perotti, 1998; Woodford, 2003).

Additionally, Table 3.1 also demonstrates that the impact of inflation (INF) on fiscal policy choice is positive and significant through models (1)-(6). These results suggest that as inflation increases, the probability of a tight fiscal policy also increases. Therefore, during periods of high inflation, governments pursue tight fiscal policy for the following reasons. First, tight fiscal policy helps lower inflationary pressures stemming from excess demand. Second, tightening policy demonstrates the government's commitment to controlling inflation, potentially enhancing the effectiveness of monetary policy and calming inflationary expectations. Third, as it is well established in the economic literature that in open economies, high inflation can lead to currency depreciation and capital flight, so tightening fiscal policy can help mitigate these risks. Fourth, high inflation can be politically unpopular, leading to pressure on governments to take action. However, to combat this problem tightening fiscal policy, especially during good economic times, can be seen as a more feasible option compared to cutting popular spending programs (Alesina and Perotti, 1998; Woodford, 2003). Similarly, the impact of government debt (DEBT) on fiscal policy choice is positive and highly significant across all models (1)-(6). These results suggest that as debt increases, the probability of a tight fiscal policy also increases. There are some possible interpretations and considerations for governments to pursue tight fiscal policy during periods of high government debt. First, high debt levels raise concerns about future fiscal sustainability, thus governments might tighten fiscal policy to reduce future debt burdens. As a result, this lowers the risk of sovereign debt default or financial crises, ensuring long-term fiscal stability. Second, tightening fiscal policy demonstrates the government's commitment to fiscal discipline, potentially improving creditworthiness and reducing borrowing costs. Third, high debt can crowd out private investment by competing for loanable funds, therefore tightening fiscal policy can free up resources for the private sector. Fourth, rising debt levels can trigger negative reactions from financial markets, leading to higher borrowing costs and potential capital flight. Thus, tightening fiscal policy reassures investors about the government's commitment to debt reduction, potentially restoring confidence and lowering borrowing costs. Fifth, in extreme cases, tightening policy might be necessary to avoid credit downgrades or loss of market access (Buchanan and Wagner, 1977).

In contrast, Table 3.1 also demonstrates that the impact of government revenue (REVENUE) on fiscal policy choice is negative and highly significant across models (1)-(6). These results suggest that as government revenue increases, the probability of a tight fiscal policy decreases. There are some possible interpretations and considerations for governments to pursue less tight fiscal policy during periods of high government revenue. First, higher revenue improves the fiscal position, potentially creating space for increased spending or tax cuts without compromising fiscal sustainability. Second, increased revenue allows governments to address existing spending needs or invest in desired areas without resorting to tighter measures. Third, governments might be less inclined to implement austerity measures that can be unpopular, especially with higher revenue to fund desired programs. For instance, higher revenue can enable investment in public infrastructure, social programs, or other priorities. However, saving some of the increased revenue can create buffers for future downturns or unforeseen expenses. Fourth, tax cuts can stimulate economic activity, potentially leading to further revenue growth in the long run (Alesina and Perotti, 1998; Buchanan and Wagner, 1977).

Furthermore, the effect of NDCTOT on fiscal policy choice is expected to be influenced by other factors like economic structure, institutional quality, and government policies in place at the time of export commodity price shock of the export-dependent economy (as explained in the theoretical section above). Therefore, we examine the impact of such certain conditional variables on the impact of NDCTOT on fiscal policy choice, expecting that the outcome of fiscal policy choice to vary based on these factors. For example, the interactive term of NDCTOT and INTRATE, (NDCTOT* INTRATE) is positive and significant at a 10% level in the model (2) of Table 3.1 while the individual effect of INTRATE is negative and significant at a 1% level.[93] The interaction term means that the impact of NDCTOT on fiscal policy is contingent on the level of INTRATE. So, the positive interaction term indicates that the probability of choosing tight fiscal policy increases as a result of

[93] Higher interest rates can lead to a "crowding out" effect, where increased government borrowing competes with private sector borrowing. This can lead to higher interest rates for businesses and consumers, which can dampen economic activity. To mitigate this effect, governments may be inclined to maintain or expand fiscal stimulus, even if it means running larger deficits. Or an increase in interest rates can also signal a tightening of monetary policy by the central bank to control inflation or cool down an overheating economy. This can lead to an economic slowdown, which may prompt governments to use fiscal policy to counteract the negative effects, potentially leading to a loosening of fiscal policy.

an increase in NDCTOT when INTRATE a conditioning variable increase, and vice versa. Model (2) in Table 3.2 shows that as the level of INTRATE increases, from low to average to high, the NDCTOT effect on the probability of choosing tight fiscal policy increases with a 5% significance level throughout the low, average, and high levels of INTRATE. There are a few economic justifications for this finding. An improved NDCTOT can lead to increased economic activity and potentially inflationary pressures. While higher interest rates aim to reduce money supply and aggregate demand, mitigating these pressures. Tightening fiscal policy (reducing government spending or raising taxes) can further complement monetary policy by reducing government demand and inflationary pressures. High interest rates might signal concerns about inflation or future debt sustainability. Tightening fiscal policy during such times can demonstrate the government's commitment to addressing these concerns and maintaining macroeconomic stability, potentially enhancing the effectiveness of monetary policy. Export-dependent economies might rely on external borrowing when NDCTOT is high. Rising interest rates can increase the cost of this borrowing, making fiscal consolidation more desirable to reduce reliance on external debt and improve debt sustainability (for more details see for instance, Dornbusch and Fischer, 1986).

For example, the interactive term of NDCTOT and ECNG, (NDCTOT* ECNG) is positive and significant at a 1% level in the model (3) of Table 3.1. This interaction term means that the impact of NDCTOT on fiscal policy is conditional upon the level of ECNG. So, the positive interaction term indicates that the probability of choosing tight fiscal policy increases as a result of an increase in NDCTOT when ECNG a conditioning variable increase, and vice versa. Model (3) in Table 3.2 shows that as the level of ECNG increases, from low to average to high, the NDCTOT effect on the probability of choosing tight fiscal policy increases with a 1% significance level throughout the low, average, and high levels of ECNG. There are a few economic justifications for this finding. That is during periods of high economic growth and favorable NDCTOT (increased export earnings), governments might tighten fiscal policy to avoid overheating. For instance, tight fiscal policy prevents inflationary pressures and potential future economic instability. Similarly, saving windfall export revenue creates buffers for future downturns or investments. In addition to that, tightening fiscal policy during good times demonstrates commitment to reducing debt and strengthens investor confidence. Likewise, in periods of high growth and strong public finances, governments might face less political resistance to tightening fiscal policy, as tax increases or spending cuts might be more acceptable when the economy is doing well. Moreover, creditors and international organizations might exert less pressure when economic growth levels are competent (for deeper discussion see, Merzlyakov, 2012; Sturm et al., 2009; Dornbusch and Fischer, 1986).

For example, the interactive term of NDCTOT and UNEMPL, (NDCTOT*UNEMPL) is negative and significant at a 10% level in the model (4) of Table 3.1. This interaction term means that the impact of NDCTOT on fiscal policy be dependent on the level of UNEMPL. So, the negative interaction term indicates that the probability of choosing tight fiscal policy decreases as a result of an increase in NDCTOT when UNEMPL a conditioning variable increase, and vice versa. Model (4) in Table 3.2 shows that as the level of UNEMPL increases, from low to average to high, the NDCTOT effect on the probability of choosing tight fiscal policy decreases with a 1% significance level throughout the low, average, and high levels of UNEMPL. There are a few economic justifications for this finding. During periods of high unemployment (economic downturns),

Table 3.2: Indirect Effects of Narrow Dependent Commodity Terms of Trade (NDCTOT) on Fiscal Policy Response through Different Conditional Variables having Different Percentile Levels[94]

Conditional Variables and their different levels	INTRATE From Model (2)	ECNG From Model (3)	UNEMPL From Model (4)	INF From Model (5)	DEBT From Model (6)
Low	0.524**	0.749***	0.675***	0.716***	0.800***
	(0.261)	(0.205)	(0.192)	(0.205)	(0.209)
Average	0.618**	0.776***	0.564***	0.752***	0.816***
	(0.310)	(0.215)	(0.153)	(0.211)	(0.208)
High	0.697**	0.824***	0.430***	0.817***	0.828***
	(0.329)	(0.226)	(0.121)	(0.223)	(0.219)

Note: Interest rate (INTRATE), economic growth (ECNG), unemployment (UNEMPL), inflation (INF), and debt (DEBT) are conditional variables. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Low, Average, and High mean 25th, 50th, and 75th percentile respectively.

governments might pursue expansionary fiscal policy to stimulate economic activity and reduce unemployment. This implies opposing the tightening effect of high NDCTOT. For example, fiscal authorities might increase spending or decrease taxes to boost demand. Tightening fiscal policy during downturns can be politically unpopular due to potential negative impacts on social programs and vulnerable populations. Especially, high unemployment might amplify this resistance, making such policies less likely. To further explain the observed negative relationship, some countries have automatic fiscal stabilizers, like progressive taxation or unemployment benefits, that automatically increase government spending when unemployment rises (see for example, Sturm et al., 2009; Ezema, 2012).

For example, the interactive term of NDCTOT and INF, (NDCTOT*INF) is positive and significant at a 10% level in the model (5) of Table 3.1. This interaction term means that the impact of NDCTOT on fiscal policy is conditional upon the level of INF. So, the positive interaction term indicates that the probability of choosing tight fiscal policy increases as a result of an increase in NDCTOT when

[94] Similar results can be found from our estimated fixed effect probit model in Table B3.2 in Appendix B.

INF a conditioning variable increase, and vice versa. Model (5) in Table 3.2 shows that as the level of INF increases, from low to average to high, the NDCTOT effect on the probability of choosing tight fiscal policy increases with a 1% significance level throughout the low, average, and high levels of INF. There are a few economic justifications for this finding. During periods of high inflation, governments might tighten fiscal policy to reduce aggregate demand. This can help lower inflationary pressures stemming from higher NDCTOT-driven economic activity and potential cost-push inflation due to imported goods becoming more expensive. Tightening fiscal policy demonstrates the government's commitment to controlling inflation, potentially enhancing the effectiveness of monetary policy and calming inflationary expectations. High inflation can be politically unpopular, leading to pressure on governments to take action. Therefore, tightening fiscal policy in conjunction with high NDCTOT can be seen as a more feasible option during such times compared to cutting popular spending programs (for further details see, Merzlyakov, 2012; Sturm et al., 2009; Dornbusch and Fischer, 1986).

For example, the interactive term of NDCTOT and DEBT, (NDCTOT*DEBT) is positive and significant at a 10% level in the model (6) of Table 3.1. This interaction term means that the impact of NDCTOT on fiscal policy is conditional upon the level of DEBT. So, the positive interaction term indicates that the probability of choosing tight fiscal policy increases as a result of an increase in NDCTOT when DEBT a conditioning variable increase, and vice versa. Model (6) in Table 3.2 shows that as the level of DEBT increases, from low to average to high, the NDCTOT effect on the probability of choosing tight fiscal policy increases with a 1% significance level throughout the low, average, and high levels of DEBT. There are a few economic justifications for this finding. High NDCTOT signifies increased export earnings, suggesting potential for future inflationary pressures. While high DEBT highlights vulnerability to those pressures due to limited fiscal space. Together, they create a stronger case for tightening fiscal policy. Governments with high debt might adopt a more precautionary approach to economic booms due to concerns about future debt sustainability. So, tightening fiscal policy during good times helps create fiscal buffers to manage future debt service costs and economic downturns. High debt can raise concerns about solvency. Hence, tightening policy demonstrates commitment to debt reduction and boosts market confidence, potentially lowering borrowing costs. High debt can make austerity measures during booms more politically palatable. That is why highlighting the need to manage debt might make tight fiscal policy seem more necessary and justifiable to the public. Creditors and international organizations might exert greater pressure on highly indebted governments to adopt stricter fiscal policies (for details see, Sturm et al., 2009; Ezema, 2012).

3.5.2 Monetary Policy Response to Narrow Dependent Commodity Terms of Trade Fluctuations

Table 3.3 exhibits that the probabilities of NDCTOT are convincingly high and manage to show the expected sign, and the relationship is statistically significant at a 1% level over in models (1)-(6). These results indicate that a more favorable NDCTOT leads to a decrease in the likeliness (or decrease in the probabilities or it is less likely to) of choosing the tight monetary policy, on average.[95] Our findings are consistent with the previous literature (Tervala, 2012; Blanchard and Gali, 2007). Although less tight monetary policy might seem contradictory to utilizing current economic gains, but it reflects a strategic approach to manage the current situation. Improvements in the terms of trade that are narrow and dependent can result in a decline in interest rates or a more accommodative monetary policy through various economic mechanisms. We present some potential mechanisms in the following. When commodity prices rise, there is an increase in liquidity in the economy due to higher export revenues. Consequently, the demand for credit decreases, leading to a decrease in interest rates (Gylfason and Zoega, 2006). Enhancements in the terms of trade can improve the external balance of payments, thereby reducing the need for tight monetary policy to support the currency (Van Wijnbergen, 1984). Higher commodity prices can strengthen the domestic currency, making imports, especially essential goods like fuel and raw materials, cheaper. This, in turn, can mitigate domestic inflation, creating leeway for central banks to lower interest rates without concerns of inflation (Corden and Neary, 1982).

Similarly, Blanchard and Perotti (2002) propose that lower inflation resulting from external factors allows for a more expansionary monetary policy without the risk of inflation. Favorable terms of trade can enhance export earnings, which can potentially lead to higher economic growth. Central banks may lower interest rates to support and sustain this growth, particularly in economies reliant on exports. A case in point is Obstfeld and Rogoff (2000), who explore how external factors like terms of trade can influence monetary policy decisions aimed at achieving growth objectives. Similarly, improvements in the terms of trade can stimulate economic activity, resulting in an increased demand for credit. However, if the increase in economic activity is perceived as temporary, central banks may choose to keep interest rates low to support growth (Bruno and Sachs, 1985). Higher commodity prices can augment government revenue, enabling governments to reduce borrowing, which, in turn, can lead to lower interest rates (Collier and Goderis, 2012). Similarly, increased revenue from commodity exports can create fiscal space for governments to increase spending or reduce debt. This can alleviate pressure on central banks to tighten monetary policy

[95] Similar results can be found from our estimated fixed effect probit model in Table B3.3 in Appendix B.

(raise interest rates) in order to control inflation or address concerns regarding debt sustainability. Alesina and Tabellini (2007) provide an illustration of the interconnectedness between fiscal and monetary policy, wherein a strong fiscal position can create room for a more lenient monetary policy.

Table 3.3: Monetary Policy Response to Narrow Dependent Commodity Terms of Trade Fluctuations_ FE_LOGIT

Independent Variables	MONETARY POLICY CHOICE_INTEREST RATE: TIGHT=1, EASY=0					
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
NDCTOT	-0.617*** (0.213)	-0.850*** (0.244)	-0.621*** (0.214)	-0.706*** (0.221)	-0.737*** (0.222)	-0.619** * (0.213)
ECNG	-0.0993*** (0.0255)	-0.113*** (0.0297)	0.00783 (0.0256)	-0.0984*** (0.0253)	-0.0996*** (0.0255)	-0.106*** (0.0266)
UNEMPL	-0.0539 (0.324)	0.00337 (0.339)	-0.0526 (0.324)	0.00775 (0.0913)	-0.0937 (0.327)	-0.146 (0.328)
INF	0.726* (0.397)	0.0127* (0.00592)	0.718* (0.398)	0.745* (0.403)	0.723*** (0.399)	0.967** (0.595)
DEBT	0.896*** (0.251)	0.834*** (0.254)	0.887*** (0.254)	0.916*** (0.254)	0.926*** (0.253)	0.923*** (0.256)
EXRATE	0.00115* (0.000609)	0.00135** (0.000640)	0.00114* (0.000608)	0.00115* (0.000608)	0.00103* (0.000610)	0.000421 (0.000620)
GOVNEXP		-0.149*** (0.0367)				
NDCTOT x GOVNEXP		0.0205*** (0.00606)				
NDCTOT x ECNG			-0.00101*** (0.000262)			
NDCTOT x UNEMPL				-0.00527* (0.00265)		
NDCTOT x INF					0.0243** (0.0115)	
NDCTOT x EXRATE						0.0104* (0.00570)
No. of Obs.	689	645	689	681	689	689
Pseudo R-squared (%)	12.03	15.17	12.01	12.05	11.83	12.08
Log-Likelihood	-419.367	-378.840	-419.416	-419.518	-420.307	-419.121
LR chi-squared test	114.64	135.51	114.55	111.62	112.76	115.14
Prob>chi2	0.0005	0.0000	0.0006	0.0011	0.0009	0.0005

Note: This table consists of models (1)-(6) which are entirely estimated through fixed effect logistic (FEL) regression technique. The dependent variable is the monetary policy choice that is tight = 1 otherwise 0. Independent variables are narrow dependent commodity terms of trade (NDCTOT), economic growth (ECNG), unemployment (UNEMPL), inflation (INF), government debt (DEBT), exchange rate (EXRATE), and government expenditure (GOVNEXP). All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Model (1) shows results of the base model solely, whereas models (2)-(6) indicate results of the base model with GOVNEXP, ECNG, UNEMPL, INF and EXRATE as conditional variables and (NDCTOT x GOVNEXP), (NDCTOT x ECNG), (NDCTOT x UNEMPL), (NDCTOT x INF), and (NDCTOT x EXRATE) are their interactive terms, respectively.

Additionally, we incorporate key control variables into our models to analyze the reaction of monetary policy to improvements in narrow dependent commodity terms of trade (see Table 3.3). For instance, the impact of economic growth (ECNG) on monetary policy choice is negative and significant across models (1)-(6) except in model (3) where it is positive but insignificant as well (refer to Table 3.3). These results suggest that as ECNG increases, the probability of choosing a tight monetary policy decrease. There are some possible interpretations and considerations for central banks to implement tight monetary policy (raising interest rates) when the economy is growing. First, higher growth usually leads to lower unemployment, reducing inflationary concerns. Similarly, increased economic activity often translates to higher tax revenues, easing fiscal constraints that might necessitate tighter monetary policy. In addition to that expectations of continued growth can lead to stable inflation expectations, obviating the need for proactive tightening (Bernanke and Gertler, 2000; Clarida et al., 1998; Gali and Monacelli, 2008).

Meanwhile, Table 3.3 also demonstrates that the impact of unemployment (UNEMPL) on monetary policy choice is mixed which is positive and negative across models (1)-(6) but at the same time insignificant all over the models as well. Moreover, the impact of inflation on monetary policy choice is positive throughout models (1)-(6) but significant at different levels all over the examined models (see Table 3.3). This result suggests that as INF increases, the likelihood of a central bank choosing a tight monetary policy also increases. These results are aligned with established economic theory and policy practices. So, there are some possible interpretations and considerations for central banks to implement tight monetary policy when the economy is growing. As mentioned before, central banks generally prioritize price stability, meaning keeping inflation under control. Rising inflation deviates from this objective and poses a significant threat to the economy. To counter inflation, central banks typically implement tightening monetary policy through raising interest rates. This makes borrowing more expensive, reduces aggregate demand, and ultimately curtails inflationary pressures. Raising interest rates serves not only as a direct tool to combat inflation but also as a signal to financial markets and the public of the central bank's commitment to price stability. Maintaining this credibility discourages inflationary expectations from becoming unanchored, further fueling inflation (Bernanke and Gertler, 2000; Clarida et al., 1998; Gali and Monacelli, 2008).

Similarly, Table 3.3 shows that the impact of government debt (DEBT) on monetary policy choice is positive and highly significant across all models (1)-(6). These results suggest that as debt increases, the probability of choosing tight monetary policy increases. This result is aligned more closely with established economic theory and policy practices. There are some possible interpretations and considerations for governments to pursue tight monetary policy during periods of high government debt. First, high debt levels raise concerns about future inflationary pressures. As governments finance their debt, they might issue more bonds, potentially leading to higher interest rates and inflation expectations. Second, excessive debt can pose a threat to fiscal sustainability, increasing the risk of default or financial instability. Central banks might raise interest rates to signal their commitment to fiscal discipline and encourage responsible borrowing. Third, high debt can lead to crowding out private investment due to competition for loanable funds. To counter this effect and stimulate economic growth, central banks might tighten monetary policy despite the debt burden. Fourth, independent central banks prioritize price stability and might feel pressured to tighten policy even with high debt to maintain credibility and prevent inflation expectations from becoming unanchored (Reinhart and Rogoff, 2011; Blanchard et al., 2010). Moreover, the impact of exchange rate (EXRATE) on monetary policy choice is positive and highly significant across all models (1)-(6) (refer to Table 3.3). These results suggest that as the exchange rate (in nominal terms) increases or depreciated (weaker domestic currency) often leads to an increased likelihood of tight monetary policy. This result is aligned more closely with established economic theory and policy practices compared. There are some possible interpretations and considerations for governments to pursue tight monetary policy during periods of high depreciated and volatile exchange rate. First, depreciation makes imports more expensive, translating to higher domestic inflation. This directly contradicts the central bank's objective of price stability, prompting them to raise interest rates to curb inflation expectations and control price increases. Second, depreciation can trigger capital outflows as investors seek assets denominated in stronger currencies. This can put upward pressure on domestic interest rates as the central bank attempts to attract capital back and stabilize the exchange rate. Third, raising interest rates in response to depreciation sends a strong signal to markets that the central bank is committed to maintaining price stability. This helps anchor inflation expectations and prevent a self-fulfilling prophecy of further depreciation and inflation. Fourth, while depreciation can make exports cheaper and boost competitiveness in the short term, excessive depreciation can also harm overall economic growth by increasing the cost of imported inputs and dampening domestic demand. Therefore, tightening monetary policy might be seen as a necessity to address these concerns (Obstfeld and Rogoff, 2000; Blanchard et al., 2017).

The effect of NDCTOT on monetary policy choice is expected to be influenced by other factors like economic structure, institutional quality, and government policies in place at the time of export commodity price shock of the export-dependent economy (as explained in the theoretical section above). Therefore, we examine the impact of the related conditional variables on the impact of NDCTOT on monetary policy choice, expecting that the outcome of monetary policy choice to vary based on these factors. For instance, the interactive term of NDCTOT and GOVNEXP, (NDCTOT*GOVNEXP) is positive while the individual effect of GOVNEXP is negative but both effects are significant at 1% level in the model (2) of Table 3.3.[96] The interaction term means that the impact of NDCTOT on monetary policy is conditional upon the level of GOVNEXP. So, the positive interaction term indicates that the less likelihood of choosing tight monetary policy decreases as a result of an increase in NDCTOT when GOVNEXP a conditioning variable increase, and vice versa. More specifically, model (2) in Table 3.4 shows that as the level of GOVNEXP increases, from low to average to high, the NDCTOT effect on the less likelihood of choosing tight monetary policy decreases with a 1% significance level throughout the low, average, and high levels of GOVNEXP. Improved NDCTOT (rising export prices), generally leads to inflationary pressures, prompting central banks to tighten policy (raise interest rates). Likewise, increased government expenditure can also put upward pressure on inflation, potentially leading to tighter policy. However, the presence of GOVNEXP as an interaction term suggests that higher government expenditure might act as a moderator, potentially counteracting some of the inflationary pressures arising from improved NDCTOT. Several explanations could underlie this moderating effect. First, if increased government expenditure crowds out private investment, it could reduce aggregate demand in the economy, mitigating inflationary pressures from improved NDCTOT. This effect, however, depends on the specific economic context and the strength of crowding-out. Second, if a government has a credible track record of responsible fiscal policy, markets might anticipate future tax increases or spending cuts to offset higher spending, potentially dampening inflationary expectations and reducing the need for tight monetary policy. Third, improved NDCTOT can lead to currency appreciation, making imports cheaper and potentially offsetting some inflationary pressures from higher government spending. Fourth, the central bank's independence and mandate play a crucial role. If the central bank prioritizes price stability and is independent of government influence, it might be less likely to accommodate higher government spending through loose monetary policy (for more details see, Ahmed et al., 2021; Sack and Wieland, 2000; Woodford, 2003).

For instance, the interactive term of NDCTOT and ECNG, (NDCTOT*ECNG) is negative and significant at a 1% level in the model (3) of Table 3.3. The interaction term means that the impact of NDCTOT on monetary policy is conditional upon the level of ECNG. So, the negative interaction term indicates that the probability of not choosing tight monetary policy increases as a result of an increase in NDCTOT when ECNG a conditioning variable increase, and vice versa. More specifically, model (3) in Table 3.4 shows that as the level of ECNG increases, from low to average

[96] The negative effect of GOVNEXP can be due to, in some cases, particularly in economies with high levels of government debt, increased government expenditure can lead to fiscal dominance over monetary policy. This means that the central bank may feel compelled to accommodate the government's spending by keeping interest rates low, even if it is not in line with its monetary policy objectives.

to high, the NDCTOT effect on the probability of not choosing tight monetary policy increases with a 1% significance level throughout the low, average, and high levels of ECNG. Central banks often follow countercyclical policies, aiming to stabilize the economy through interest rate adjustments.

Table 3.4: Indirect Effects of Narrow Dependent Commodity Terms of Trade on Monetary Policy Response through Different Conditional Variables having Different Percentile Levels[97]

Conditional Variables and their different levels	GOVNEXP From Model (2)	ECNG From Model (3)	UNEMPL From Model (4)	INF From Model (5)	EXRATE From Model (6)
Low	-0.798***	-0.624***	-0.289*	-0.662***	-0.609***
	(0.243)	(0.214)	(0.141)	(0.224)	(0.213)
Average	-0.724***	-0.693***	-0.407*	-0.611***	-0.587***
	(0.218)	(0.217)	(0.244)	(0.213)	(0.214)
High	-0.618***	-0.768***	-0.482**	-0.537***	-0.556***
	(0.211)	(0.239)	(0.228)	(0.195)	(0.216)

Note: Government expenditure (GOVNEXP), economic growth (ECNG), unemployment (UNEMPL), inflation (INF), and exchange rate (EXRATE) are conditional variables. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Low, Average, and High mean 25th, 50th, and 75th percentile respectively.

When economic growth is already high, it suggests a stronger economy less susceptible to the inflationary pressures that might arise from improved NDCTOT. Therefore, central banks might be less inclined to raise interest rates even with favorable export prices. The output gap measures the difference between actual and potential economic output. During high growth, the gap is likely positive, indicating that the economy is operating closer to its full capacity. Tightening policy in such a scenario could overheat the economy and create inflationary pressures beyond those arising from NDCTOT improvement. During high growth, domestic demand might already be robust. Raising interest rates to curb inflation stemming from improved NDCTOT might unnecessarily dampen demand, potentially hindering further economic expansion. Appreciation of the domestic currency due to improved NDCTOT can naturally dampen inflationary pressures by making imports cheaper. This might allow central banks to maintain accommodative policies (lower interest rates) even with higher export prices (for further details see for instance, Merzlyakov, 2012; Fraga et al., 2003; Sack and Wieland, 2000; Woodford, 2003; Dornbusch and Fischer, 1986).

For instance, the interactive term of NDCTOT and UNEMPL, (NDCTOT*UNEMPL) is negative and significant at a 10% level in the model (4) of Table 3.3. The interaction term means that the impact of NDCTOT on monetary policy is conditional upon the level of UNEMPL. So, the negative interaction term indicates that the probability of not choosing tight monetary policy increases as a result of an increase in NDCTOT when UNEMPL a conditioning variable increase, and vice versa. More specifically, model (4) in Table 3.4 shows that as the level of UNEMPL increases, from low

[97] Similar results can be found from our estimated fixed effect probit model in Table B3.4 in Appendix B.

to average to high, the NDCTOT effect on the probability of not choosing tight monetary policy increases with a 1% and 10% significance level throughout the low, average, and high levels of UNEMPL, respectively. The interaction between narrow dependent commodity terms of trade and unemployment influences the likelihood of tight monetary policy in export-dependent economies. Unemployment acts as a moderator by dampening the positive effect of improved NDCTOT on the likelihood of tight monetary policy. Central banks often follow countercyclical policies, aiming to stabilize the economy during downturns. When unemployment is high, it signifies a weak economy. Raising interest rates in such a scenario could further stifle economic activity and exacerbate unemployment. Therefore, central banks might be reluctant to tighten policy even if export prices improve. While higher NDCTOT can put upward pressure on inflation, the immediate concern during high unemployment might be the risk of deflation due to weak demand. Tightening policy in this context could worsen deflationary pressures. High unemployment can lead to social unrest and political pressure on policymakers. To maintain social stability, governments might favor expansionary policies (lower interest rates) even if TOT improves. The output gap refers to the difference between actual and potential output. During high unemployment, the output gap is likely negative, indicating underutilized resources. Tightening policy in such a situation might further reduce output and widen the gap, which is generally undesirable (see for example, Fraga et al., 2003; Sack and Wieland, 2000; Woodford, 2003; Merzlyakov, 2012).

For instance, the interactive term of NDCTOT and INF, (NDCTOT*INF) is positive and significant at a 5% level in the model (5) of Table 3.3. The interaction term means that the impact of NDCTOT on monetary policy is conditional upon the level of INF. So, the negative interaction term indicates that the probability of not choosing a tight monetary policy decreases as a result of an increase in NDCTOT when INF a conditioning variable increase, and vice versa. More specifically, model (5) in Table 3.4 shows that as the level of INF increases, from low to average to high, the NDCTOT effect on the probability of not choosing a tight monetary policy decreases with a 1% significance level throughout the low, average, and high levels of INF. As increase in inflation, regardless of NDCTOT, typically leads to an increased likelihood of tight monetary policy, aligning with standard economic theory. Improved NDCTOT can fuel inflationary pressures in export-dependent economies by making imports cheaper and potentially increasing domestic demand. Central banks generally prioritize price stability and aim to combat inflation through various tools, including raising interest rates. Therefore, it is logical that higher inflation, even without considering NDCTOT, would incentivize central banks to raise interest rates to counteract those inflationary pressures (for deeper details see, Ball, 2000; Sack and Wieland, 2000; Woodford, 2003; Dornbusch and Fischer, 1986).

For instance, the interactive term of NDCTOT and EXRATE, (NDCTOT* EXRATE) is positive and significant at a 10% level in the model (6) of Table 3.3. The interaction term means that the impact of NDCTOT on monetary policy is conditional upon the level of EXRATE. So, the negative interaction term indicates that the probability of not choosing a tight monetary policy decreases as a result of an increase in NDCTOT when EXRATE a conditioning variable increase or depreciate, and vice versa. More specifically, model (6) in Table 3.4 shows that as the level of EXRATE increases, from low to average to high, the NDCTOT effect on the probability of not choosing a tight monetary policy decreases or it is more likely to choose a tight monetary policy with a 1% significance level throughout the low, average, and high levels of EXRATE. Currency depreciation generally increases inflationary pressures by making imports more expensive. To combat inflation, central banks usually implement tight monetary policy Therefore, the anticipated relationship is for depreciation to be associated with a higher likelihood of tight monetary policy, aligning with standard economic theory (for further details see, Dornbusch and Fischer, 1986; Ball, 2000; Merzlyakov, 2012; Ebeke and Fouejieu, 2018).

3.6 Conclusion and Policy Recommendations

Over the past four decades, the world experienced various rapid and substantial exogenous shocks in commodity prices. Commodity prices often provide signals about the future direction of the economy. Hence, these shocks have posed complex challenges especially, for those economies that are narrowly dependent on commodity export for their foreign exchange earnings as one of the major income streams. At the same time the ability of export narrow-dependent countries to neutralize these effects, if they wished to do so, is much more limited. Therefore, these commodity price fluctuations lead to mismanagement of the domestic economy (as we have shown in Chapter 2) which in turn leads to pose challenges for sound macroeconomic policies. Macroeconomic policies are concerned with the performance of the well-established economy. These policies intend to produce a steady economic environment that is likely to encourage strong and sustainable economic growth, create wealth, generate employment opportunities, and hence improve the living standards of a country's individuals and households as a whole. However, in comparison to other macroeconomic policies, like exchange rate, trade, and sectoral policies, etc., fiscal and monetary policies are the most important macroeconomic policies. Because close coordination of both monetary and fiscal policies is a key to sound macroeconomic management (Tang, 2008). These policies are very important as policymakers react to cyclical fluctuations or business cycles originating within the domestic economy or transforming from outside the foreign economy(s). These cyclical fluctuations are inevitable up to some extent, however, their impact can be mitigated through well-chosen fiscal and monetary policy regimes (Ocran and Biekpe, 2007; Frankel, 2011;

Phelps, 1978). Frequently, macroeconomic policy is pro-cyclical, meaning it tends to destabilize rather than stabilize the economy. Some literature is relevant for assessing what the optimal fiscal and monetary reaction of developing countries to exogenous shocks should be.

However, much of the previous literature has focused on the response of fiscal and monetary variables, not policy responses, to changes in the standard TOT and CTOT as an exposure variable to accommodate commodity price shocks. Instead of the theoretically more pertinent country-specific gauge of commodity price fluctuations, which relies on the composition of the specific country's commodity export and import baskets, using standard TOT and CTOT as a commodity price exposure indicator in the era of frequently fluctuated commodity prices have triggered renewed interest because these previous commodity price exposure indicators do not capture and account the role of commodity dependence for especially producing and exporting economies in a major and broader level. The concern is not a minor one. Therefore, we argue that using the recently well-known CTOT index, along the lines of Spatafora and Tytell (2009) among others, but accounting and controlling for the strong and narrow export-dependent commodities' role in export-dependent economies to study the unanticipated effects of world trade prices, which led to macroeconomic mismanagement, on the response of fiscal and monetary policies. We anticipate that this variable more accurately captures the impacts of commodity price fluctuations in the export-dependent economies group, compared with the standard TOT and CTOT index. Moreover, most of the existing empirical literature focuses on the direct effects, ignoring the role of possible conditional factors as some obstacles that exist in all countries are far more important than others. As the macroeconomic response to exported commodities price booms and busts are not the same, rather they are heterogeneous across the countries (IMF, 2016) and depend mainly on two things; i) the structural characteristics of the economy and ii) the policy framework that is in place (Cespedes and Velasco, 2012). That is why in some instances, these price explosions and busts have translated fully in some instances, while on other occasions they are partially translated to exporting commodities-dependent countries. Therefore, fiscal and monetary authority's response would be different accordingly and based on these structural characteristics of the economy and the policy framework, both of them may also be called conditioning or moderating variables, that is in place. Because it is expected that the institutional framework and policy rules ought to matter in the reaction of fiscal policy to commodity price fluctuations (McLeay et al., 2020; Gelos and Ustyugova, 2017; Medina, 2010; Tang, 2008). To obtain consistent estimates, this study employs the advantages of the fixed-effect logit and probit method as an estimator to evaluate the response of fiscal and monetary policies to changes in narrow dependent commodity terms of trade, directly as well as indirectly, over the 1995–2021-time frame.

We provide evidence of countercyclicality of fiscal policy that is improvements in narrow dependent commodity terms of trade (NDCTOT) lead to an increase in the likelihood of choosing a tight fiscal policy and the other way round. The probability of choosing a countercyclical fiscal policy is further enhanced by a tight monetary policy (an increase in interest rate), economic growth, inflation, and government debt, however, it is decreased by a high level of unemployment. In contrast, improvement in narrow dependent commodity terms of trade leads to a decrease in the likelihood of choosing a tight monetary policy and on the contrary. The likelihood of not choosing a tight monetary policy is decreased by an increase in government expenditure, inflation, and exchange rate depreciation, however, it is increased by an increase in economic growth and unemployment and oppositely.

Our findings suggest that employing accommodative fiscal and monetary policies may help mitigate the impacts of both positive and negative external exportable commodity price fluctuations on the narrow export-dependent economy.

Appendices

Appendix A3

Table A3.1: Summary Statistics of Fiscal Policy Choice

Variable	Observation	Mean	Std. Dev.	Min	Max
FPC	919.000	0.481	0.500	0.000	1.000
NDCTOT	1377.000	99.970	2.146	94.089	108.903
ECNG	1284.000	3.979	5.056	-33.493	43.480
INF	1263.000	105.302	189.875	6.080	5411.002
UNEMPL	1306.000	6.820	4.819	0.100	31.840
DEBT	1335.000	53.750	46.338	0.000	388.401
REVENUE	1291.000	27.357	16.793	0.000	164.054
INTRATE	962.000	6.956	11.039	-81.132	54.678

Notes: The dependent variable is FPC, and the independent variables are NDCTOT, ECNG, INF, UNEMPL, DEBT, REVENUE, and INTRATE. All variables are in their original form, which means non-log transformed.

Table A3.2: Summary Statistics of Monetary Policy Choice

Variable	Observation	Mean	Std. Dev.	Min	Max
MPC	702.000	0.524	0.500	0.000	1.000
NDCTOT	1377.000	99.970	2.146	94.089	108.903
ECNG	1284.000	3.979	5.056	-33.493	43.480
UNEMPL	1306.000	6.820	4.819	0.100	31.840
INF	1263.000	105.302	189.875	6.080	5411.002
DEBT	1335.000	53.750	46.338	0.000	388.401
EXRATE	1352.000	4972954.000	183000000.000	0.009	6720000000.000
GOVNEXP	1254.000	19.473	12.290	0.003	107.424

Notes: The dependent variable is MPC, and the independent variables are NDCTOT, ECNG, INF, UNEMPL, DEBT, EXRATE, and GOVNEXP. All variables are in their original form, which means non-log transformed.

Table A3.3: Correlation Matrix of Fiscal Policy Choice

Variable	FPC	NDCTOT	ECNG	INF	UNEMPL	DEBT	REVENUE	INTRATE
FPC	1.000							
NDCTOT	0.035	1.000						
ECNG	0.121	0.037	1.000					
INF	-0.013	0.053	-0.043	1.000				
UNEMPL	0.040	0.137	-0.040	-0.008	1.000			
DEBT	0.008	0.204	-0.187	0.018	0.192	1.000		
REVENUE	-0.017	-0.048	-0.054	-0.059	-0.154	-0.160	1.000	
INTRATE	-0.202	-0.016	-0.002	-0.278	0.122	0.123	-0.132	1.000

Notes: The dependent variable is FPC, and independent variables are NDCTOT, ECNG, INF, UNEMPL, DEBT, REVENUE, and INTRATE. All variables are in their original form, which means non-log transformed.

Table A3.4: Correlation Matrix of Monetary Policy Choice

Variable	MPC	NDCTOT	ECNG	UNEMPL	INF	DEBT	EXRATE	GOVNEXP
MPC	1.000							
NDCTOT	-0.049	1.000						
ECNG	0.037	0.056	1.000					
UNEMPL	-0.024	0.127	-0.052	1.000				
INF	-0.042	0.070	-0.152	-0.038	1.000			
DEBT	0.030	0.205	-0.121	0.224	-0.018	1.000		
EXRATE	0.043	-0.050	0.040	0.010	0.033	-0.057	1.000	
GOVNEXP	0.034	0.068	-0.118	0.205	-0.108	0.287	-0.246	1.000

Notes: The dependent variable is MPC, and independent variables are NDCTOT, ECNG, UNEMPL, INF, DEBT, EXRATE, and GOVNEXP. All variables are in their original form, which means non-log transformed.

Appendix B3

Table B3.1: Fiscal Policy Response to Narrow Dependent Commodity Terms of Trade Fluctuations_FE_PROBIT

Independent Variables	FISCAL POLICY CHOICE_GOVERNMENT EXPENDITURE: TIGHT=1, EASY=0					
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
NDCTOT	0.443*** (0.121)	0.364** (0.164)	0.451*** (0.121)	0.444*** (0.121)	0.443*** (0.122)	0.486*** (0.124)
ECNG	0.0680*** (0.0137)	0.0588*** (0.0163)	-0.00486 (0.0140)	0.0686*** (0.0137)	0.0655*** (0.0136)	0.0725*** (0.0141)
UNEMPL	-0.377** (0.169)	-0.348 (0.214)	-0.398** (0.170)	0.225 (0.315)	-0.325** (0.168)	-0.367** (0.170)
INF	0.402** (0.183)	0.872*** (0.301)	0.392** (0.183)	0.410** (0.184)	0.793** (0.443)	0.422** (0.184)
DEBT	0.386*** (0.111)	0.411*** (0.153)	0.382*** (0.111)	0.383*** (0.111)	0.350*** (0.111)	0.689*** (0.214)
REVENUE	-0.874*** (0.258)	-0.0303** (0.0130)	-0.850*** (0.258)	-0.859*** (0.259)	-0.811*** (0.262)	-0.801*** (0.261)
INTRATE		-0.0559*** (0.0105)				
NDCTOT x INTRATE		0.000149* (0.0000778)				
NDCTOT x ECNG			0.000707*** (0.000145)			
NDCTOT x UNEMPL				-0.00586* (0.00328)		
NDCTOT x INF					0.0108* (0.00579)	
NDCTOT x DEBT						0.00354* (0.00213)
No. of Obs.	836	610	835	836	836	836
Pseudo R-squared (%)	10.73	19.07	10.85	10.80	11.11	11.02
Log-Likelihood	-516.933	-340.783	-515.601	-516.546	-514.713	-514.618
LR chi-squared test	124.27	160.60	125.48	125.04	128.71	127.45
Prob>chi2	0.0001	0.0000	0.0001	0.0001	0.0000	0.0000

Note: This table consists of models (1)-(6) which are entirely estimated through fixed effect logistic (FEL) regression technique. The dependent variable is the fiscal policy choice that is tight = 1 otherwise 0. Independent variables are narrow dependent commodity terms of trade (NDCTOT), economic growth (ECNG), unemployment (UNEMPL), inflation (INF), government debt (DEBT), government revenue (REVENUE), and interest rate (INTRATE). All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Model (1) shows results of the base model solely, whereas models (2)-(6) indicate results of the base model with INTRATE, ECNG, UNEMPL, INF and DEBT as conditional variables and (NDCTOT x INTRATE), (NDCTOT x ECNG), (NDCTOT x UNEMPL), (NDCTOT x INF), and (NDCTOT x DEBT) are their interactive terms, respectively.

Table B3.3: Monetary Policy Response to Narrow Dependent Commodity Terms of Trade Fluctuations_ FE_PROBIT

Independent Variables	MONETARY POLICY CHOICE_INTEREST RATE: TIGHT=1, EASY=0					
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
NDCTOT	-0.388***	-0.400***	-0.386***	-0.444***	-0.458***	-0.390***
	(0.128)	(0.139)	(0.139)	(0.133)	(0.133)	(0.129)
ECNG	-0.0603***	-0.0642***	0.00674	-0.0594***	-0.0605***	-0.0637***
	(0.0150)	(0.0169)	(0.0149)	(0.0149)	(0.0150)	(0.0151)
UNEMPL	-0.0249	-0.0298	0.0175	0.00905	-0.0450	-0.0717
	(0.194)	(0.203)	(0.197)	(0.0560)	(0.195)	(0.196)
INF	0.458*	0.479*	0.651**	0.467*	0.638***	0.811**
	(0.239)	(0.287)	(0.266)	(0.242)	(0.264)	(0.387)
DEBT	0.567***	0.566***	0.588***	0.580***	0.585***	0.584***
	(0.151)	(0.158)	(0.158)	(0.152)	(0.151)	(0.154)
EXRATE	0.000737*	0.000785**	0.00104**	0.000737**	0.000670*	0.000693
	(0.000364)	(0.000378)	(0.000410)	(0.000363)	(0.000369)	(0.000372)
GOVNEXP		-0.962**				
		(0.386)				
NDCTOT x GOVNEXP		0.0106***				
		(0.00403)				
NDCTOT x ECNG			-0.000646***			
			(0.000156)			
NDCTOT x UNEMPL				-0.000326*		
				(0.000155)		
NDCTOT x INF					0.0143**	
					(0.00683)	
NDCTOT x EXRATE						0.00631*
						(0.00339)
No. of Obs.	689	645	673	681	689	689
Pseudo R-squared (%)	11.93	13.81	13.04	11.96	12.49	11.98
Log-Likelihood	-419.803	-384.928	-404.783	-417.957	-417.139	-419.565
LR chi-squared test	113.77	123.34	121.38	108.74	119.10	114.25
Prob>chi2	0.0006	0.0001	0.0001	0.0014	0.0002	0.0007

Note: This table consists of models (1)-(6) which are entirely estimated through fixed effect logistic (FEL) regression technique. The dependent variable is the monetary policy choice that is tight = 1 otherwise 0. Independent variables are narrow dependent commodity terms of trade (NDCTOT), economic growth (ECNG), unemployment (UNEMPL), inflation (INF), government debt (DEBT), exchange rate (EXRATE), and government expenditure (GOVNEXP). All variables are log-transformed. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Model (1) shows results of the base model solely, whereas models (2)-(6) indicate results of the base model with GOVNEXP, ECNG, UNEMPL, INF and EXRATE as conditional variables and (NDCTOT x GOVNEXP), (NDCTOT x ECNG), (NDCTOT x UNEMPL), (NDCTOT x INF), and (NDCTOT x EXRATE) are their interactive terms, respectively.

Table B3.2: Indirect Effects of Narrow Dependent Commodity Terms of Trade on Fiscal Policy Response through Different Conditional Variables having Different Percentile Levels

Conditional Variables and their different levels	INTRATE From Model (2)	ECNG From Model (3)	UNEMPL From Model (4)	INF From Model (5)	DEBT From Model (6)
Low	0.365** (0.165)	0.454*** (0.121)	0.437*** (0.121)	0.436*** (0.121)	0.433*** (0.122)
Average	0.393** (0.169)	0.496*** (0.129)	0.382*** (0.113)	0.501*** (0.131)	0.486*** (0.124)
High	0.455** (0.189)	0.561*** (0.149)	0.317*** (0.096)	(0.585*** (0.157)	0.616*** (0.165)

Note: Interest rate (INTRATE), economic growth (ECNG), unemployment (UNEMPL), inflation (INF), and debt (DEBT) are conditional variables. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Low, Average, and High mean 25th, 50th, and 75th percentile respectively.

Table A3.4: Indirect Effects of Narrow Dependent Commodity Terms of Trade on Monetary Policy Response through Different Conditional Variables having Different Percentile Levels

Conditional Variables and their different levels	GOVNEXP From Model (2)	ECNG From Model (3)	UNEMPL From Model (4)	INF From Model (5)	EXRATE From Model (6)
Low	-0.373*** (0.139)	-0.388*** (0.139)	-0.198* (0.095)	-0.384*** (0.129)	-0.587*** (0.214)
Average	-0.358*** (0.121)	-0.411*** (0.142)	-0.257* (0.147)	-0.356*** (0.125)	-0.556*** (0.216)
High	-0.322*** (0.111)	-0.467*** (0.147)	-0.304** (0.137)	-0.332*** (0.121)	-0.386*** (0.129)

Note: Government expenditure (GOVNEXP), economic growth (ECNG), unemployment (UNEMPL), inflation (INF), and exchange rate (EXRATE) are conditional variables. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively. Robust standard errors are reported in parentheses. Low, Average, and High mean 25th, 50th, and 75th percentile respectively.

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Chapter #03

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