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Commodities and International Capital Flows: The Effect of Commodity Price Volatility on Foreign Debt Inflows in West Africa & Latin America

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ABSTRACT

This paper studies the relationship between commodity price volatility and foreign debt inflows for three recipient sectors: sovereigns, banks, and corporates. Eight countries in West Africa and Latin America are studied by using quarterly data over the period 1996-2019. A commodity price volatility measure is constructed per country by multiplying the GARCH-values of commodities with the corresponding weights in the country's total exports. Foreign debt inflows are derived from the dataset constructed by Avdjiev et al (2018). Both OLS and GLS regressions were performed, and results showed a significant relationship between commodity price volatility and foreign debt inflows for different sectors, with the relationship being negative for sovereign and total inflows and positive for the bank sector. No significant moderating effect has been found for global GDP growth.

Keywords: International Capital Flows, Foreign Debt Inflows, Commodity Price Volatility, Commodity Dependence, Developing Countries

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1. Introduction

In the first 15 years of the 2000s, a lot of African economies went through a growth period which was largely caused by robust commodity prices. Even during the global financial crisis in 2008, this growth was barely affected, mainly because of steady foreign capital inflows coming from large countries like China and India (Africa Renewal, 2017). This 'golden era' took a turn when commodity prices crashed. The economic growth rates of Nigeria and Angola - Africa's most important oil producers - halved, because of oil prices going from $100 per barrel in 2013 to $26 per barrel in 2016. The continent is rich in and dependent on several commodities, so not only the oil price affected the economies. With copper and iron prices hitting historic lows, countries like Zambia and Sierra Leone were also heavily impacted (Africa Renewal, 2017). More recently, COVID-19 took its turn on African economies as well. Foreign direct investment declined by 16% in 2020. This decline was caused both by economic and health challenges due to the pandemic and by low prices of energy commodities. A report by the UNCTAD showed that commodity-dependent countries – which are countries where commodities represent over 60% of total exports – were affected more than non-commodity-dependent countries (UNCTAD, 2021). Because of this commodity dependence, these countries are vulnerable to market volatility and price fluctuations, and this often leads to lower levels of development and economic stability (UNCTAD, 2023).

In a paper by Tahar et al (2021), the asymmetric effects of commodity prices on GDP per capita in commodity-dependent countries are studied with a nonlinear ARDL model. Results demonstrate that an increase in commodity prices has a positive significant effect on GDP per capita and that a decrease has a less significant negative effect. Results also show that in the short term only negative price shocks affect GDP. The paper by Eissa & Elgammal (2019) studied the determinants of foreign investments in oil-exporting countries with panel data from six Gulf Cooperation Council countries (1990-2015) and taking into account variables such as market growth, trade openness, inflation, infrastructure, oil prices, and reserves. Results demonstrate a positive impact of market growth, trade openness, and oil prices on foreign investment, while oil reserves negatively affect foreign investment, which can be explained by the fact that oil-rich countries often have the financial resources to finance their economic projects themselves. Another explanation could be that these countries may set restrictions on foreign investments to maintain control over their resources. Although this thesis focusses on volatility rather than price levels, it is interesting to see how commodity price levels affect foreign capital inflows in general. In a paper by Ibrahim & Olakada (2020), the relationship between crude oil price levels and foreign investment in Nigeria is researched. The results show a significant positive relationship between crude oil prices and foreign investment inflows. Again, it is important to note that, unlike the mentioned paper, this thesis focuses on price volatility. However, the findings of

the paper are still relevant, since it demonstrates that commodity prices influence foreign capital inflows in general, which implies that volatility could also be of influence. De Sá Farias et al (2022) studied the impact of commodity prices on capital movement in emerging economies, focusing on the 1995-2016 period. The authors mainly studied Latin-American countries, but also cover other countries like South Africa. They use probit and cloglog models and results indicate that high commodity prices can lead to increased foreign capital inflows. Finally, Ofori-Abebrese & Pickson (2017) studied the relationship between cocoa prices, exchange rate and economic growth in Ghana and Côte d'Ivoire from 1980 to 2011. The authors make use of an autoregressive distributed lag model and find that higher cocoa prices reduce long-term economic growth in Ghana but have no significant impact in Côte d'Ivoire. These papers do not directly relate to foreign capital inflows, but it implies that commodity price volatility, both for oil and non-oil commodities, could influence the economy.

As shown in the previous paragraph, literature already researched the relationship between commodity prices and foreign capital inflows. However, existing literature has a couple of limitations. First of all, foreign debt inflows are not covered that well. However, debt inflows form the largest component of total foreign capital inflows, both for advanced economies and emerging markets (Avdjiev et al, 2018). In the paper by Avdjiev et al (2018), the dynamics of international capital flows – consisting mainly of debt inflows – are studied. The authors make use of a new dataset of quarterly capital inflows divided by recipient sector. The methodology includes panel regressions to analyze the impact of domestic GDP growth and global risk aversion on capital flows. Results show that capital inflows and outflows in developing countries are highly procyclical for banks and corporates, while sovereign flows are countercyclical, providing stability during periods of global financial stress. Another limitation of the papers discussed in the previous paragraph is that most of the papers regarding commodity prices focus on the price level itself, but not on its volatility. However, a lot of commodity prices are not stable – which is demonstrated in paragraph 3.2.1 – and the price level is just a snapshot, but not representative on the longer term. It would be interesting to see how this longer-term uncertainty caused by the price volatility affects foreign debt inflows. Abaidoo et al (2022) wrote a paper on commodity price uncertainty in Sub-Saharan Africa. The authors show how commodity price volatility significantly influences political stability. Although the paper does not focus on capital flows, it is most likely influenced by global commodity price uncertainty. This would correspond with the findings of Jardet et al (2022). In their paper, the authors show that global uncertainty, rather than host country uncertainty, significantly influences foreign investment inflows. Studying the effects of commodity price volatility on foreign debt inflows is relevant, because these regions heavily rely on commodities for their economic stability, with price fluctuations significantly influencing their GDP, employment rates, and overall economy. Understanding this relationship is important for policymakers to attract and sustain capital inflows, which also became clear during the COVID-19 pandemic as described earlier in this chapter. Finally, an important limitation of existing literature is that they focus

on a specific commodity and/or a specific country instead of a portfolio of multiple commodities/countries. It would be interesting to consider price volatility of the most important export commodities for multiple countries. The results would be more externally valid and therefore would give a clearer view on the relationship between commodity price volatility and foreign debt inflows. The research question this thesis aims to answer is:

How does commodity price volatility affect foreign debt inflows in West African and Latin American commodity-dependent countries?

To define volatility, this thesis works with a prediction model (see paragraph 3.2.1), which indicates how volatile each commodity is. Subsequently, these values are multiplied by the weight in total export value for each commodity in a specific country, which gives us the final volatility index. Foreign debt inflows are divided into three recipient sectors: sovereign, banks, and corporates. This thesis expects a positive effect of volatility on foreign debt inflows for the bank and corporate sector, while a negative effect is expected for sovereign inflows. These hypotheses are further explained in the next chapter.

This thesis aims to find significant relationships between commodity price volatility and foreign debt inflows, which could potentially help policy makers to stabilize their economies and attract more stable capital inflows. As demonstrated in chapter 5, resi;ts show that commodity price volatility seems to positively influence foreign debt inflows in the bank sector. For the sovereign sector and for total foreign debt inflows, commodity price volatility seems to have a negative influence. These findings match the hypotheses discussed in the previous paragraph. For the corporate sector, no clear relationship has been found.

The remainder of this paper is structured as follows. Chapter 2 covers the theoretical framework, consisting out of 2 main subjects: foreign debt inflows and commodities. It also describes the hypotheses of this thesis. Chapter 3 gives a description of the data sample and variables, and subsequently, in chapter 4 the methodology is clarified. Chapter 5 gives the findings from the regression analysis. Finally, the chapter 6 discusses the outcomes of the study, offers recommendations for future research, and addresses the study's limitations.

2. Theoretical Framework

In this chapter, different theories and concepts will be described regarding foreign debt inflows, commodities, and commodity-dependent developing countries (CDDCs). Also, the existing literature will be reviewed to be able to develop the hypotheses. The goal of this chapter is to get a better understanding of the different theories and concepts and the connection between them, and to create well-founded hypotheses.

2.1 Foreign debt inflows

2.1.1 Foreign debt inflows in general

Foreign capital inflows refer to the capital coming from another country into the domestic country. There are multiple forms of this capital movement, among which foreign direct investment, portfolio investment, debt and other investments. This thesis focuses on debt inflows, which refers to foreign capital invested in debt instruments, which for instance can be government bonds, corporate bonds, or bank loans. Avdjiev et al (2018) studied these debt inflows and compared characteristics of three different recipient sectors: sovereigns, banks, and corporates. They constructed a publicly available dataset, which is also used for this thesis, that divided capital inflows and outflows by sector on a quarterly basis. In this dataset, two types of debt inflows are described, being portfolio debt and other investment debt. Portfolio debt includes bonds and other debt securities such as notes. Other investment debt includes bank loans, deposits, trade credit, and other investment debt instruments. The authors of the paper describe multiple important findings related to capital inflows. First of all, they found that the co-movement of capital inflows and outflows is mainly driven by the banking sector, meaning that inflows and outflows tend to move together, influenced by banks' activities. They also found that capital inflows by banks and corporates move procyclical, while sovereigns' debt inflows move acyclically in advanced economies and countercyclically in developing countries. This implies that when domestic economic activity increases, banks and corporates increase their borrowing, while sovereigns borrow to compensate for economic downturns. Third, they also found that when global risk aversion increases, capital inflows and outflows for banks and corporates decrease. Sovereign flows however do not seem to be impacted by global risk aversion. In the next paragraphs, macroeconomic effects and foreign debt inflows per recipient sector are described more in detail.

2.1.2 Macroeconomic characteristics of foreign capital

International capital flows both influence and are influenced by macroeconomic factors. This paragraph looks into what macroeconomic factors are related to international capital movement. The paper by Davis (2015) studied the macroeconomic effects of foreign capital inflows, and specifically

focused on the difference between debt-based and equity-based inflows. The author found that exogenous shocks to total capital inflows lead to an increase in output, inflation, asset prices, credit growth, and exchange rate appreciation. These effects, however, are mainly driven by debt inflows. Equity inflows do not show similar influence. Another finding of the paper is that debt-based inflows are 2.5 times more volatile than equity-based inflows. This volatility is one of the reasons why debt inflows have a higher influence on macroeconomic factors. Because of this significant influence of debt inflows, the author calls for strong policies to manage these inflows. Finally, the author found that both debt and equity inflows are influenced by global liquidity and risk factors, with debt inflows being most affected by these. Tahir et al (2019) studied the impact of different types of foreign capital inflows, among which aid, foreign direct investment, and debt inflows. They specifically studied countries in the South Asian Association for Regional Cooperation (SAARC). The authors found that foreign aid and direct investment positively affect economic growth, while foreign debt has a negative impact. The paper states that high levels of debt in SAARC countries, and improper use of these loans, negatively affect long-term economic growth. Repayment of debt accounts for a significant part of the annual budget. It is advised to governments by the authors to manage debt levels and ensure productive use to avoid negative effects. Yasar (2021) studied the causal relationship between foreign debt and economic growth in the Commonwealth of Independent States (CIS). The author found a negative long-term unidirectional relationship from foreign debt to GDP, which supports the debt overhang hypothesis. This hypothesis states that high levels of foreign debt discourage investment and economic growth due to anticipated future tax burdens needed to repay the debt. As described earlier, this was also a determinant of the negative effect of foreign debt in SAARC countries (Tahir et al, 2019). The negative impact of foreign debt on GDP in CIS countries is partly attributed to poor management of financial resources, incomplete governance, and immature institutions. In the short term, foreign debt seems to stimulate economic growth, but then the long-term costs of borrowing limit this positive effect. In line with other papers, the author highlights the importance of effective management of foreign debt and financial resources. Omodero & Alpheaus (2019) studied how foreign debt influences Nigeria's economic growth. Results of the study indicate that foreign debt has a significant negative impact on economic growth, but foreign debt servicing shows a strong positive effect. This implies that while accumulating foreign debt can hinder economic progress, effectively servicing that debt can help stimulate growth by making the country more creditworthy and potentially attracting more investment. However, this cycle can lead to overdependence on foreign capital, which could contribute to a debt overhang situation where the country's resources are largely consumed by debt repayments. Again, the authors advise to implement efficient borrowing strategies.

2.1.2 Sovereigns' foreign debt inflows

As mentioned in the first chapter, this thesis makes use of the publicly available dataset constructed by Avdjiev et al (2018). Foreign debt inflows are divided into three recipient sectors: sovereigns, banks,

and corporates. This paragraph focuses on sovereigns' debt inflows. This again is divided into two types of debt inflows: portfolio debt (PD) and other investment debt (OID). PD mainly consists of government bonds. OID among others includes instruments such as currency and deposits, loans, trade credit, and other accounts payable. This thesis takes the sum of PD and OID to construct the total of sovereign foreign debt inflows. Lin & Sosin (2001) defined sovereign foreign debt as loans acquired by a country from foreign sources, among which international institutions like the IMF and World Bank. The authors state that foreign debt can either stimulate or hinder economic growth. In line with recommendations of previously discussed papers, they mention that this depends on how it is managed and utilized. Coulibaly et al (2019) discussed the increasing concerns of a potential new sovereign debt crisis in Sub-Saharan Africa. Since 2013, debt in this region has been rising. This rise is driven by multiple factors, among which policy measures to support economic activity which led to declining government revenues and widening fiscal deficits. The authors also mention changes in the debt structure that increases risk. One of these changes is a higher share of foreign-currency-denominated debt, which exposes countries to global market volatility. Also, the role of China as a lender, especially for infrastructure projects, has increased. A significant part of debt to China is commodity-linked, which adds another layer of risk. The rapid increase and structural changes could potentially lead to a sovereign debt crisis. Therefore, the authors call for proactive measures such as improving domestic resource mobilization, improving tax revenue collection, and strengthening governance. They also call for development banks to play a bigger role in infrastructure financing. Governance and debt management has been mentioned in multiple papers discussed and seems to be an effective way to influence macroeconomic effects of foreign debt. Manasseh et al (2022) studied the influence of sovereign debt on economic growth in Sub-Saharan countries, and specifically focused on the role of governance. They also noticed the significant increase in debt-to-GDP ratios, which often surpasses thresholds set by national and international institutions. In line with other papers, they also state the negative effects of debt overhang. Regarding governance, the study found that good governance, which consists of factors such as corruption control, regulatory quality, and political stability, can mitigate the negative effects of foreign debt. Countries with better governance structures are more likely to use foreign debt effectively, which can lead to economic growth and development. The papers mentioned until now mainly focus on the debtor side, being sovereigns. However, the type of creditor might also be of influence on the effects of sovereign debt. Alfaro et al (2014) studied international debt transactions and looked at different types of creditors. They found that when sovereign debt is financed by private creditors, it positively affects economic growth. However, when the creditor is another sovereign, it negatively affects economic growth. Regarding governance and policies, it might therefore also be relevant for governments to carefully choose the source of debt.

2.1.3 Banks' and corporations' foreign debt inflows

Besides sovereigns' foreign debt inflows, the paper by Avdjiev et al (2018) also discusses the dynamics of foreign debt inflows into banks and corporations. Interestingly, the authors state that before the global financial crisis in 2008, advanced economy's banks received the biggest part of foreign capital inflows, mostly in the form of other investment debt - which among others consists of bank loans, deposits and trade credit. After the crisis in 2008, however, a big increase in debt inflows into developing countries' banks and corporations took place. Also, the authors found that in advanced economies most of the debt is held by banks. In developing economies, the debt is more evenly split between banks, corporations, and sovereigns. As already described earlier, the authors found that banks' and corporations' foreign debt inflows move procyclical, which is a relevant pattern when constructing the hypotheses of this thesis. Hawkins & Turner (2008) discussed the implications and challenges of foreign debt inflows into the banking and corporate sectors in developing economies. They state that foreign borrowing by the corporate sector is often substantial, and capital is often borrowed in foreign currencies, making it vulnerable to exchange rate fluctuations. A big challenge described by the authors is that companies often prefer short-term foreign debt, which makes economies more vulnerable to shifts in financial market confidence, due to the frequent and unpredictable nature. Regarding banks, the paper highlights the need for sufficient management of foreign exchange and liquidity risks. Banks are regarded as more implicitly guaranteed by governments, making their foreign debt management of influence for the overall financial stability. Caballero (2014) studied the influence of sudden increases in foreign capital inflows and banking crises, but did not find a direct link between these surges in capital inflows leading to lending booms, which could potentially lead to banking crises. However, a strong link between these surges and banking crises is found without the lending boom, which implies that these inflows can increase financial instability through other channels than excessive lending. The author states that portfolio-equity inflows significantly increase the probability of banking crises, suggesting that these types of inflows might cause asset price bubbles and increased financial fragility due to liquidity effects. Finally, the author found that emerging economies face greater risks from large inflows of capital, which leads to the recommendation to policymakers to design policies that limit the size of capital inflows and ensure financial stability. The paper by Williams (2018) studied the effects of foreign debt inflows on the private sector by studying a natural experiment in Colombia. In March 2014, J.P. Morgan included several Colombian treasury bonds in its emerging markets debt index, which led to a significant increase in foreign capital inflows into Colombia's debt market. The increase of foreign capital into the sovereign debt market reduced the need for domestic banks to hold government debt, allowing these banks to increase lending to the private sectors. This led to an increase in economic activity. In conclusion, foreign debt inflows play an important role in the dynamics of the banking and

corporate sector. While in more extreme forms it could potentially lead to financial challenges, with good policies foreign capital is also able to stimulate domestic economic activity.

2.2 Commodities

2.2.1 Commodities and the global economy

In order to link foreign debt inflows to commodity price volatility, it is important to have a good understanding of the dynamics of commodities and its relation to the global economy. In this paragraph, multiple papers related to this topic are discussed. Lee (2010) studied Global Commodity Chains (GCC) and Global Value Chains (GVC) to get a better understanding of the global economy. GCC refers to the network involved in producing and delivering a commodity, from raw material extraction to final product. GVC refers to the value added at each step of production. The commodity production process usually takes place in different countries to take advantage of country-specific benefits, such as cheap labor, raw materials, and advanced technology. Large companies, often called lead firms, play an important role in GVCs, since they decide where to source materials, where to manufacture, and how to distribute products globally. The countries involved in GVCs might benefit from economic growth, but it can also lead to dependency on lead firms or vulnerability to global market changes. Disruption in one part of the world can impact the entire chain. Therefore, effective governance and policies are important for countries and their role in GVCs. Bair & Werner (2011) further discussed GVCs, GCCs and the impact on global capitalism, and focus on the uneven geographies they cause. As described, GVCs show the value added at each step. These chains clearly show the role of different countries and companies, and therewith the power dynamics within these global chains. The authors introduce the ‘disarticulations perspective’, focusing on how GCCs can lead to both inclusion and exclusion of countries and other actors in global production, and show the uneven and volatile nature of global capitalism. By presenting different case studies, the authors show that the process of including and excluding regions from GCCs often increases social inequalities. Social factors like race and gender seem to play an important role in deciding who benefits from these global chains. With the findings of these papers in mind, it would be interesting to learn more about commodity prices. The paper by Matsumoto et al (2023) studied the influence of commodity prices on global economic activity. They state that commodities account for approximately 17% of global trade, and therefore prices are closely linked to global economic activity. The results show that many commodities, especially industrial commodities such as metals and energy, seem to move together with economic activity. Obviously, supply shocks can lead to an increase in prices, but nevertheless, the relationship between commodity prices and economic activity is strong. Therefore, the authors state that commodity prices contain useful information regarding the state of the current and future global economy. This relationship is confirmed by Duarte et al (2021). They introduced the derived-demand approach to explain the positive correlation between commodity prices and global economic

activity: when global production increases, the demand for commodities increases as well, leading to higher prices, and the other way around. The authors also show that, in the short-term, the supply of important commodities such as oil and metals doesn't respond to price changes that heavily. This can be explained by the capital-intensive production processes. The authors state that policymakers should take commodity prices into account when forecasting global economic trends. Previously discussed literature showed a strong relationship between commodity prices and the global economy. It is interesting to see in which way this relationship goes. Yating et al (2022) studied the influence of commodity price volatility on global economic performance, mainly focusing on oil and gas. The study describes the significant volatility in commodity prices during different global crises and finds that commodity price volatility negatively affects global economic performance. This relationship is bidirectional: in the short-term the influence of commodity price volatility on economic performance is stronger. On the long-term economic performance affects commodity price volatility. Not that long ago, COVID-19 took place: a perfect example of a global crisis which had a big impact on the global economy. Sun & Wang (2021) studied the influence of commodity price volatility on global economic performance in the context of this crisis. Before the pandemic, commodity prices and the global economy were growing steady, but during the pandemic, the paper shows that there was significant volatility in commodity prices. However, the authors do not find a significant influence on global economic performance. The authors suggest some recommendations for policymakers, among which price ceilings and strategic reserves to avoid volatility. With the discussed literature in mind, it is fair to state that commodity prices and global economic activity are strongly linked, and that it is important for policymakers to anticipate this.

2.2.2 Commodity trading

When looking into the relationship between commodity price volatility and foreign debt inflows, it is important to have a good understanding of the world and dynamics of commodity trading. The paper by Pirrong (2014) covers the dynamics of this industry and describes commodity trading firms (CTFs). These firms move commodities from one place to another, store them over time, and sometimes process them into different forms. Simply put, they gain profits by buying commodities where they are cheap and selling them where they are more expensive. CTFs face many risks, such as changes in commodity prices, but most firms use strategies like hedging or use other derivates to manage these price risks. For CTFs, private ownership rather than public ownership is common. Unlike banks, CTFs do not form a big risk to the financial system, since they are smaller, less leveraged, and do not create credit risks. If one firm goes bankrupt, another firm can take over its assets, ensuring that commodity flows continue. The paper by Baines & Hager (2021) gives a clear view of the position of CTFs in the global economy. The authors describe CTFs as central intermediaries in global supply chains, connecting producers and users of raw materials through transportation, storage, and processing. The paper mentions a couple of CTFs – among which Cargill, Louis Dreyfus, Vitol, and Glencore – who

handle a big part of the global trade in commodities. After the big boom in commodity prices from 2003 to 2011, commodity trading firms shifted their focus from financial activities back to their core business, such as processing and selling commodities. Nevertheless, CTFs have increased dividends and share repurchase commitments, positively influencing shareholder value. CTFs are a target of criticism regarding ecological damage, deforestation, forced labor, and corruption. Also, their speculative activities in derivatives markets are also criticized for having destabilizing effects on physical markets. Baines & Hager (2021) studied whether it would be possible for financial activists to influence CTFs on prioritizing long-term environmental and social goals over short-term profits, but found that despite some potential, the predominance of private ownership in CTFs excludes the activists from shareholder resolutions. Large shareholders often vote in favor of management proposals and against ESG improvements. Nevertheless, multilateral efforts involving governments, NGOs, and other financial institutions could potentially hold CTFs accountable for their negative impact and promote sustainable practices. As mentioned, the paper points out Cargill as one of the major CTFs. Salerno (2016) wrote an interesting case study on how Cargill increases its profits during times of market volatility, giving a better insight into the commodity trading industry. The author describes Cargill's extensive network as an important factor since it gives access to critical information about global agricultural supply and demand, providing the firm with real-time insights into market conditions and allowing it to anticipate and respond to market changes more effectively than competitors. Cargill has set up a couple of financial subsidiaries which are active in speculative trading and hedging activities, making use of the information from Cargill's operations. The author states that the firm's operations and financial strategies are intertwined, which allows Cargill to profit from market volatility by taking positions in the market based on its superior knowledge of supply and demand. The paper also discusses how regulatory changes, such as the Dodd-Frank Act (increasing transparency and accountability in the financial system), try to limit speculative activities, but notes that these regulations often do not (fully) apply to firms like Cargill. Overall, literature shows that the influence of CTFs on the global economy is substantial.

2.2.3 Developing countries and commodity dependence

This thesis studies the influence of commodity price volatility on foreign debt inflows in commodity-dependent developing countries (CDDCs) in West Africa and Latin America. It is therefore important to have a clear theoretical framework regarding CDDCs. A country is regarded to be commodity-dependent if commodities account for more than 60% of its total exports of goods (UNCTAD, 2023). CDDCs are vulnerable to external, economic shocks due to the volatility of commodity prices. For example, a sudden drop in commodity prices can decrease export revenues, which can lead to national budget deficits and increased debt levels. Also, commodity price volatility can negatively influence terms of trade for these countries, which can potentially increase inequality and poverty levels. The cyclical nature of commodity prices – meaning periods of high prices are often followed by sharp

declines – makes long-term economic planning difficult for CDDCs. UNCTAD (2023) states that policies aiming to diversify away from primary commodities are important for these countries. Also, improving institutional quality and governance is important to effectively manage revenue streams and use them to support sustainable development goals. Finally, they state that international collaboration and support, such as development assistance, technology transfer, and trade agreements, are important for CDDCs. Regarding the policies, it is interesting to research which factors stimulate economic development in CDDCs. The paper by Birdsall & Hamoudi (2002) studied the relationship between commodity dependence, trade openness, and economic growth. They found that the relationship between trade openness and growth is complicated, especially for CDDCs. The paper shows that countries highly dependent on commodity exports experience slower economic growth than countries less dependent on commodities. Trade openness alone does not solve the challenges that come with commodity dependence. The authors state that variables such as geographical characteristics, political history, and institutional frameworks play a significant role in a country's economic growth. In line with UNCTAD, they recommend these countries to diversify their economies away from primary commodities, for instance by investing in human capital, infrastructure, and technological innovation. The paper by Nkurunziza et al (2017) studied the relationship between commodity dependence and human development in developing countries. Human development stands for improving people's well-being regarding their health, education, and living standards. The authors found that high commodity-dependence negatively affects human development. However, while commodity dependence is linked to lower human development in developing countries, better institutional quality can reduce some of these negative effects. Another important factor to consider in developing countries is the potential collapse of currencies. Bodart & Carpantier (2020) studied this effect and found that these currency crises take place more often – almost twice as much – in commodity-dependent countries compared to other countries that are not so dependent on commodities. Also, the currency value depreciation seems to be heavier in commodity-dependent countries. The authors conclude that currency crises have a significant impact on economic growth in commodity-dependent countries. It might be interesting for CDDCs to implement policies regarding commodity dependence. Tröster et al (2019) wrote a paper on the effectiveness of price stabilization in the cocoa sector in Côte d'Ivoire and Ghana. This stabilization policy entails selling cocoa beans at fixed prices before the harvest season, which protects farmers from price changes within the season. This mechanism, however, is insufficient to protect farmers from the price volatility between different seasons due to the dominant role of CTFs and the connection of domestic prices to global futures markets. When comparing the two countries, the authors find that the Ghanaian system offers better protection to global price volatility due to stronger control over the cocoa supply and stable relationships with buyers. With discussed literature in mind, the best policy for CDDCs might be to diversify away from commodities.

2.3 Hypotheses

As mentioned multiple times in the previous paragraphs, Avdjiev et al (2018) found that capital inflows and outflows in developing countries are highly procyclical for banks and corporates, and countercyclical for sovereigns. This procyclicality was also found by Alfaro et al (2014) when looking at the creditor side. They found a positive correlation between government borrowing from the private sector (banks and corporates) and domestic growth, while a negative correlation was found when borrowing from another government. Some of the papers discussed in the previous paragraphs, among which Matsumoto et al (2023) and Duarte et al (2021), found a clear relationship between global economic activity and commodity prices and showed that many commodities seem to move together with global economic activity. Ibrahim & Olakada (2020) found a significant positive relationship between increasing commodity prices and foreign direct investment inflows. There was also a weaker, insignificant negative relationship when prices decreased. Although foreign direct investment inflows are not the same as foreign debt inflows, they share a lot of characteristics, both being part of foreign capital inflows.

Combining findings of previous literature, one could argue that upward volatility would have a stronger effect than downward volatility. Subsequently, upward volatility of commodity prices would probably go hand in hand with an increase in global economic activity. Based on the findings of Avdjiev et al (2018), sectors with capital inflows that move procyclical would then have more inflows. The authors show that the sovereign sector is accountable for the biggest part of capital inflows. Since these flows move countercyclical in developing countries, the first hypothesis is as following:

(1) *"Higher commodity price volatility negatively influences total foreign debt inflows in CDDCs in West-Africa and Latin America."*

For the different sectors, the hypotheses are obviously different and dependent on the fact if the sector inflows move pro- or countercyclical. These hypotheses are as following:

(2) *"Higher commodity price volatility negatively influences sovereigns' foreign debt inflows in CDDCs in West-Africa and Latin America."*

(3) *"Higher commodity price volatility positively influences banks' foreign debt inflows in CDDCs in West-Africa and Latin America."*

(4) *"Higher commodity price volatility positively influences corporates' foreign debt inflows in CDDCs in West-Africa and Latin America."*

As mentioned earlier in this chapter, Matsumoto et al (2023) and Duarte et al (2021), found a clear relationship between global economic activity and commodity prices and showed that many commodities seem to move together with global economic activity. An increase in global economic activity could also lead to higher investors' confidence, which could lead to more foreign capital inflows. This would be in line with the paper by Guo & He (2020), of which results show that global economic growth positively influences investors' confidence, leading to increased capital flows. Global GDP is often used as an indicator for global economic growth, for instance in the World Economic Outlook by the International Monetary Fund (2021). Based on the combination of commodity prices moving together with global economic activity and increased global economic activity leading to higher investors' confidence, one could expect global GDP growth to moderate the relationship between commodity price volatility and foreign debt inflows, leading to the following final hypothesis:

(5) *"The relationship between commodity price volatility and foreign debt inflows is moderated by global GDP growth."*

3. Data

In this chapter, the composition of the used dataset will be discussed. First, the sample construction will be described. Second, the independent, dependent, moderating, and control variables are defined. Finally, the descriptive statistics are presented.

3.1 Sample construction

To be able to get enough observations and avoid time-specific influences, this thesis makes use of a broad time frame of 1996-2019. By analyzing 24 years – 56 quarters – a reliable relationship between commodity price volatility and foreign debt inflows in CDDCs can be established. The sample includes eight different countries: four from West Africa – Côte d'Ivoire, Gabon, Ghana, and Nigeria – and four from Latin America – Colombia, Ecuador, Paraguay, and Peru. For every country, foreign debt inflows data per quarter is retrieved, divided into recipient sectors: sovereigns, banks, and corporates. A dataset containing this information was made publicly available by Avdjiev et al (2018), who constructed this dataset by combining data from several publicly available sources, among which the International Monetary Fund. For every country, the price volatility of the most important export commodities is predicted and weighted against the total exports to create a representative volatility variable (OEC, n.d.). Monthly price information on commodities was retrieved from the IMF Primary Commodity Price System (IMF, n.d.). Since Avdjiev et al (2018) constructed an impressive dataset without missing values for the countries analyzed in this thesis and information on export commodities and associated prices are widely available, it was possible to construct a complete dataset without missing values for certain countries. The final sample contains 768 observations.

3.2 Defining variables

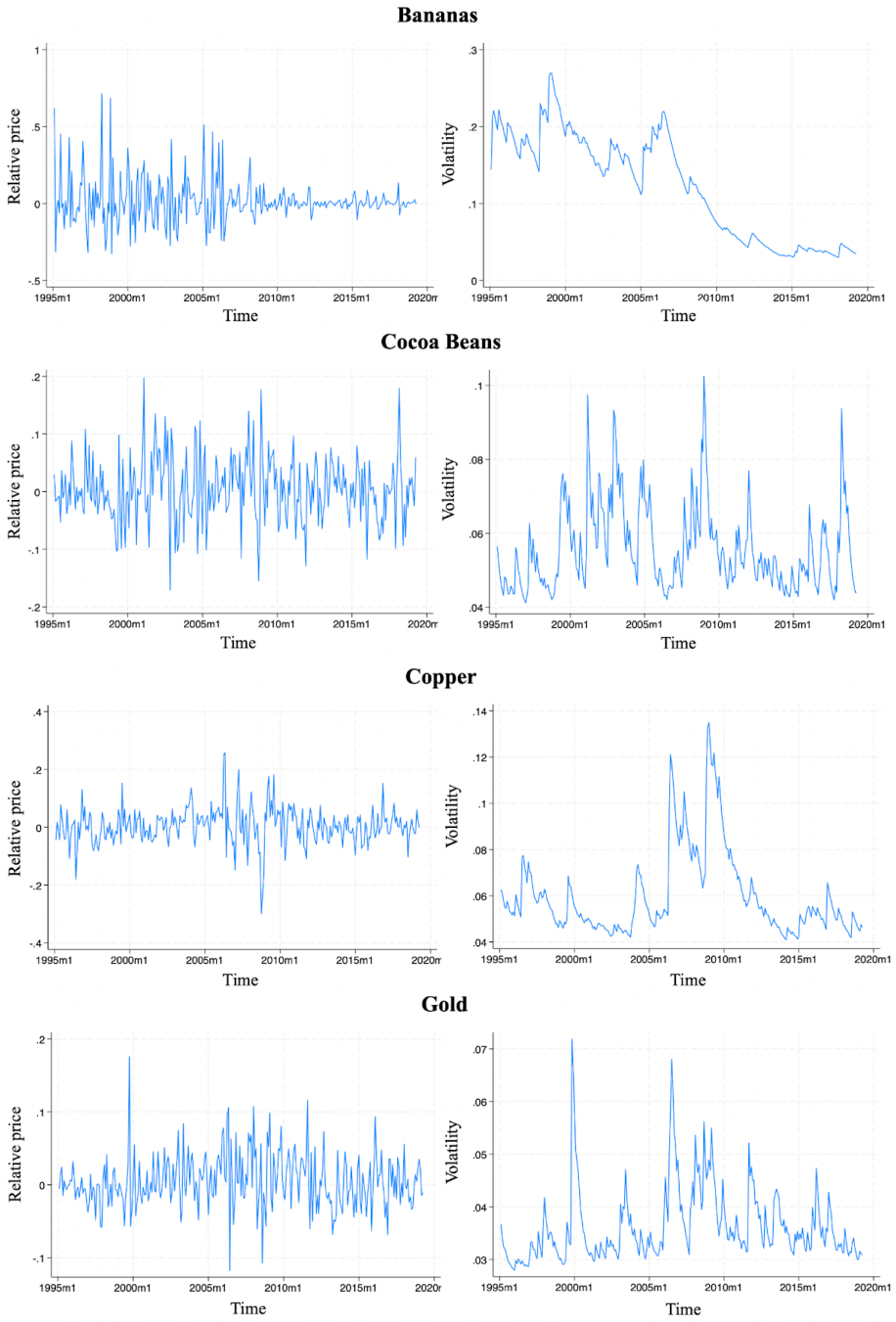
3.2.1 Independent variable

This thesis studies the influence of commodity price volatility on foreign debt inflows in West African and Latin American CDDCs. Therefore, the independent variable is commodity price volatility. Since investments are often based on prediction models, it makes sense to make use of expected volatility values based on a common prediction model. The paper by Bernard et al (2008) examined different prediction models for forecasting aluminum prices. They made use of the GARCH-model to account for time-varying volatility and conditional heteroskedasticity. Also, the authors mention that the GARCH-model is an effective way to model the dynamic behavior of prices influenced by speculation and market shocks. The GARCH-values following from this model represents how much the price of a commodity is expected to vary over time and is calculated relatively to the price level of the specific commodity. The model looks at past price data to predict the future volatility and uses historic variances and errors.

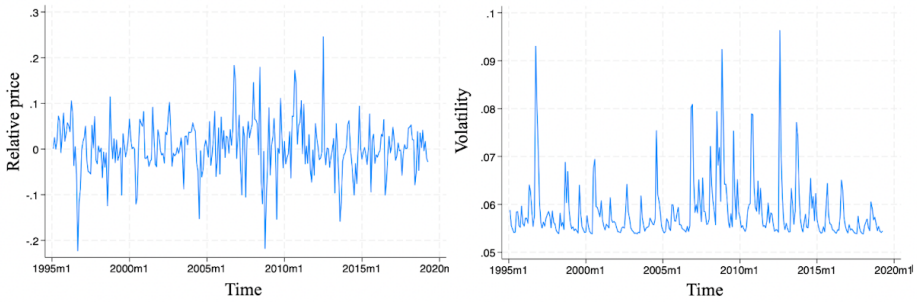
Monthly price data is derived from the International Monetary Fund (n.d.). An important assumption of the GARCH-model is stationarity, meaning that the data's mean and variance are constant over time. Therefore, a Dickey Fuller test is performed on the commodity price data. This test is used to check if time series data, like differences in commodity prices, is stationary. The null hypothesis in this test is that the series is a random walk (with or without drift). Since the results of all three tests - with drift term, without drift term, and with trend term - have a very low p-value (0.0000), the null hypothesis can be rejected, which confirms that the time series data is stationary.

For every commodity studied, plots on the (i) changes in price relatively to the price level of the specific commodity and (ii) volatility estimates can be found in figure 1. Overall, the commodities show different patterns of price changes and volatility. Until 2010, bananas showed significant price fluctuations and high volatility, while after 2010, prices seem to be quite stable. Cocoa beans also demonstrate price fluctuations, but less extreme than bananas, which can also be derived from the volatility estimates. Copper is quite comparable, but relative price changes and volatility seem to be a bit higher. Gold, however, seems to be more stable. Maize and soybeans demonstrate relatively consistent price changes with occasional spikes in volatility. These spikes are likely due to seasonal factors and weather conditions affecting supply. Oil prices stand out due to their high volatility, which reflects the vulnerability of the commodity to geopolitical events and economic uncertainties.

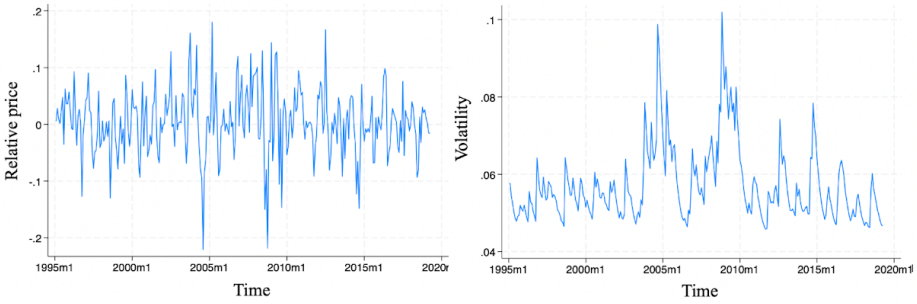
Figure 1: Relative price changes and volatility estimates per commodity



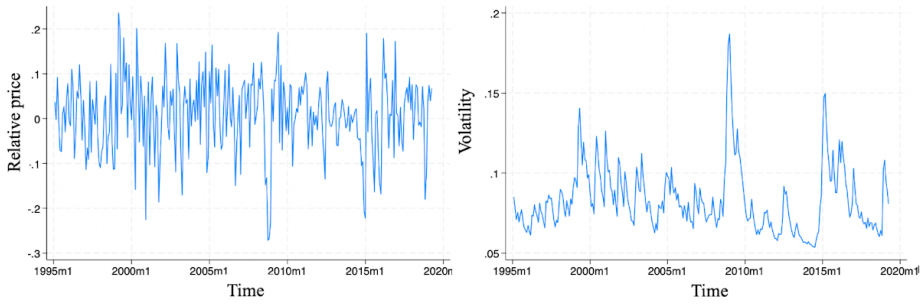
Maize



Soybeans



Oil



Adler (2012) wrote a paper examining Indonesia's export boom and its effect on competitiveness. The author made use of export weights to show the real impact of each commodity on the economy. This thesis agrees with this approach, and therefore the GARCH-values for different commodities are multiplied with the corresponding export weights, leading to the following final formula:

Volatility = (GARCH_Commodity1 * Weight_Commodity 1) + (GARCH_Commodity1 * Weight_Commodity2)

Since GARCH-values are calculated relatively to the price levels of the specific commodities, all final volatility values are on the same scale. This makes it easier to interpret the coefficients. In table 1, the commodities studied per country with the corresponding weights for 2019 are shown. As can be derived from the table, (crude) oil is a very significant commodity in the analysis, being one of the export commodities in 5 out of 8 countries studied. Also, the weights in total exports are relatively high in comparison to other commodities. For Gabon, only oil is studied, since there was no price data available on the other main exports, being ships and manganese ore (International Monetary Fund, n.d.).

Table 1: Commodities per country with corresponding weights in total exports in 2019 (OEC, n.d.)

Country	Commodity A	Commodity B	A Weight 2019*	B Weight 2019
Colombia	Crude Oil	Gold	31,7%	3,6%
Ecuador	Crude Oil	Bananas	35,6%	14,4%
Paraguay	Maize	Soybeans	5,6%	19,3%
Peru	Copper	Gold	25,5%	14,2%
Côte d'Ivoire	Crude Oil	Cocoa	6,8%	27,7%
Gabon	Crude Oil	-	52,1%	-
Ghana	Gold	Cocoa	49,5%	7,4%
Nigeria	Crude Oil	Cocoa	71,8%	1,1%

3.2.2 Independent variable

The independent variable in this analysis is foreign debt inflows, divided into three recipient sectors: sovereigns, banks, and corporates. As described in paragraph 2.1, a publicly available dataset constructed by Avdjiev et al (2018) is used. The authors constructed this dataset by combining different existing datasets: Balance of Payments and International Investment Position statistics of the IMF, Locational Bank Statistics, Consolidated Bank Statistics, and International Debt Securities from the Bank for International Settlements, Quarterly External Debt Statistics of the IMF and World Bank, and Debt Reporting System data of the World Bank. The authors state that the IMF Balance of Payments was the most important source for constructing the dataset. It is relevant to study investment behavior for different sectors, since policymakers can anticipate this. Debt inflows per recipient sector are divided into two types: portfolio debt (PD) and other investment debt (OID). PD mainly consists of government bonds. OID among others includes instruments such as currency and deposits, loans, trade credit, and other accounts payable. This thesis takes the sum of PD and OID to construct the total of foreign debt inflows for each recipient sector.

In table 2, the debt inflows per sector per country during the overall sample period can be found. Differences in the size of the numbers between countries can be quite big, but it is hard to draw any conclusions from it, since these differences could be caused by a lot of different factors. For instance, Colombia has a way bigger total sovereign debt inflow over the sample period than Paraguay, but its population is also approximately 9 times bigger (World Bank, n.d.). It might be more interesting to look at the differences in inflows per sector. For both Latin American and West African countries, the sovereign (public) sector has the most foreign debt inflows. For Latin American countries, the second biggest sector would be corporations, while for West African countries this would be banks. However, here it is also hard to draw any conclusion, since inflow numbers are also influenced by debt repayments.

Table 2: Debt inflows per sector per country during overall sample period (1996-2019)

Country	Sovereign (x 1 bn $)	Bank (x 1 bn $)	Corporate (x 1 bn $)
Colombia	75.1	12.9	35.5
Ecuador	28.1	0.49	7.7
Paraguay	4.9	1.7	-5.2
Peru	17.2	14.5	24.5
Côte d'Ivoire	7.3	-0.9	-0.6
Gabon	3.6	0	0.1
Ghana	21.5	0.5	-11.3
Nigeria	25.9	19.2	15.1

3.2.3 Moderating variable

Some of the papers discussed in the previous chapter, among which Matsumoto et al (2023) and Duarte et al (2021), found a clear relationship between global economic activity and commodity prices. Results showed that many commodities seem to move together with economic activity. An increase in global economic activity could also lead to higher investors' confidence, which could lead to more foreign capital inflows. This would be in line with the paper by Guo & He (2020), of which results show that global economic growth positively influences investors' confidence, leading to increased capital flows. Global GDP is often used as an indicator for global economic growth, for instance in the World Economic Outlook by the International Monetary Fund (2021). Based on previous literature, it might be true that this variable strengthens the relationship between commodity price volatility and foreign debt inflows. Therefore, global GDP growth – calculated as the global GDP in year t minus global GDP in year t-1 – is included in the regression model as a moderating variable.

3.2.4 Control variables

Since the dependent variable in this thesis, a country's foreign debt inflows, obviously is influenced by more factors than just the independent variable and the moderating variable, different control variables are included in the analysis. The main reason for including these specific control variables is that previous literature often considered these as potentially influential on foreign capital flows. The control variables all vary on a quarterly basis, which is important to run a reliable regression. A region dummy is implemented to control for region-specific long-term variables. The included control variables are domestic GDP/Capita growth, inflation, exchange rate change, and deposit interest rate. A more detailed description of these variables can be found below:

i. Domestic GDP/Capita growth: GDP/Capita is sourced from the World Bank (n.d.) and is a well-known indicator for economic development. It is also a variable that is often considered when studying foreign capital inflows. GDP/Capita is often used as a proxy for economic growth and higher GDP/Capita is usually linked to better economic performance. Hence, a positive relationship between GDP/Capita and foreign debt inflows is expected for banks and corporates, since these tend to move procyclical. A negative relationship is expected for sovereigns, since these tend to move countercyclical (Avdjiev et al, 2018). This thesis specifically looks at GDP/capita growth per quarter.
ii. Inflation: Inflation rates are sourced from the World Bank (n.d.). It is hard to link inflation directly to economic performance, since it can both be caused by good economic conditions - for instance higher consumers' willingness to pay- and bad economic conditions - for instance the central bank printing extra money to stimulate the economy. Although it's hard to predict the influence of inflation on foreign debt, Sayek (2009) found a significant, direct, negative effect on foreign direct investment. Since this could imply a negative effect on investors' climate, a negative relationship between inflation and foreign debt inflows is expected. This thesis specifically looks at inflation rate per quarter.
iii. Exchange Rate Change: Exchange rates relative to the US Dollar are sourced from the World Bank (n.d.). Appreciation of currencies relative to the US Dollar in general negatively influences exporters, since products then become more expensive to foreign buyers. This thesis studies CDDCs which often rely heavily on exports, and therefore, it most probably negatively influences the domestic economy. Hence, a negative relationship between exchange rate changes and foreign debt inflows is expected for banks and corporates, since these move procyclical. A positive relationship is expected for sovereigns, since these move countercyclical (Avdjiev et al, 2018). This thesis specifically looks at exchange rate changes per quarter.

iv. Deposit Interest Rate: Deposit interest rates are sourced from the World Bank (n.d.) These rates represent the rate paid by commercial or similar banks for demand, time, or savings deposits. Since these deposit rates are related to central banks' interest rates, and central banks' rates are often lower in economic downturns, a positive relationship between deposit interest rates and foreign debt inflows is expected for banks and corporates, since these move procyclical. A negative relationship is expected for sovereigns, since these move countercyclical (Avdjiev et al, 2018). However, one should not be too sure about this, since high deposit interest rates could also reflect a country's financial risk. This thesis specifically looks at these interest rates per quarter.

An overview of all variables used in the analysis can be found in table 8 in Appendix A.

3.3 Descriptive statistics

In table 3, the summary statistics of the variables are displayed. For all variables used significant outliers have been found. Therefore, all variables are winsorized on the 5th and 95th percentiles to minimize the influence of these outliers. Starting with the dependent variable(s), being the debt inflows, the numbers in the table show that there is a significant standard deviation, meaning that there is substantial variation in the overall debt inflows. Statistics also show that sovereign debt inflows are the most substantial type of debt inflow. Volatility is measured relative to the commodity's price level instead of an absolute value to cover big price differences among different commodities. Since standard deviation is significant here as well, a lot of variation in volatility is present. Just like debt inflows and volatility, the control variables also have significant standard deviations, implying the presence of variation. All together, these statistics demonstrate a high degree of variation in the studied sample.

Table 3: Descriptive statistics of overall sample

	mean	sd	min	max
Sovereign Debt Inflows (* 1 bn $)	0.23	0.53	-0.53	1.76
Bank Debt Inflows (* 1 bn $)	0.05	0.28	-0.44	0.91
Corporate Debt Inflows (* 1 bn $)	0.07	0.37	-0.64	1.03
Total Debt Inflows (* 1 bn $)	0.61	1.32	-0.91	4.40
Volatility (%)	3.46	2.22	0.95	7.77
Global GDP Growth (%)	1.01	1.23	-1.33	3.03
Domestic GDP Growth (%)	0.81	0.87	-1.06	2.22
Inflation Rate (%)	1.79	1.67	0.10	6.63
Exchange Rate Change (%)	1.20	2.46	-2.35	7.13
Deposit Interest Rate (%)	10.44	7.21	2.98	23.56

In Appendix A the descriptive statistics per country (table 9 and 10) are displayed. First of all, these tables show that mean values for all types of foreign debt inflows are significantly higher for Latin American countries than West African countries, implying that more capital flows into Latin America. Commodity price volatility has a higher mean for West African countries, which could imply these countries are more vulnerable to commodity price risk. Both inflation rates and exchange rate changes are higher in West African countries as well. This imposes financial risk, which could on its turn explain the higher mean for deposit interest rate for West African countries.

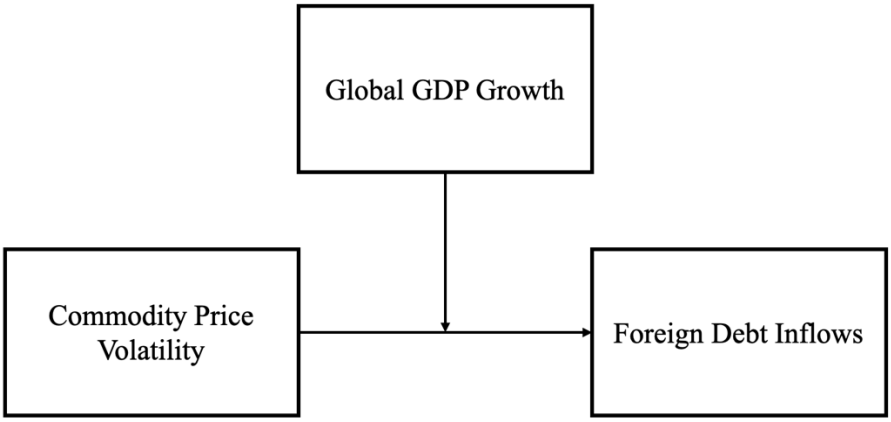
4. Method

This chapter describes the research methodology, regressions, and additional tests that are conducted to get the results that will answer the hypotheses of this paper.

4.1 Research model and regressions

This thesis performs both OLS (fixed effects) and GLS (random effects) regressions to find the influence of commodity price volatility on foreign debt inflows in CDDCs in West Africa and Latin America. These regressions will be conducted by using the statistical software STATA. As described in the previous chapter, the dependent variable, foreign debt inflows, is measured per country and is divided into three recipient sectors: sovereigns, banks, and corporates. The independent variable, commodity price volatility, is measured by using GARCH to predict price movements in the most important commodities for each country and weighing them against their share in a country's total exports. Previous literature found a strong link between global economic activity, commodity prices, and foreign capital inflows. Therefore, the relationship between commodity price volatility and foreign debt inflows could be influenced by the state of the global economy. This thesis included global GDP growth as a moderating variable to account for this.

Figure 2. Conceptual model for moderating analysis



To account for other factors influencing foreign debt inflows into a specific country, some country-specific control variables are included. Foreign debt inflows are normalized in order to make the data easier to compare across countries and time periods. The following regression formula is used to test the hypotheses described in paragraph 2.3:

(1) $Normalized\ Total\ Foreign\ Debt\ Inflows = a0 + \beta 1 Volatility + \beta 2(Volatility\ X\ GlobalGDPGrowth) + \beta 3 GlobalGDPGrowth + \beta 4 GDPCapitaGrowth + \beta 5 Inflation + \beta 6 ExchangeRateChange + \beta 7 InterestRate$

As described, foreign debt inflows are divided into three sectors: sovereigns, banks, and corporates. The hypotheses focusing on the specific sectors are tested by changing the dependent variable in equation (1) to the normalized foreign debt inflows for the specific sectors. For all regressions, this thesis is particularly interested in the coefficient $\beta 1$.

4.2 Additional tests

4.2.1 Hausman Test

Since both fixed effects (FE) and random effects (RE) regression models are used, a Hausman test is conducted. This tests if unobserved individual effects are correlated with the regressors in the model. When conducting this test, the first step is to run both FE and RE regressions on the model. The Hausman test uses the difference between the FE and RE coefficients. The null hypothesis of this test is that individual effects are uncorrelated with the regressors, corresponding to the random effects model. The alternative hypothesis, obviously, is that the individual effects are correlated with the regressors. Therefore, a significant result means that the null hypothesis should be rejected and the FE model should be used. The results of the Hausman tests can be found in table 11 in Appendix A. The preferred model differs per dependent variable used. In the next chapter, tables with the results are given for both the RE and the FE model. The results from the preferred model are displayed in bold.

4.2.2 Variance Inflation Factor (VIF) Test

In order to test for multicollinearity, a Variance Inflation Factor (VIF) test is conducted. Multicollinearity occurs when two or more independent variables in the model are highly correlated, which can lead to less accurate coefficients. Both the results of the VIF-test and a correlation table can be found in table 12 and 13 in Appendix A. Variance inflation factors are relatively high for Global GDP Growth and Global GDP Growth x Volatility (moderating variable). This indicates that there is moderate multicollinearity between these variables, which makes sense, because Global GDP Growth is incorporated in the interaction term. Therefore, no adjustments to the regressions have to be made based on these results.

5. Results

This chapter discusses the empirical results that were gathered through regression analyses. The results of both regressions with and without the moderating variable will be analyzed.

5.1 Effect of volatility on foreign debt inflows without the moderating variable

Table 4 displays the results of the regression on the effect of commodity price volatility on foreign debt inflows for sovereigns (column 1 and 2) and banks (column 3 and 4) without the moderating variable, being global GDP growth. Uneven column numbers represent random effects (RE) regressions, while even numbers represent fixed effects (FE) regressions. By conducting a Hausman test (see chapter 4.2), it is determined which type of regression is preferred. The preferred results are in bold. Since the regression model for corporate foreign debt inflows did not meet the asymptotic assumptions required for the Hausman test, it is not possible to determine which model is preferred, and therefore, both models are regarded. As visible in the table, the region dummy is omitted in the fixed effects models, since the fixed effects already account for time-invariant region-specific characteristics.

For sovereign foreign debt inflows, commodity price volatility seems to have a significant negative impact, confirming hypothesis (2): *"Higher commodity price volatility negatively influences sovereigns' foreign debt inflows in CDDCs in West-Africa and Latin America."* Exchange rate changes have a significant positive impact, meaning that if the value of the currency appreciates relative to the US Dollar, sovereign debt inflows increase. This is in line with the expectation described in chapter 3.2.4. Domestic interest rate has a significant negative impact on sovereign foreign debt inflows, which matches the expectation described in 3.2.4. Domestic GDP growth has a significant negative effect on the dependent variable, which is in line with the expectation that economic growth, which is represented by GDP/capita growth, destimulates sovereign foreign debt inflows (see 3.2.4). Altogether, the regression results for sovereign foreign debt inflows seem to match the corresponding hypothesis and expectations. For banks' foreign debt inflows, commodity price volatility seems to have an insignificant positive impact, which matches hypothesis (3): *"Higher commodity price volatility positively influences banks' foreign debt inflows in CDDCs in West-Africa and Latin America."* The result, however, is insignificant and therefore it is hard to draw any conclusions. Regression coefficients that actually were significant are exchange rate change and domestic interest rate. Both exchange rate changes and domestic interest rate seem to have a significant negative impact on banks' foreign debt inflows. This matches the expectations described in 3.2.4. Overall, the results for banks' foreign debt inflows seem to match hypothesis (3) and expectations, but most of the regression coefficients show no significance.

Table 4: Results for both RE (1 & 3) and FE (2 & 4) regressions for sovereign and bank sector without Global GDP Growth as a moderating variable (both interaction term and non-interacted term excluded).

* p<0.1, ** p<0.05, *** p<0.01

	(1) Sovereign Foreign Debt	**(2)** **Sovereign** **Foreign Debt**	**(3)** **Bank** **Foreign Debt**	(4) Bank Foreign Debt
Volatility	-1.576**	**-2.115****	**0.527**	0.479
	(0.634)	**(0.845)**	**(0.805)**	(1.123)
Exchange Rate Change	1.366***	**1.344****	**-1.024***	-1.067*
	(0.494)	**(0.491)**	**(0.525)**	(0.541)
Domestic Interest Rate	-0.786**	**-0.796****	**-0.201****	-0.176
	(0.320)	**(0.322)**	**(0.102)**	(0.104)
Inflation Rate	-1.435	**-1.823**	**-0.059**	-0.264
	(0.989)	**(1.047)**	**(0.581)**	(0.756)
Domestic GDP Growth	-2.948*	**-3.362***	**0.667**	0.464
	(1.632)	**(1.536)**	**(1.375)**	(1.411)
Region dummy	0.036		**0.005**	
	(0.067)		**(0.041)**	
Constant	0.482***	**0.530*****	**0.374*****	0.382***
	(0.073)	**(0.051)**	**(0.062)**	(0.048)
Observations	768	**768**	**768**	768

Table 5 displays the results of the regression on the effect of commodity price volatility on foreign debt inflows for corporates (column 5 and 6) and total foreign debt inflows (column 7 and 8). As mentioned, these are the results without the moderating variable. Since the regression model for corporate foreign debt inflows did not meet the asymptotic assumptions required for the Hausman test, it is not possible to determine which model is preferred, and therefore, both models are regarded. Both models show an insignificant regression result for the influence of commodity price volatility, with one being positive and one being negative. Therefore, it is hard to draw any conclusions on the rightfulness of hypothesis (4): *"Higher commodity price volatility positively influences corporates' foreign debt inflows in CDDCs in West-Africa and Latin America."* For both models, a significant negative impact was found for exchange rate change, matching the expectation described in paragraph 3.2.4. For domestic GDP growth, a significant positive impact was found only with the random effects model. This finding also matches the expectations. Although some of the regression coefficients match the expectations, the insignificance of most variables makes it hard to draw any conclusions. For total foreign debt inflows, a significant negative influence was found, which is in line with hypothesis (1): *"Higher commodity price volatility negatively influences total foreign debt inflows in CDDCs in West-Africa and Latin America."* A significant negative impact was found for the domestic interest rate, which could be due to the substantial portion of total foreign debt inflows in the sovereign sector. In conclusion, results for total foreign debt inflows seem to match hypothesis (1) and the other expectations described in chapter 3.2.4.

Table 5: Results for both RE (5 & 7) and FE (6 & 8) regressions for corporates and total foreign debt inflows without Global GDP Growth as a moderating variable (both interaction term and non-interacted term excluded).
p<0.1, ** p<0.05, *** p<0.01

	(5) Corporate Foreign Debt	(6) Corporate Foreign Debt	(7) Total Foreign Debt	**(8) Total Foreign Debt**
Volatility	0.456	-0.408	-1.860**	**-2.394***
	(0.634)	(1.010)	(0.894)	**(1.213)**
Exchange Rate Change	-0.451*	-0.422***	0.631*	**0.623**
	(0.249)	(0.115)	(0.340)	**(0.337)**
Domestic Interest Rate	0.014	0.074	-0.731**	**-0.722***
	(0.160)	(0.144)	(0.312)	**(0.315)**
Inflation Rate	-0.130	0.109	-1.420	**-1.719**
	(0.530)	(0.902)	(0.888)	**(0.919)**
Domestic GDP Growth	1.446**	0.812	-2.022	**-2.324**
	(0.654)	(0.771)	(1.473)	**(1.420)**
Region dummy	0.065		0.050	
	(0.041)		(0.083)	
Constant	0.373***	0.429***	0.436***	**0.486*****
	(0.043)	(0.039)	(0.092)	**(0.057)**
Observations	768	768	768	**768**

5.2 The moderating effect of global GDP growth

A regression analysis – both RE and FE – including the moderating variable, global GDP growth, is conducted to test hypothesis (5): *"The relationship between commodity price volatility and foreign debt inflows is moderated by global GDP growth."* Results are displayed in table 6 and 7. The moderating variable, global GDP growth, is included both as an interaction term and a non-interacting term. Regarding the RE and FE models, the preferred model again is displayed in bold, based on the Hausman test performed (results in Appendix A, table 11).

Starting with table 6, the effect for sovereign foreign debt inflows is similar to the effect measured without the moderating variable. The same goes for bank foreign debt inflows. For both sectors, no significant influence was found for global GDP growth, both as an interaction term and as a non-interacting term. Table 7 demonstrates that the same goes for corporate and total foreign debt inflows. For the corporate sector, some significant effects were found for both the interaction and the non-interacting term in the random effects regression model. Global GDP growth therefore demonstrates significant (positive) influence in the corporate sector. For the total foreign debt inflows, a significant effect was found for the non-interacting term in the random effects model. However, this is the non-preferred model, so no reliable conclusions can be drawn from the result. Altogether, the relationship between commodity price volatility and foreign debt inflows does not seem to be moderated by global GDP growth, unlike what is proposed in hypothesis (5).

Table 6: Results for both RE (1 & 3) and FE (2 & 4) regressions including the moderating variable for sovereign and bank sector foreign debt inflows.

* p<0.1, ** p<0.05, *** p<0.01

	(1) Sovereign Foreign Debt	**(2) Sovereign Foreign Debt**	(3) Bank Foreign Debt	**(4) Bank Foreign Debt**
Volatility	-0.626	**-2.194****	0.852	**0.651**
	(0.882)	**(0.862)**	(0.598)	**(1.122)**
Volatility x Global GDP Growth	9.711	**9.588**	-25.105	**-28.902**
	(31.163)	**(45.998)**	(18.468)	**(16.488)**
Global GDP Growth	-1.297	**-1.214**	0.384	**0.652**
	(1.112)	**(1.761)**	(0.775)	**(0.707)**
Other controls	Yes	**Yes**	Yes	**Yes**
Observations	768	**768**	768	**768**

Table 7: Results for both RE (1 & 3) and FE (2 & 4) regressions including the moderating variable for corporate and total foreign debt inflows.

* p<0.1, ** p<0.05, *** p<0.01

	(5) Corporate Foreign Debt	(6) Corporate Foreign Debt	(7) Total Foreign Debt	**(8) Total Foreign Debt**
Volatility	0.065	-0.696	-0.455	**-2.530***
	(0.806)	(0.886)	(0.916)	**(1.154)**
Volatility x Global GDP Growth	41.969*	40.788	21.737	**16.778**
	(24.775)	(30.662)	(31.025)	**(45.842)**
Global GDP Growth	-3.415*	-2.958	-2.450*	**-2.043**
	(1.891)	(2.200)	(1.362)	**(2.251)**
Other controls	Yes	Yes	Yes	**Yes**
Observations	768	768	768	**768**

6. Discussion and conclusion

This final chapter draws conclusions on the results of the study. Also, recommendations and limitations will be discussed.

This thesis studied the following research question: *"How does commodity price volatility affect foreign debt inflows in West African and Latin American commodity-dependent countries?"* This research was examined with and without a moderating variable: global GDP growth. To study the aforementioned relationship a sample of 768 observations in eight different countries over the period 1996-2019 was used. Commodity price volatility was measured by constructing GARCH-values for each commodity - based on monthly prices - and subsequently, multiplying these GARCH-values against the weight of the commodities in the country's total exports. For foreign debt inflows, the publicly available dataset by Avdjiev et al (2018) was utilized, providing quarterly data on debt inflows for three recipient sectors: sovereigns, banks, and corporates. This study is distinctive from other studies for multiple reasons. First of all, most studies look at foreign direct investment rather than foreign debt inflows. However, debt inflows form the largest component of total foreign capital inflows, both for advanced economies and emerging markets (Avdjiev et al, 2018). Also, most of the papers regarding commodity prices focus on the price level itself, but not on its volatility. However, a lot of commodity prices are not stable – which is demonstrated in paragraph 3.2.1 – and the price level is just a snapshot, but not representative on the longer term. Therefore, it is interesting to see how this longer-term uncertainty caused by the price volatility affects foreign debt inflows. Finally, this study is unique, because it studies a portfolio of multiple commodities for multiple countries, while most studies look into the effect of one type of commodity.

The results in the previous chapter displayed significant results that matched the hypotheses for the sovereign sector, the banking sector (not significant) and the total foreign debt inflows. For the corporate sector, no conclusions can be drawn since results were inconsistent for the volatility measure. Furthermore, the regression coefficients for the control variables match the expectations described in chapter 3.2.4. Also, when introducing the moderating variable, global GDP growth, to the regression model, the relationship between commodity price volatility and foreign debt inflows is not affected. This implies that the studied relationship is not necessarily dependent on global economic activity. Nevertheless, this thesis recommends future research to dive deeper into the relationship between commodity price volatility and foreign debt inflows by including additional control variables such as trade agreements, government budgets, public debt levels, and commodity reserves levels.

In chapter 2, several papers were discussed that focused on the policy implications regarding foreign debt inflows. Most papers recommended improving governance and debt management. With foreign capital inflows being an important factor for a country, this thesis fully agrees with this recommendation. However, for CDDCs only improving governance and debt management is not enough, since it won't influence the price volatility of commodities. This volatility has shown to be of influence on foreign debt inflows, and for countries that heavily rely on commodities, this can be of great risk. Therefore, this thesis recommends these countries to diversify away from commodities, in order to reduce this risk.

This study has multiple limitations. First of all, for each country only two commodities are studied. By skipping other export commodities, the conclusions might be weaker. This potential limitation is reduced by basing the choice of specific commodities on the weights in total exports. For 4 out of 8 countries, the commodities studied represent less than 50% of total exports in 2019, which implies that over half of the exports for these countries is not taken into account in the regression. For future research, it might be interesting to study even more commodities for each country, with a more substantial part of the total exports being represented.

REFERENCES

Abaidoo, R., & Agyapong, E. K. (2022). Commodity price volatility, inflation uncertainty and political stability. *International Review of Economics*, *69*(3), 351–381. https://doi.org/10.1007/s12232-022-00395-3

Adler, G. (2012). Chapter 4: Volatility in External Demand: Indonesia's Commodity Boom and Overall Competitiveness. *IMF eLibrary*. https://doi.org/10.5089/9781616352028.071.ch004

Alfaro, L., Kalemli-Ozcan, S., & Volosovych, V. (2014). Sovereigns, Upstream Capital Flows, and Global Imbalances. *Journal Of The European Economic Association*, *12*(5), 1240–1284. https://doi.org/10.1111/jeea.12106

Avdjiev, S., Hardy, B., Kalemli-Ozcan, S., & Servén, L. (2018, 4 december). *Gross capital flows by banks, corporates and sovereigns*. https://www.bis.org/publ/work760.htm

Baines, J., & Hager, S. B. (2021). Commodity traders in a storm: financialization, corporate power and ecological crisis. *Review Of International Political Economy*, *29*(4), 1053–1084. https://doi.org/10.1080/09692290.2021.1872039

Bair, J., & Werner, M. (2011). Commodity Chains and the Uneven Geographies of Global Capitalism: A Disarticulations Perspective. *Environment & Planning. A*, *43*(5), 988–997. https://doi.org/10.1068/a43505

Bernard, J., Khalaf, L., Kichian, M., & Mcmahon, S. (2008). Forecasting commodity prices: GARCH, jumps, and mean reversion. *Journal Of Forecasting*, *27*(4), 279–291. https://doi.org/10.1002/for.1061

Birdsall, N., & Hamoudi, A. (2002). Commodity Dependence, Trade, and Growth: When "Openness" is Not Enough. *Social Science Research Network*. https://doi.org/10.2139/ssrn.999988

Bodart, V., & Carpantier, J. (2020). Currency collapses and output dynamics in commodity dependent countries. *Emerging Markets Review*, *42*, 100669. https://doi.org/10.1016/j.ememar.2019.100669

Caballero, J. A. (2014). Do Surges in International Capital Inflows Influence the Likelihood of Banking Crises? *˜The œEconomic Journal/Economic Journal*, *126*(591), 281–316. https://doi.org/10.1111/ecoj.12172

Commodity prices crash hits Africa. (2017, February 23). Africa Renewal. https://www.un.org/africarenewal/magazine/december-2016-march-2017/commodity-prices-crash-hits-africa

Coulibaly, B. S., Gandhi, D., Senbet, L. W. (2019). Is sub-Saharan Africa facing another systemic sovereign debt crisis? In *Africa Growth Initiative*. https://www.brookings.edu/wp-content/uploads/2019/04/africa_sovereign_debt_sustainability.pdf

COVID-19 slashes foreign direct investment in Africa by 16%. (2021, June 21). UNCTAD.https://unctad.org/news/covid-19-slashes-foreign-direct-investment-africa-16

Davis, J. S. (2015). The macroeconomic effects of debt- and equity-based capital inflows. *Journal Of Macroeconomics*, *46*, 81–95. https://doi.org/10.1016/j.jmacro.2015.07.006

De Sá Farias, E., Bornacki De Mattos, L., & De Assis Campos Vieira, F. (2022). Commodity prices and capital movement phenomena in emerging economies. *CEPAL Review*, *137*.

Duarte, A. M., Gaglianone, W. P., De Carvalho Guillén, O. T., & Issler, J. V. (2021). Commodity prices and global economic activity: A derived-demand approach. *Energy Economics*, *96*, 105120. https://doi.org/10.1016/j.eneco.2021.105120

Eissa, M. A., & Elgammal, M. M. (2019). Foreign Direct Investment Determinants in Oil Exporting Countries: Revisiting the Role of Natural Resources. *Journal Of Emerging Market Finance*, *19*(1), 33–65. https://doi.org/10.1177/0972652719880153

Guo, Y., & He, S. (2020). Does confidence matter for economic growth? An analysis from the perspective of policy effectiveness. *International Review Of Economics & Finance*, *69*, 1–19. https://doi.org/10.1016/j.iref.2020.04.012

Hawkins, J. and Turner, P. (2008). Managing Foreign Debt and Liquidity Risks in Emerging Economies: An Overview, https://www.bis.org/publ/plcy08a.pdf, Access Date: 19.03.2021.

Ibrahim, A. U., & Olakada, N. M. (2020). Evaluating the Effect of Crude Oil Prices on Foreign Direct Investment: A Nigerian Perspective. *European Journal of Business and Management*, *12*(17). https://doi.org/10.7176/ejbm/12-17-09

International Monetary Fund (n.d.). *Primary Commodity Price System.* https://data.imf.org/?sk=471DDDF8-D8A7-499A-81BA-5B332C01F8B9&sId=1390030341854

International Monetary Fund. (2021). *World Economic Outlook: Recovery during a pandemic*. https://www.imf.org/en/Publications/WEO/Issues/2021/10/12/world-economic-outlook-october-2021

Jardet, C., Jude, C., & Chinn, M. D. (2022). Foreign direct investment under uncertainty evidence from a large panel of countries. *Review of International Economics*, *31*(3), 854–885. https://doi.org/10.1111/roie.12646

Lee, J. (2017). Global Commodity Chains and Global Value Chains. In *Oxford University Press eBooks*. https://doi.org/10.1093/acrefore/9780190846626.013.201

Lin, S., & Sosin, K. (2001). Foreign debt and economic growth. *Economics Of Transition*, *9*(3), 635–655. https://doi.org/10.1111/1468-0351.00092

Manasseh, C. O., Abada, F. C., Okiche, E. L., Okanya, O., Nwakoby, I. C., Offu, P., Ogbuagu, A. R., Okafor, C. O., Obidike, P. C., & Nwonye, N. G. (2022). External debt and economic growth in Sub-Saharan Africa: Does governance matter? *PloS One*, *17*(3), e0264082. https://doi.org/10.1371/journal.pone.0264082

Matsumoto, A., Pescatori, A., & Wang, X. (2023). Commodity prices and global economic activity. *Japan And The World Economy*, *66*, 101177. https://doi.org/10.1016/j.japwor.2023.101177

Nkurunziza, J. D., Tsowou, K., & Cazzaniga, S. (2017). Commodity Dependence and Human Development. *African Development Review*, *29*(S1), 27–41. https://doi.org/10.1111/1467-8268.12231

Ofori-Abebrese, J., Pickson, R. B., & Ofori-Abebrese, G. (2017). Commodity prices, exchange rate and economic growth in West Africa: Case study of Cote dIvoire and Ghana. *Journal of Development and Agricultural Economics*, *9*(9), 269–277. https://doi.org/10.5897/jdae2017.0842

Omodero, C. O., & Alpheaus, O. E. (2019). The Effect of Foreign Debt on the Economic Growth of Nigeria. *Management Dynamics in The Knowledge Economy*, *7*(3), 291–306. https://doi.org/10.25019/mdke/7.3.01

Pirrong, C. & Trafigura. (2014). *The Economics Of Commodity Trading Firms*. https://www.smallake.kr/wp-content/uploads/2014/04/economics-of-ctfs.pdf

Salerno, T. (2016). Cargill's corporate growth in times of crises: how agro-commodity traders are increasing profits in the midst of volatility. *Agriculture And Human Values*, *34*(1), 211–222. https://doi.org/10.1007/s10460-016-9681-8

Sayek, S. (2009). Foreign Direct Investment and Inflation. *Southern Economic Journal*, *76*(2), 419–443. https://doi.org/10.4284/sej.2009.76.2.419

Sun, L., & Wang, Y. (2021). Global economic performance and natural resources commodity prices volatility: Evidence from pre and post COVID-19 era. *Resources Policy*, *74*, 102393. https://doi.org/10.1016/j.resourpol.2021.102393

Tahar, M. B., Slimane, S. B., & Houfi, M. A. (2021). Commodity prices and economic growth in commodity-dependent countries: New evidence from nonlinear and asymmetric analysis. *Resources Policy*, *72*, 102043. https://doi.org/10.1016/j.resourpol.2021.102043

Tahir, M., Estrada, M. A. R., & Afridi, M. A. (2019). Foreign inflows and economic growth: An emiprical study of the SAARC region. *Economic Systems, 43*(3–4), 100702. https://doi.org/10.1016/j.ecosys.2019.100702

The State of Commodity Dependence 2023. (2023, 22 juni). UNCTAD. https://unctad.org/publication/state-commodity-dependence-2023

Tröster, B., Staritz, C., Grumiller, J., & Maile, F. (2019). *Commodity dependence, global commodity chains, price volatility and financialisation: Price-setting and stabilisation in the cocoa sectors in Côte d'Ivoire and Ghana*. https://www.econstor.eu/handle/10419/213297

United Nations. (2021). *STATE OF COMMODITY DEPENDENCE 2021* (by United Nations Conference on Trade and Development). https://unctad.org/system/files/official-document/ditccom2021d2_en.pdf

Williams, T. (2018). Capital Inflows, Sovereign Debt and Bank Lending: Micro-Evidence from an Emerging Market. *Review Of Financial Studies*, *31*(12), 4958–4994. https://doi.org/10.1093/rfs/hhy026

World Bank. (n.d.). *World Bank Open Data.* https://data.worldbank.org/?skipRedirection=true

Yasar, N. (2021). The Causal Relationship Between Foreign Debt and Economic Growth: Evidence from Commonwealth Independent States. *Foreign Trade Review*, *56*(4), 415–429. https://doi.org/10.1177/00157325211018329

Yating, Y., Mughal, N., Wen, J., Ngan, T. T., Ramirez-Asis, E., & Maneengam, A. (2022). Economic performance and natural resources commodity prices volatility: Evidence from global data. *Resources Policy*, *78*, 102879. https://doi.org/10.1016/j.resourpol.2022.10287

APPENDIX A

Table 8: Overview of variables

Variable	Type	Description
Sovereign Debt Inflows	Dependent	Foreign debt flowing into the sovereign sector.
Bank Debt Inflows	Dependent	Foreign debt flowing into the bank sector.
Corporate Debt Inflows	Dependent	Foreign debt flowing into the corporate sector.
Total Debt Inflows	Dependent	Total foreign debt flowing into a country.
Volatility	Independent	GARCH-values of different commodities weighted against share in country's total exports.
Global GDP Growth	Moderating	Quarterly growth of global GDP.
Domestic GDP Growth	Control	Quarterly growth of domestic GDP.
Inflation Rate	Control	Quarterly domestic inflation rates.
Exchange Rate Change	Control	Quarterly changes in exchange rates (currency relative to the US Dollar)
Deposit Interest Rate	Control	Quarterly deposit interest rates.

Table 9: Descriptive statistics for Latin American countries

	mean	sd	min	max
Sovereign Debt Inflows (* 1 bn $)	0.31	0.62	-0.53	1.76
Bank Debt Inflows (* 1 bn $)	0.06	0.32	-0.44	0.91
Corporate Debt Inflows (* 1 bn $)	0.12	0.39	-0.64	1.03
Total Debt Inflows (* 1 bn $)	0.85	1.52	-0.91	4.40
Volatility (%)	2.79	1.98	0.95	7.77
Global GDP Growth (%)	1.10	1.23	-1.33	3.03
Domestic GDP Growth (%)	0.91	0.82	-1.06	2.22
Inflation Rate (%)	1.63	1.54	0.10	6.63
Exchange Rate Change (%)	1.03	2.38	-2.35	7.13
Deposit Interest Rate (%)	9.28	7.39	2.98	23.56

Table 10: Descriptive statistics for West African countries

	mean	sd	min	max
Sovereign Debt Inflows (* 1 bn $)	0.15	0.41	-0.53	1.76
Bank Debt Inflows (* 1 bn $)	0.05	0.24	-0.44	0.91
Corporate Debt Inflows (* 1 bn $)	0.02	0.34	-0.64	1.03
Total Debt Inflows (* 1 bn $)	0.37	1.04	-0.91	4.40
Volatility (%)	4.13	2.24	1.17	7.77
Global GDP Growth (%)	1.10	1.23	-1.33	3.03
Domestic GDP Growth (%)	0.72	0.91	-1.06	2.22
Inflation Rate (%)	1.95	1.76	0.10	6.63
Exchange Rate Change (%)	1.38	2.52	-2.35	7.13
Deposit Interest Rate (%)	11.59	6.84	2.98	23.56

Table 11: Hausman test results

Null hypothesis (H0)	Chi-squared	P-value
Difference in coefficients is not systematic (sovereign foreign debt inflows) – without moderating variable	25.51	0.0001
Difference in coefficients is not systematic (bank foreign debt inflows) – without moderating variable	3.09	0.6867
Difference in coefficients is not systematic (total foreign debt inflows) – without moderating variable	14.02	0.0155
Difference in coefficients is not systematic (sovereign foreign debt inflows) – including moderating variable	132.83	0.0000
Difference in coefficients is not systematic (bank foreign debt inflows) – including moderating variable	178.02	0.0000
Difference in coefficients is not systematic (total foreign debt inflows) – including moderating variable	116.92	0.0000

Table 12: Variance Inflation Factor (multicollinearity) test results

Variable	VIF	1/VIF
Global GDP Growth	4.72	0.21
Global GDP Growth x Volatility	4.33	0.23
Exchange Rate Change	2.04	0.49
Volatility	1.83	0.54
Inflation	1.78	0.56
Deposit Interest Rate	1.51	0.66
Domestic GDP Growth	1.27	0.79
Region	1.14	0.88
Mean	2.33	

Table 13: Correlation table

Correlation	Volatility	Global GDP Growth x Volatility	Global GDP Growth	Exchange Rate Change	Deposit Interest Rate	Inflation	Domestic GDP Growth	Region
Volatility	1							
Global GDP Growth x Volatility	0.35	1						
Global GDP Growth	-0.05	0.78	1					
Exchange Rate Change	0.04	-0.39	-0.54	1				
Deposit Interest Rate	0.04	-0.01	-0.11	0.39	1			
Inflation	0.18	-0.01	-0.09	0.48	0.52	1		
Domestic GDP Growth	-0.13	0.27	0.42	-0.27	-0.11	0.00	1	
Region (1 = Latin America, 0 = West Africa)	-0.30	-0.14	0.00	-0.07	-0.16	-0.10	0.11	1