Essays on Foreign Direct Investment, Tax Avoidance and Institutions

Grivas Shimonde Chiyaba

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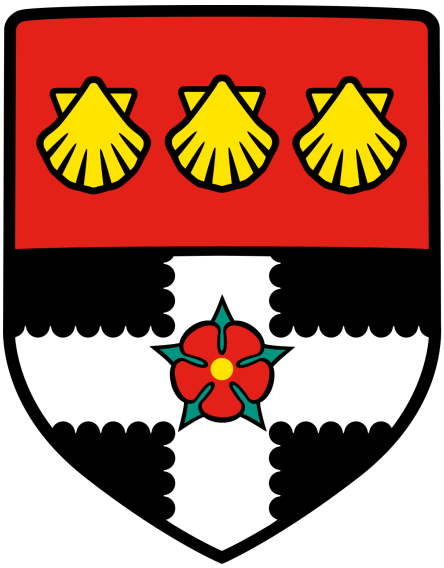

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Abstract

This thesis presents three essays, each exploring various dimensions relating to foreign direct investment (FDI), tax avoidance, natural resources, and institutions. Using Zambia as a case study, the first essay examines the response of the three components of FDI flows to macroeconomic variables within firms. It also investigates the determinants of FDI flows. The second essay explores the use of tax avoidance instruments by large multinational enterprises (MNEs), using a case study of a European headquartered MNE manufacturing in Zambia. The final essay investigates whether natural resources and FDI tend to erode or support the development of national institutions.

The components and determinants of FDI within firms: A case study of Zambia
This chapter investigates the response of the components of FDI flows to macroeconomic variables within firms. Using a new firm-level database constructed from anonymised confidential data held by the Bank of Zambia covering the period from 2008–2017, I find positive and significant effects of the copper price on FDI inflows. This supports the theory that high commodity prices tend to stimulate investment. I also find a negative relationship between FDI flows and exchange rate appreciation. The effect is insignificant, but it aligns with the theory. The evidence shows varying results when I consider the individual components of FDI. I find that the relationship between equity capital and copper price is negative. The evidence also indicates a negative relationship between equity capital and exchange rate appreciation. In contrast, the evidence shows a positive relationship between reinvested earnings and the copper price. This suggests that firms reinvest profits to finance their operations when the copper price increases. However, the estimated effect of the exchange rate appreciation on reinvested earnings is negative. Also, evidence shows a significant positive relationship between intra-firm debt and copper price, while the impact of the exchange rate depreciation on intra-firm debt is positive. These findings provide new empirical evidence on the response of components of FDI to macroeconomic variables, which could be helpful for future investment

policy formulation in developing countries. For instance, the results suggest that policymakers whose primary objectives include attracting more FDI should be aware that reinvestment and intra-firm debt are sensitive to exchange rate movements.

Tax avoidance by multinationals: A case study of the Zambian manufacturing sector
This chapter investigates the use of tax avoidance instruments by large MNEs, using a case study of a European headquartered MNE manufacturing in Zambia. This detailed study synthesises information from multiple sources, and is believed to be the first of its kind in the literature. Theory identifies three key tax avoidance mechanisms: transfer pricing, mis-pricing of internal loans, and overcharging for internal management services. Transfer pricing can reduce ad valorem tariffs as well as taxes; internal loans are easy to administer; while internal management services are already used for a variety of purposes. All three mechanisms are used by the case study firm. By using multiple mechanisms an MNE can minimize the risk of detection; furthermore, should one mechanism be disabled by tax authorities, others can be substituted for it. The case study firm is regarded as a good corporate citizen by host governments, because of its philanthropic support for hospitals and schools, but the loss of income to high-tax host economies through tax avoidance far outweighs the value to them of its philanthropic activities. Future research should investigate how far these conclusions generalise to other firms, industries and countries.

Do natural resources and FDI tend to erode or support the development of national institutions?
This chapter explores the effects of natural resources and FDI inflows on the quality of national institutions, also known as "the rules of the game". Using a panel dataset of 69 developing countries over the period 1970–2015, we find negative and significant effects of natural resource use or extraction on the development of national institutions. We focus on legal and property rights, but these findings also apply to the quality of some other national institutions. Our results align with a theory that abundant natural resources lead to weakened institutions because of the potential for firms to secure monopoly rents. Further, we find that the effects of FDI inflows on institutional development are not robust to controlling for natural resource rents. This suggests that the latter tend to erode institutions regardless of whether those resources are exploited alongside increased foreign investment into the local economy.

Lay summary

This thesis presents three essays addressing distinct aspects relating to FDI, tax avoidance, natural resources, and institutions. FDI is a type of investment where a company or an investor purchases an interest of 10% or more in an enterprise located in another country. An enterprise that produces goods or delivers services in more than one country is known as a multinational enterprise (MNE) or simply multinational. The first two essays are discussed in the context of Zambia, and the third essay focuses on developing countries endowered with natural resources. The first essay seeks to understand how FDI and its three individual components are affected by macroeconomic factors. The second essay explores the use of tax avoidance instruments by large multinationals to reduce their amount of tax without breaking the law. The final essay seeks to explain the relationships between natural resources, FDI, and the quality of national institutions. It attempts to understand whether natural resources and FDI tend to erode or support the development of national institutions.

The components and determinants of FDI within firms: A case study of Zambia

The essay presents a background to the evolution of aggregate FDI flows and the three FDI financing modalities for foreign owned companies operating in Zambia. FDI financing consists of funds provided in the form of equity capital, loans from related entities (intra-firm debt), reinvested earnings, or some combination of all three. The analysis in this essay focuses on the period from 2000 to 2017. The key macroeconomic variables of interest are copper price and the exchange rate. The results show that an increase in copper price leads to a rise in FDI flows. This supports the theory that high commodity prices tend to stimulate investment. The evidence also shows a negative relationship between FDI flows and exchange rate appreciation, implying that the investment levels decline when the exchange rate appreciates. When I consider the individual components of FDI, the evidence shows varying effects. I find that the relationship between equity capital and copper price is negative. The evidence also indicates a negative relationship between equity capital and exchange rate appreciation. In contrast, the evidence shows a positive relationship between reinvested earnings and copper prices. This suggests that firms reinvest profits to

finance their operations when the copper price increases. However, the estimated effect of the exchange rate appreciation on reinvested earnings is negative. Also, evidence shows a significant positive relationship between intra-firm debt and copper price, while the impact of the exchange rate depreciation on intra-firm debt is positive. These findings provide new empirical evidence that supports the theory that components of FDI may respond differently to the same set of macroeconomic variables. These results have important implications for policymakers because they highlight critical issues in formulating appropriate investment policies. For instance, the results show that reinvested earnings and intra-company debt are the most sensitive forms of financing, mainly to exchange rate movements.

Tax avoidance by multinationals: A case study of the Zambian manufacturing sector
This essay investigates the use of tax avoidance instruments by large multinational enterprises (MNEs), using a case study of a Europe headquartered MNE manufacturing in Africa. This detailed study synthesises information from multiple sources, and is believed to be the first of its kind in the literature. Theory identifies three key tax avoidance mechanisms: transfer pricing, mis-pricing of internal loans, and overcharging for internal management services. Transfer pricing involves understating the value of products. It can reduce taxes. Mis-pricing of internal loans involves overstating the value of a financial asset. Internal loans are easy to administer. Overcharging for internal management services involves overstating the price of a notional service. Internal management services are already used for a variety of purposes. All three mechanisms are used by the case study firm. By using multiple mechanisms an MNE can minimize the risk of detection; furthermore, should one mechanism be disabled by tax authorities, others can be substituted for it. The case study firm is regarded as a good corporate citizen by host governments, because of its philanthropic support for hospitals and schools, but the loss of income to high-tax host economies through tax avoidance far outweighs the value to them of its philanthropic activities. Future research should investigate how far these conclusions generalise to other firms, industries and countries.

Do natural resources and FDI tend to erode or support the development of national institutions?
This essay explores the effects of natural resources and FDI inflows on the quality of national institutions. The central argument is that most resource-rich countries are dependent on a single sector or resource, which is also the dominant destination for FDI. We suppose that MNEs or very large local or state-backed enterprises operating in an economically important or intrinsic sector can undermine the prevailing quality of domestic institutions, and any prospects of improving them through lobbying and

exerting undue pressure on policymakers in government. To study the effects, we use a dataset of 69 developing countries over the period 1970–2015. We focus on property rights as a measure of institutions. We find that using or extracting natural resources hurts the development of national institutions. This aligns with the theory that abundant natural resources lead to the weakening of institutions. This is explained by the greater potential for firms to invest in actions that help to secure and capitalise on abnormal profits. The evidence shows no effect of net FDI inflows on institutions after conditioning on natural resource abundance. This suggests that natural resource abundance tends to result in eroded institutions regardless of whether the resources are exploited through increased foreign investment into the local economy. The evidence also shows that the use or extraction of natural resources weakens the quality of some other measures of institutions: government size, freedom to trade internationally, regulation, political stability, and the absence of violence and terrorism. Our findings add new evidence on the average relationships across countries between natural resources, FDI, and institutions, which could be helpful for future policy formulation in resource rich countries. For instance, our results suggest that policymakers whose objectives are to strengthen domestic institutions should be wary (and possibly renew their resolve) when their countries develop new opportunities to extract abnormal profits from natural resources. In other words, they would be advised to discourage, dismantle, or robustly regulate natural monopoly industries, which have strong incentives to invest in political pressure or other measures that can secure and ensure abnormal profits.

Declaration

I, Grivas Shimonde Chiyaba, confirm that the work presented in this thesis is my own. Where the research was carried out alongside others, or where information has been derived from other sources, I confirm that this has been indicated in the thesis. This work has not been submitted for any other degree or professional qualification.

To the loving memory of my late father, Webby "Miller" Chiyaba, aunt, Naomi "Nomai" Mukwashi, grandfather, Paul "PM7" Moonga and young brother, Alex "Chiizyo" Chiyaba.

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"For I know the thoughts that I think toward you, says the Lord, thoughts of peace and not of evil, to give you a future and a hope" (Jer. 29:11, NKJV). Thank you, Lord, for your goodness and many opportunities! May glory and honour be unto you for this success!

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Finally, I am most grateful to my employer, the Bank of Zambia, for funding support.

Disclaimer

Parts of this thesis use a new database constructed from anonymised confidential firm-level data held by the Bank of Zambia. The information is provided in aggregate form to protect the respondent's confidentiality. I respectfully acknowledge that due to the research methodology applied in this work, the results may not exactly be the same as the data owner's aggregates. The use of the data in this thesis does not imply the endorsement of the data owners to the interpretation or analysis of the information.

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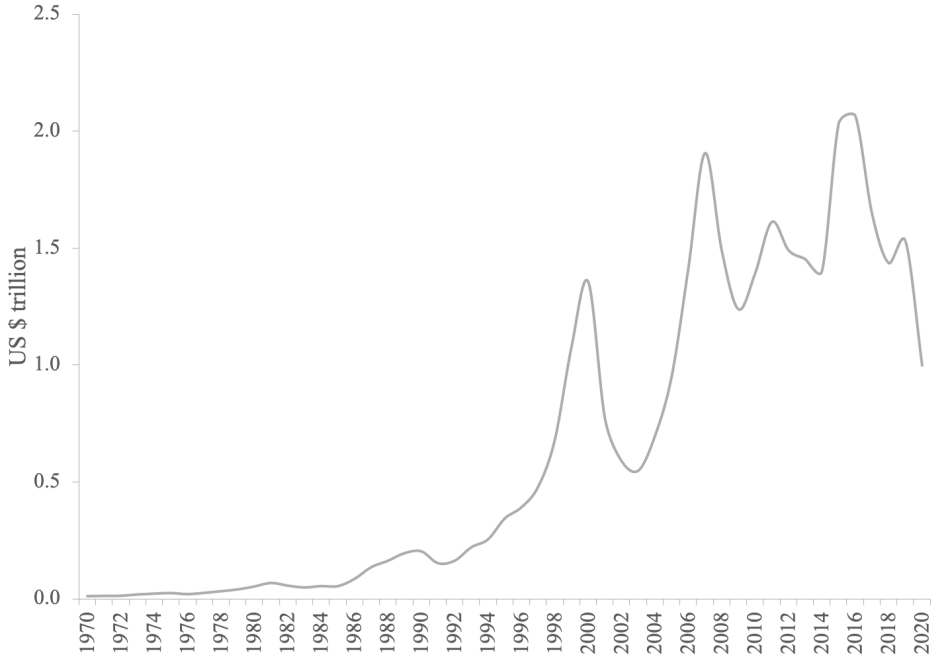
Chapter 1

Introduction

Foreign direct investment (FDI) inflows have considerably grown in the last five decades, albeit with some declines. The latest deepest and sharpest drop was in 2020, and the COVID-19 crisis precipitated it (see, Figure 1.1), causing a 35% decline in FDI to US$1.0 trillion from US$1.5 trillion in 2019 (UNCTAD, 2021). Figure 1.2 illustrates that the share in global total FDI inflows for developing countries rose to nearly 70% in 2020 from below 50% in 2019. Figures 1.1 and 1.2 demonstrate the growing importance of the flow of global FDI, particularly to developing countries. This importance is driven by the potential benefits commonly associated with FDI. The benefits include economic growth, job creation, transfer of technology and increased competitiveness (Makiela & Ouattara, 2018). Empirical literature supports this perception of FDI and highlights how host countries can benefit.

FDI to developing countries is potentially a crucial contributor to economic growth through direct and indirect channels. Access to FDI can be an essential source of financing to supplement domestic savings, especially for developing countries that suffer from financing constraints due to low levels of income (Jude & Levieuge, 2017; Mody & Murshid, 2005). Directly, FDI may impact growth through multinational enterprises (MNEs) as they expand their production capacities and hire the citizens of host countries (Dunning & Lundan, 2008), which results in increased export earnings, higher employment, and income. Indirectly, FDI may influence growth through MNE activity that yields positive spillovers to host countries through knowledge transfer, skills, the introduction of alternative management practices, organisational arrangements and higher wages (de Mello Jr., 1999; Javorcik, 2015; Toews & Vézina, 2017). In addition, FDI may have other significant effects, such as on-the-job worker training and investment in formal education (Agénor, 2003; Javorcik, 2015).

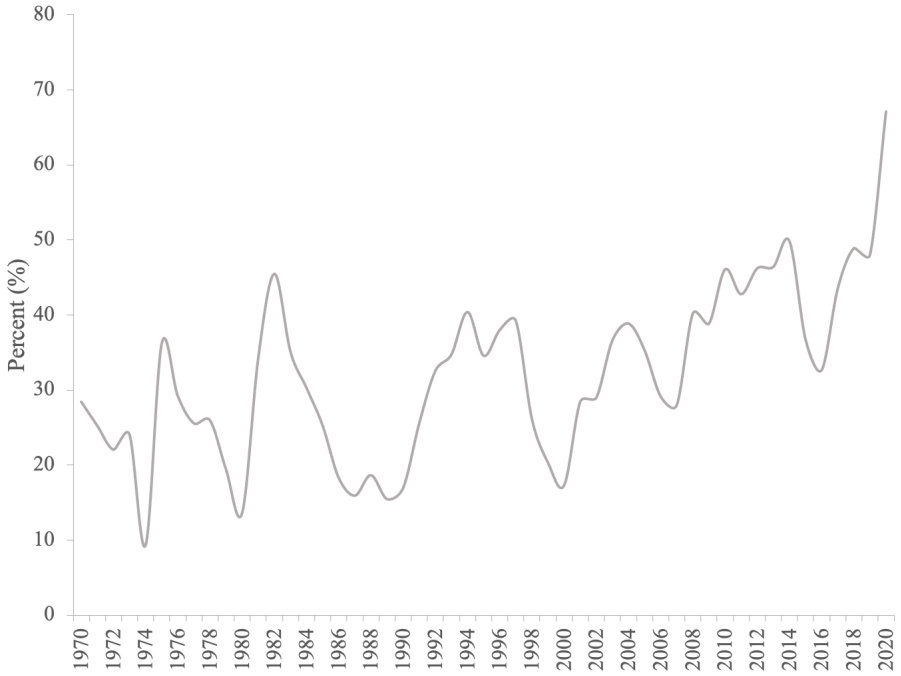
FIGURE 1.1: Trends in global FDI inflows (US$ trillion), 1970-2020



Notes.- UNCTAD time series data, accessed on 19/04/2022.

Subsequently, developing countries offer incentives to promote FDI inflows in their economies (Makiela & Ouattara, 2018).

FIGURE 1.2: Developing countries' share of FDI inflows in global total FDI inflows (%), 1970-2020



Notes.- author calculations using UNCTAD time series data, accessed on 19/04/2022.

Moreover, FDI may also generate potential costs. For instance, FDI may lead to a high concentration of capital flows. This may arise due to information asymmetry, with foreign investors gaining inside information about the operations of the firms they invest in (Agénor, 2003). In other words, foreign investors would have an informational advantage over domestic investors who are less informed and may have insufficient shareholding to control the corporate. Consequently, foreign investors may exploit their informational asymmetry by selling only low-productivity firms to less informed domestic investors while retaining the high-productivity ones. This has the potential to lead to over-investment by foreign direct investors. FDI may also lead to macroeconomic instability (Nguyen, 2011). Increased foreign investment can have undesirable macroeconomic effects, such as rapid monetary expansion, widening current account deficits, inflationary pressures, and real exchange rate appreciation (Calvo et al., 1996). Also, FDI may harm a host country's economy if foreign investors claim meagre resources, such as loan facilities and skilled workforce, and crowd out local investment opportunities from domestic sources (Herzer et al., 2008). Furthermore, under flexible exchange rate regimes, growing external deficits could lead to currency depreciation, while under a fixed exchange rate regime, the growing external imbalances and loss in competitiveness could precipitate a currency crisis and increase financial instability as the confidence in the viability and sustainability of the peg is eroded (Agénor, 2003). Likewise, the initial effect of FDI flows on local competitors' productivity can be negative (Merlevede et al., 2014).

However, the ambiguous empirical results on the benefits of FDI on host countries have raised questions about whether the kinds of incentives provided to foreign firms are merited. Alfaro (2003) suggests that FDI gains might differ across primary, services and manufacturing sectors. Other scholars suggest that natural resources can be more a curse than a blessing for some countries. For example, Sachs & Warner (1995) indicate that countries with abundant natural resources are also among the poorest and slowest growing, particularly those with poor institutions. Yet, natural resource-rich developing countries with external debt need export earnings to purchase imports and service their debts. But, when the natural resource sector is privately owned, the owners can avoid paying taxes, for instance, by using transfer pricing, changing the financing strategy (for example, using intra-company debt from related parties in tax havens) and payments for services to foreign affiliated companies. Thus, states require fiscal instruments to appropriate a share of export earnings.

This thesis revisits these issues and seeks to contribute to understanding the general discussions around the impact of MNEs operations and FDI on host developing countries. Each essay provides a distinct contribution to the literature. The motivation

for this thesis derives from my intrinsic interest in these discussions, triggered initially by my own personal and professional experience. Before commencing my doctoral studies, I was actively involved in collecting and compiling the confidential firm-level FDI data at the Bank of Zambia (BoZ), so I was familiar with the data used in parts of this thesis. However, the finished product is undoubtedly an outcome of a rigorous process that progressively evolved during the writing of the thesis, which greatly benefitted from the guidance of my supervisors. Some initial research ideas were dropped, while new ones were generated depending on the considered contributions to the current literature.

The first two essays examine specific research questions focusing on Zambia. The first essay analyses the responses of aggregate FDI inflows and disaggregated components of FDI flows to macroeconomic variables within firms in Zambia's mining sector. It is motivated by the sudden shift in the FDI financing behaviour in 2012 and 2013 by foreign firms operating in Zambia. In other words, this essay revisits the preposition by Brewer (1993) that each component of FDI responds differently to the same set of macroeconomic variables. The essay uses a new database constructed from anonymised confidential firm-level data held by BoZ. This is the first empirical investigation to use this novel dataset. The primary source of the database is a private capital flows dataset based on information compiled through an annual survey. The survey coverage is comprehensive, with most firms with foreign assets and liabilities included in the sample. The survey captures gross flows and stocks of FDI, portfolio investments, and private sector external debt information. The FDI flows and stocks are disaggregated into equity capital, reinvested earnings, and intra-company debt at the firm level.

Thus, these data can be used to estimate the effect of macroeconomic variables on FDI financing behaviour and the profits within firms. The limitations associated with using aggregate FDI data for such research are addressed here. For instance, aggregate FDI flows obscure any switching behaviour in the financing mix, which could provide helpful information in deriving a firm's investment objectives or motivations. Estimating individual financing options may also have significantly varying consequences for macroeconomic conditions, such as switching from equity to intra-company debt financing. This may lead to *earnings stripping* through the payment of higher interest rates (Grubert et al., 1993) and, consequently, the avoidance of tax payments. This essay uses the data to answer essential questions and makes noteworthy contributions to the current literature on the determinants of FDI flows in a developing resource-rich country.

The second essay extends the first. The motivation for this project derives from the findings of the first essay, which suggest that firms engage in tax avoidance. The essay focuses on the manufacturing sector instead of the mining industry covered by the first essay. Specifically, the essay studies how multinationals deploy methods, opportunities, and tools to avoid paying taxes using a subsidiary operating in the manufacturing sector. The analysis is conducted using a unique dataset constructed from sources combining many company records, such as annual financial statements and other official sources. The essay also uses information from the anonymised firm-level panel dataset held by the local Central Bank. Taxing MNEs has been a persistent global problem for policymakers (Foss et al., 2019; Lyon & Silverstein, 2019). They avoid paying taxes using a broad range of activities that allow them to shift profits to low-tax jurisdictions from high-tax countries (Foss et al., 2019; Zucman, 2014). Theory shows three key mechanisms that resource-based MNEs can use to avoid tax: transfer pricing, mis-pricing of internal loans, and overcharging for notional services. These mechanisms involve internal mis-pricing of a flow to facilitate the redistribution of income to a low-tax country from a high-tax. The distinction is that transfer pricing mis-prices a real flow, often by understating its value. In contrast, mis-pricing of internal loans mis-prices a financial flow, by overstating its value, and notional services mis-price a notional flow almost every time overstate its value.

Beer et al. (2020), Cooper & Nguyen (2020), Dharmapala (2014), Hanlon & Heitzman (2010), Riedel (2018) and Wang et al. (2020) provide comprehensive reviews of literature, both theoretical and empirical focusing on MNEs and their tax planning. The literature suggests that developing countries are more vulnerable to tax avoidance due to ineffective law enforcement (Fuest et al., 2011; Johannesen et al., 2020; OECD, 2015). Yet, developing countries need tax revenues for developmental purposes. This essay addresses an important area that has generated increased interest in public debate due to the low tax revenues paid by MNEs in recent years. Moreover, the study is important as it contributes to bridging the gap in the absence of comparative studies and diversity in geographic representation (Cooper & Nguyen, 2020), especially for developing countries.

The third essay explores the relationships between natural resources, FDI inflows, and the quality of national institutions, also known as “the rules of the game”. This is an analysis motivated by my passion for understanding better why countries with abundant natural resources are generally among the poorest and slowest growing (Sachs & Warner, 1995). This project was conceived during somewhat socially distanced supervision meeting walks with Carl around the University of Reading grounds at the peak of the COVID-19 pandemic in the summer of 2020.

The literature suggests that natural resources can be more of a curse than a blessing for some countries. However, the curse is more likely to be felt by countries with poor institutions because owners of natural resources can take advantage of weak institutions and trade openness to disadvantage the growth of other sectors (e.g., Bulte et al., 2005; Butkiewicz & Yanikkaya, 2010; Torvik, 2002). Therefore, the third essay asks an important question: Do natural resources, and FDI tend to erode or support the development of national institutions? The essay uses a panel dataset of 69 developing countries to respond to this most critical question.

Unlike most researchers who have examined the relationship between FDI and institutions by focusing on the direction of causality going from the institutions of destination countries to FDI, our study explores the effect of FDI on the institutions in recipient countries. This is premised on the assumption that foreign investors are an essential vehicle for facilitating institutional reforms (Libman, 2006). Central to these issues is the fact that most resource-rich countries are dependent on a single sector or resource, which is also the dominant destination for FDI (Poelhekke & van der Ploeg, 2013). Thus, re-examining these viewpoints and relationships is important for policymakers, especially those whose objectives are to strengthen domestic institutions when their countries develop new opportunities to extract rents from natural resources.

Chapter 2

The components and determinants of FDI within firms: A case study of Zambia

Note: The working paper version of this essay has been published as the University of Reading Department of Economics Discussion Paper Series No. 2021-09. The paper is also publicly available at RePEc: https://ideas.repec.org/p/rdg/emxxdp/em-dp2021-09.html. Earlier versions of this essay were presented at the University of Reading Department of Economics PhD Seminar Series, PhD Workshop (June 2020), and the Annual Southern PhD Economics Conference (June 2021).

2.1 Introduction

Mineral rich developing countries, with their own domestic currency and debt denominated in a strong foreign currency, need export earnings to purchase imports and to service their debts. When their mineral sector is privately owned, the state requires fiscal instruments, such as profit taxes, to appropriate a share of export earnings. But private owners can avoid taxes by using transfer pricing, changing the financing strategy (for example, using intra-company debt from related parties in tax havens) and payments for services to foreign affiliated companies. This study examines these issues in the context of the Zambian economy.

Primarily, the objective of this essay is to estimate the effect of macroeconomic variables on inward foreign direct investment (henceforth FDI) financing. I then use these results to evaluate the extent to which the patterns observed may be

attributable to other explanations. FDI financing modalities to foreign affiliates by parent firms consist of funds provided in the form of equity capital, intra-company debt or reinvested earnings, or some combination of all three. Aggregate FDI flows obscure any switching behaviour in the financing mix, which could provide useful information in deriving a firm's investment objectives or motivations. Estimating individual financing options may also have significantly varying consequences for macroeconomic conditions. For example, when there is a domestic shock, firms may decide to increase their FDI inflows by switching from equity to intra-company debt financing. This has the potential of *earnings stripping* through the payment of higher interest rates (Grubert et al., 1993) and, consequently, the avoidance of tax payments.

Brewer (1993) presents a comprehensive theory of the relationship between the components of FDI flows and host country macroeconomic variables. He suggests that components of FDI might respond differently to the same macroeconomic variables. Past empirical studies have only examined this relationship on aggregate FDI inflows or a single component of FDI (e.g., Chakravarty & Xiang, 2011; Globerman & Shapiro, 1999; Loree & Guisinger, 1995; Shapiro & Globerman, 2003). No known study has investigated the relationship between the individual financial components of FDI and the host country's macroeconomic variables at the firm level. This study, therefore, aims to fill that gap. The current study is different from past research as it investigates this relationship of all three components in a single study and is believed to be the first empirical study to test Brewer's theory on a developing country. The essay addresses critical issues essential for policymakers.

This study is motivated by the sudden shift in the FDI financing behaviour of foreign firms operating in Zambia, following the implementation of currency management policies in 2012 and 2013. Specifically, it investigates the response of the components of FDI flows to macroeconomic variables. The key variables of interest are copper price and the exchange rate. Using a new firm-level database constructed from anonymised confidential data held by the Bank of Zambia (BoZ) covering the period from 2008 to 2017, the essay presents the following facts. I found a positive and significant effect of copper price on FDI inflows. This supports the theory that high commodity prices tend to stimulate investment. I also found a negative relationship between FDI flows and exchange rate appreciation. The relationship is insignificant, but it aligns with the theory.

When I considered the individual components of FDI, the evidence shows varying effects. For instance, the relationship between equity capital and copper price is negative. The evidence also indicates a negative relationship between equity capital and exchange rate appreciation. Furthermore, the evidence shows a positive

relationship between reinvested earnings and copper price. This suggests that firms reinvest their profits to finance or expand their operations when copper prices increase. However, the estimated effect of the exchange rate appreciation on reinvested earnings is negative. Also, the evidence shows a significant positive relationship between intra-firm debt and copper price. Likewise, the effect of the exchange rate depreciation on intra-firm debt is positive. These results provide new empirical evidence that supports the theory that components of FDI may respond differently to the same set of macroeconomic variables.

The study also provides evidence for understanding the effects of the currency management policies implemented by the Zambian Government on FDI financing. The evidence suggests an aggressive substitution of reinvested earnings financing with intra-company funding in 2012 and 2013. These results may also indicate firms engaged in tax avoidance through profit shifting. For this reason, government policies should target to deter profit shifting by integrating foreign subsidiaries with local firms.

The literature presents theoretical and empirical channels through which FDI impacts the host economy. For instance, FDI may increase efficiency in using the world's resources by stimulating innovation, competition, economic growth, and employment (Alfaro et al., 2004). It is also argued that FDI impacts growth through knowledge transfer, the introduction of alternative management practices and organisational arrangements (de Mello Jr., 1999). Cockcroft & Riddell (1991) claimed that FDI has the potential to address the low levels of investment and the foreign exchange shortages faced by most countries in Sub-Saharan Africa. Multinational enterprises (henceforth MNEs) are considered the most critical vehicle for FDI.

The constant supply of foreign currency from exporting firms is one of Zambia's expected primary benefits of FDI. However, over the years, there was a systematic decline in the supply of foreign currency from exporters. Consequently, this generated a great deal of concern for the Government. The abnormally low foreign currency supply from exporting firms raised concerns that it was fuelling instability in the foreign exchange rate. The mining industry accounts for about 70% of the country's total exports (Chipili, 2016). Zambia's policy and regulatory agenda has focused on the need to attract more FDI because of the expected benefits. Thus, to capture more foreign currency from export earnings, the Zambian Government implemented currency management policies in 2012 and 2013.[1]

[1]The currency regulations of 2012 were aimed at barring the settlement of domestic transactions in foreign currency (Bank of Zambia, 2013; Government of Zambia, 2012). This was complemented by changes to the monitoring of balance of payments regulations in 2013 (Bank of Zambia, 2014; Government of Zambia, 2013).

Following these new policies, inward FDI flows surged in 2012 and 2013. A glance at the composition of the FDI financing suggests a fundamental shift in the firms' behaviour, with intra-company debt being the primary driver. At the same time, reinvested earnings contracted substantially compared to the previous two years, when they were the main contributor to FDI growth. The unprecedented high intra-company debt was a significant departure from firms' previous financing behaviour. Thus, the motivation to understand the shift in the FDI financing behaviour.

This study contributes to the existing literature in three ways. First, it illustrates how the individual components of FDI react to the macroeconomic variables and policy change using a novel dataset. Second, to the best of my knowledge, this is the first study to investigate the determinants of each component of FDI at the firm level. Third, it is believed to be the first study to examine the response of the individual components of FDI to selected macroeconomic variables in the context of a developing country.

Recent research on issues in this essay has focused on the following strands of literature. One strand has studied the determinants of foreign investment. Another strand has focused on the effect of the level of the exchange rate on FDI. The other strand of literature focuses on how firms respond to macroeconomic shocks (Buch & Lipponer, 2005). This study extends the existing broader empirical literature by combining all these branches of research using the Zambian inward FDI data. The study focuses on both domestic and firm-level characteristics.

The remainder of the essay is structured as follows: Section 2.2 provides a background; Section 2.3 presents related literature; Section 2.4 highlights the theory and hypotheses; Section 2.5 briefly outlines the dataset; Section 2.6 discusses the estimation methodology and key results; and Section 2.7 concludes.

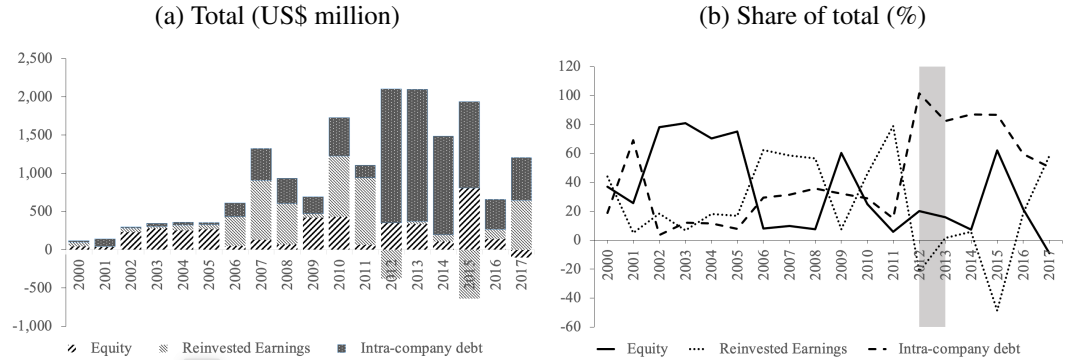
2.2 Background

Before 1991, Zambia's FDI flows were low because most firms were state owned enterprises (SOEs). However, the Government then introduced wide ranging macroeconomic reforms that included privatisation, which is generally credited as a major stimulant to the initial robust FDI inflows into the country (Cambell White & Bhatia, 1998; Fundanga & Mwaba, 1997). The sale of the mines in the early 2000s, which is the dominant recipient of FDI, was a key milestone in the privatisation process (see, e.g., Lungu (2008) for a detailed account of the privatisation process of the mines).

2.2.1 FDI Flows

Total inward FDI flows to Zambia registered enormous growth in the past two decades, rapidly rising from US$122 million in 2000 to US$1,324 million in 2007 and peaking at US$2,100 million in 2013. In 2017, FDI flows were US$1,108 million. Figure 2.1 displays trends in FDI financing for the period 2000-2017. Sub-Figure 2.1(a) shows gross annual levels of flows for each of the components of FDI, while Sub-Figure 2.1(b) displays the components of FDI as a share of the total gross annual flows. Both Sub-Figures 2.1(a) and 2.1(b) show that aggregated FDI flows were characterised by fluctuations in levels and financing options. For instance, equity financing was the major source of FDI inflows in Zambia from 2002 to 2005 and in 2009. Equity financing increased from US$45 million in 2000 to US$269 million in 2005, before declining to US$50 million in 2006 and remaining substantially low until 2008. In 2009, equity financing surged to US$419 million and remained elevated at US$433 million in 2010. However, in 2011, equity financing contracted to US$65 million before surging to US$351 million and US$335 million in 2012 and 2013, respectively. This was followed by a contraction of US$109 million in 2014 and a surge of US$379 million in 2015, followed by a recovery of US$143 million in 2016 and an outflow of US$100 million in 2017.

FIGURE 2.1: Trends in FDI financing, 2000-2017



Notes.- author calculations using the anonymised confidential firm-level database. Figure 2.1(a) shows the gross annual levels of flows for each of the components of FDI. Figure 2.1(b) shows the components of FDI as a share of the total gross annual flows. The shaded area denotes the period when the currency regulations of 2012 and the monitoring of balance of payments regulations of 2013 were implemented.

Reinvested earnings were relatively low until 2005. Between 2006 and 2008, however, they were the major contributor to FDI inflows, rising from US$7 million in 2001 to US$776 million in 2007. In 2009, the reinvested earnings contracted to US$52 million following the financial crisis. They surged in 2010 and 2011 to US$795 million and US$876 million, respectively, before contracting to negative US$375.6 million in 2012. Reinvested earnings recovered to US$35 million in 2013 and US$87 million in

2014 before declining again to negative US$70 million in 2015. Reinvested earnings recovered to US$125 million in 2016 and US$647 million in 2017. The data suggests that in times of policy certainty, firms reported stable profits, to the extent that part of those earnings were reinvested. Section 2.2.2 presents a detailed discussion on the distribution of profits, while the contribution of reinvested earnings to total FDI inflows in Zambia is illustrated in Figure 2.1.

Intra-company debt financing was relatively insignificant until 2006. It rose from US$23 million in 2000 to US$181 million in 2006, US$416 million in 2007 and US$36 million in 2008. Intra-company debt financing was US$223 million in 2009, US$501 million in 2010, declining to US$167 million in 2011. However, intra-company debt rapidly rose to an all-time high of US$1,756 million in 2012 and US$1,730 million in 2013 (see Sub-Figures 2.1(a) and 2.1(b)). The intra-company debt remained the major contributor to FDI flows in 2014 at US$1,293 million and US$996 million in 2015. Although it was still the major contributor to FDI in 2016, intra-company debt contracted to a record low in five years of US$396 million before surging to US$561 million in 2017. Since no major global economic event occurred during this period, the potential explanation for this firm financing behaviour might be attributed to the policy changes introduced in 2012 and 2013.

2.2.2 Profit dynamics

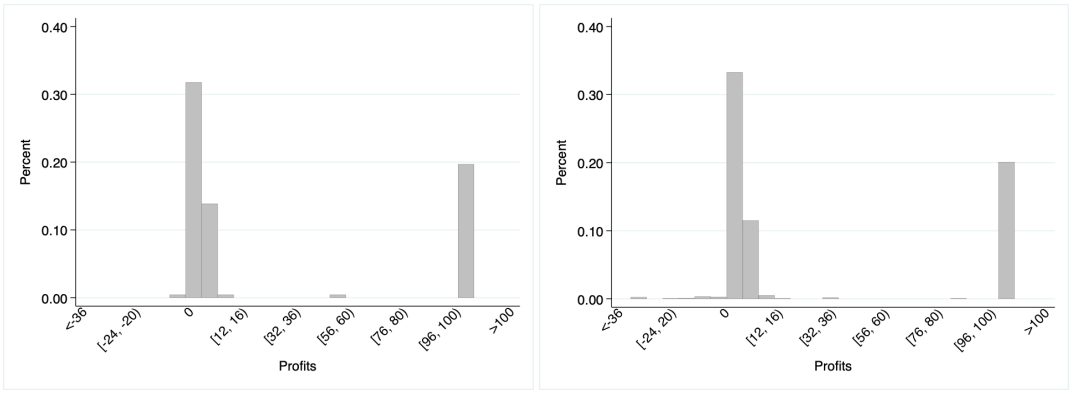
In this section, I provide a detailed discussion of the stylised facts of the distribution of profits. Profits are distributed as dividends and reinvested earnings. Dividends are paid to shareholders for their investment in the firm following its dividend policy. But the earnings not distributed to firm owners count as reinvested earnings. Thus, this discussion provides additional information to understand specific observable firm behaviour. I apply a graphical approach by constructing a series of histograms of year-by-year and individual year changes using reported profits. To address the endogeneity caused by firm size, I use percentage changes in plotting the graphs. The graphical representations show varying features, which provide unclear patterns, making it difficult to make an overall statement on the firms' profits dynamics over time. Nonetheless, the data suggest that a nontrivial proportion of firms recorded zero change and reducing profits during the study period.

Figure 2.2 displays histograms showing the distribution of year-to-year percentage changes in profits. Sub-Figure 2.2(a) pools percentage changes in profits for all firms for the period 2010-2012 and Sub-Figure 2.2(b) pools percentage changes in profits for all firms for the period 2013-2017. Both Sub-Figures 2.2(a) and 2.2(b) display that a higher proportion of changes in firm profits are concentrated around zero with a

nontrivial number of firms in the samples and periods having reported positive change in profits. This is supported by statistics in Table 2.1 and Table 2.2. Similarly, Appendix Figure A.1, Appendix Figure A.2 and Appendix Figure A.3 show that a higher proportion of firms in the samples and periods reported positive change in profits.

FIGURE 2.2: 2010-2017, pooled changes, all firms

(a) 2010-2012 (b) 2013-2017



Notes.- Pooled annual changes of profits for all firms before the policy change, 2010-2012 and pooled annual changes of profits for all firms after the policy change, 2013-2017.
The bin size is 2; implying that the bin to the right of zero contains firms whose percentage change in profit is positive but not greater than 2, the next bin contains firms whose percentage change in profit is greater than 2, but less than or equal to 4, and so on. The construction of the bins to the left of zero is symmetrical.

Table 2.1 presents the frequency of firms reporting losses and zero profits in Zambia. The table shows that a nontrivial majority of firms reported zero change or reduced profits between 2010 and 2017. On an annual basis, over 50% of the firms reported zero change or reduced profits, except in 2010, when this number was 26%. These figures are surprisingly very high. Moreover, firms in the sample reported zero change or reduced profits, while reinvested earnings, which are a function of profits, were the primary form of investment financing. For instance, in 2011 about 67% of the firms reported zero change or reducing profits, yet reinvested earnings financing was 79% of the total FDI financing. This suggests that firms recorded stable profits, particularly the mining sector, whose profits could have been boosted by the high copper prices which were at a record high (see Figure 2.4). When the number of firms that recorded zero change or reduced profits was second lowest in 2012, reported profits were lower, with huge reinvestment earnings outflows (see Figure 2.1). The notable highest number of firms reporting zero change or reduced profits was in 2017, about 76%. During the same year, the recorded profits substantially increased, leading to increased reinvested earnings financing (see Figure 2.1).

TABLE 2.1: The frequency of firms making losses and zero profits in Zambia, 2010-2017

Year	Making losses (1)	Zero profits (%) (2)	Number of firms (N) (3)
2010	21.2	4.5	132
2011	54.7	12.4	137
2012	61.1	5.4	149
2013	41.1	33.5	236
2014	44.1	14.1	227
2015	39.7	22.1	267
2016	46.1	27.2	254
2017	50.5	25.5	204

Notes.- Making losses and zero change profits show the percentage of firms making yearly losses and no change profits, respectively. The computations are on the full sample of all firms.

Table 2.2 shows the frequency of firms reporting reduced and frozen profits in Zambia. The data suggest that most firms recorded zero change or reduced profits on a year-to-year basis. The proportion of firms that reported zero change or reduced profits is high and, in most pairs of years, is above 80%, except for the pair of years 2010-2011, when the fraction of firms was 65%. This fraction rose to 82% between 2011 and 2012. For the pair of years 2012-2013, 92% of the firms reported zero change or reduced profits. This proportion rose to 99% for the pair of years 2013-2014. This suggests that nearly all firms recorded zero change or reducing profits, which is rather unusual. However, the proportion declined to 86% for the years 2014-2015. This suggests an increase in firms that recorded positive or increasing profits. The high fraction of firms reporting zero change or reducing profits suggests that many foreign-owned firms operating in Zambia repeatedly reported zero change or reduced taxable profits. Although these figures are comparatively very high, such behaviour is not unusual among foreign firms (see, for example, Bilicka (2019)).

2.2.3 Foreign exchange dynamics

Export earnings are Zambia's primary source of foreign currency, and they help to stem the pressure on the local exchange rate. An adequate supply of foreign currency boosts chances for the Central Bank to purchase foreign currency for purposes of accumulating international reserves to abate an appreciation (Aizenman & Lee, 2007) and for servicing the Government's foreign debt. However, the balance of payments data shows that export earnings were increasingly deposited in foreign banks. For instance, the share of deposits banked in foreign banks as a percentage

TABLE 2.2: The frequency of firms making reduced and frozen profits in Zambia, 2010-2017

Year	Reduced (%) (1)	Frozen (%) (2)	Number of firms (N) (3)
2010-2011	53.2	12.1	141
2011-2012	69.1	13.3	181
2012-2013	57.4	34.8	244
2013-2014	60.3	38.5	247
2014-2015	56.8	28.8	285
2015-2016	61.3	31.7	284
2016-2017	65.7	27.2	254

Notes.- author calculations using the anonymised confidential firm-level database. Reduced and frozen show the percentage of firms with year-to-year negative profits and no change in the profits, respectively. The computations are done on the full sample.

of total export earnings rapidly rose from 10% in 2005 to 26% in 2011 (Bank of Zambia, 2008, 2013). During the same period, the Zambian kwacha depreciated by 49%. Whereas maintaining export earnings in foreign accounts was within the law, the practice deprived the country of foreign currency, fuelling the weakening of the local currency due to supply and demand forces. To address the foreign exchange challenges and capture more foreign currency from export earnings, the Government introduced regulations in 2012 and 2013. Figure 2.3 displays foreign currency transactions in United States dollars for the period 2008-2017. The figure suggests that these policies had an immediate positive impact, as the net supply of liquidity in the foreign exchange market rapidly increased (Bank of Zambia, 2013, 2014).[2] However, both policies were revoked in 2014 (Government of Zambia, 2014a,b).

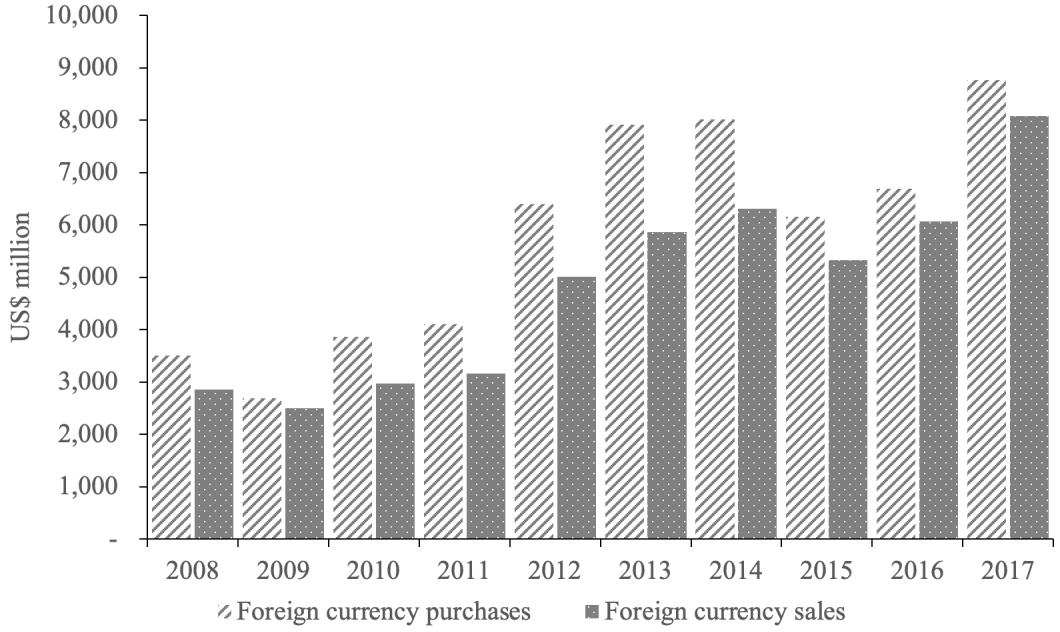
2.2.4 Domestic characteristics

Several fundamental factors can affect FDI flows, such as resource endowment, exchange rate, macroeconomic policy shocks, the tax regime, and governance. Although it is not possible to construct a time series panel of firms that covers all these factors, most of them, however, may be captured in macroeconomic variables, especially the exchange rate.

Like most African countries, a more significant proportion of Zambia's FDI is in the primary sector (Jaiblai & Shenai, 2019), with the mining sector accounting for 60% of the total FDI stock. The mining sector is dominated mainly by copper

[2]Foreign currency supply in the interbank market rose by 56% in 2012 to US$6,398 million from US$4,105 million in 2011 and remained elevated, rising by 24% in 2013 to US$7,910 million.

FIGURE 2.3: Foreign Currency Transactions (US$ million), 2008-2017



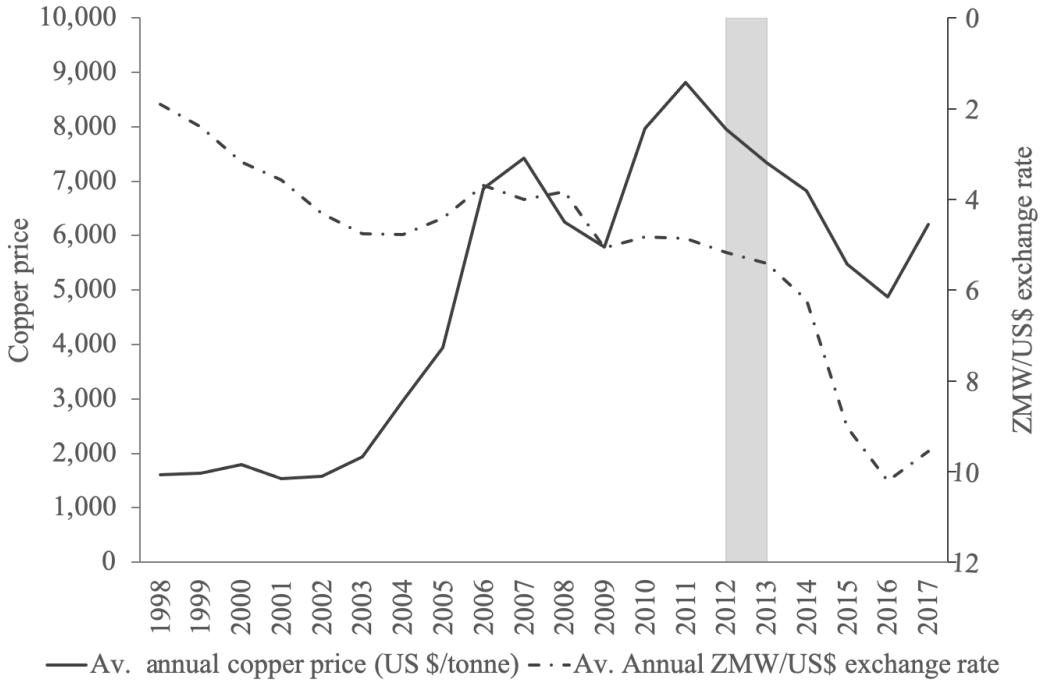
Notes.- Foreign currency transactions show that both supply and demand increased after 2012 following the introduction of currency management policies. Although both supply and demand had contracted in 2015 and 2016, they were still higher than before the policies.

production, with smaller quantities of cobalt, gold, nickel and others. Consequently, Zambia is vulnerable to global copper price fluctuations, which threaten the country's macroeconomic stability (Cerda, 2007), including the foreign currency exchange rate. Since the country has a flexible exchange rate regime, the price of copper plays a critical role in driving market sentiments in the foreign exchange market, which in turn influences the foreign exchange rate (see Figure 2.4). Chipili (2016) finds a long-run equilibrium association between the real copper price and Zambia's real kwacha/US$ exchange rate. This confirms the proposition by Bova (2009) that commodity export prices significantly impact the real exchange rate, especially for countries with flexible exchange rate regimes. A stable exchange rate helps to maintain macroeconomic stability, which influences the location decision of investments (e.g., Alguacil et al., 2011; Demekas et al., 2007).

2.3 Related literature

A great deal of previous research on FDI has focused on either aggregate or firm-level data, like this study. The analyses at the aggregate level are carried out for a wider cross-country perspective, albeit with some potential econometric challenges, such as omitted variable biases and endogeneity. The firm-level investigations are usually restricted to one country, but they often take care of the estimation

FIGURE 2.4: Copper prices and ZMW/US dollar exchange rates, 1998-2017



Notes.- The plot suggests a systematic association of the annual average copper price and the annual average exchange rate. The similarity in swings and turning suggests that an increase (decrease) in the copper price leads to an appreciation (depreciation) of the Zambian kwacha/US dollar exchange rate. The shaded area denotes the period when the currency regulations of 2012 and the monitoring of balance of payments regulations of 2013 were implemented.

challenges more cogently. The estimation challenges associated with aggregate data have triggered increased interest in firm-level analysis. A review of the estimation techniques used in most of these studies shows that a broad range of methods were applied. However, since these estimation methods involve diverse interpretations of the identical sample correlations, divergences in estimation techniques typically make minimal difference to headline results (Li & Casson, 2018).

This study will attempt to explain the effects of macroeconomic variables on the components of inward FDI flows within firms. The analysis will focus on domestic macroeconomic variables and firm-level characteristics. I identify copper price and the exchange rate to distinguish their effects on total inward FDI flows and disaggregated FDI sub-components: equity capital, reinvested earnings, and intra-company debt. Several empirical studies include commodity prices and the exchange rate movements as determinants of FDI.

2.3.1 FDI flows and Commodity prices

Bevan et al. (1994) suggested that a considerable rise in the relative commodity price led to a rise in the return to capital for the commodity sector, which in turn

induced, investment. By the same argument, they suggested that the opposite was true. Mash (1998) posited that investment booms in response to commodity price shocks could occur or could take place at the end of the commodity price shock. However, his study did not specifically focus on FDI, but on investment in general. Kariuki (2015) investigated the factors that influence FDI flows into African countries using data from 35 nations. She found a positive and significant association between inward FDI flows and the commodity price index performance.

These three studies did not specifically focus on copper, but Comelli & Ruiz (2016) investigated the effect of copper price uncertainty on investment decisions in Chile. The study estimated a vector autoregressive (VAR) using seasonally adjusted monthly data for the period 1999 to 2015. The results indicated that the effect of a copper price uncertainty shock on investment was strong and persistent. This is consistent with the findings of Fornero & Kirchner (2018), who analysed the effect of the commodity price shocks on saving-investment dynamics for the Chilean economy. The study used a dynamic stochastic general equilibrium (DSGE) model and concluded that if there was a high and persistent commodity price shock, the potential actualisation of higher returns of capital, particularly in the commodity sector, would trigger a boom in investment.

2.3.2 FDI flows and exchange rates

Literature assessing the effects of exchange rates on FDI is ambiguous. For example, Froot & Stein (1991) demonstrated that FDI is affected by currency depreciation through the changes in the relative wealth of firms across different countries. A real depreciation works to the advantage of foreign buyers of domestic assets and is related to a rise in inward FDI. The opposite is the case for a real appreciation. Klein & Rosengren (1994) found that a depreciation of the real exchange rate in the dollar facilitated increased FDI inflows into the United States. A study by Kogut & Chang (1996) explored the effects of industry, firm and exchange rate movements on investment. The study found that investment decisions were significantly influenced by real exchange rate movements. Blonigen (1997) found that the depreciation of the United States dollar led to increased Japanese investments in United States firms.

In a similar study, Kosteletou & Liargovas (2000) found an ambiguous relationship in the direction of the association between FDI and real exchange rate volatility. They applied a simultaneous equation model and time series data for 12 European countries over the period from 1960 to 1997. Likewise, Bénassy-Quéré et al. (2001) found that FDI is affected by exchange-rate volatility. The authors used a panel of 42 developing

countries that were recipients of FDI from 17 Organisation for Economic Co-operation and Development (OECD) source countries covering the period 1984–1996. Lee & Min (2011) assessed the effect of both the movements and volatility of the exchange rate on FDI inflows in South Korea. The study analysed the relationship between the exchange rate volatility and foreign investors' decisions. The study found that the exchange rate volatility had a robust impact on FDI flows.

The estimation evidence from Pain & Welsum (2003) showed that the effect of exchange rates on FDI was ambiguous. It is heterogeneous across different countries and modes of investment. The authors claimed that the difference in the impact of the exchange rates on FDI could be explained by the types of acquisitions by the foreign firms — only activities relating to the purchase of firm-specific assets acquired to generate firm-level scale economies are affected by currency movements. This argument suggests that mergers and acquisitions (M&A) are more sensitive to exchange rate movements than greenfield investments. Pain & Welsum (2003) further suggested that FDI may be less sensitive to exchange rate movements in developing countries because they were largely dominated by greenfield investments.

2.3.3 FDI components

Brewer (1993) argued that individual components of FDI respond differently to government policies because FDI is a multidimensional, evolutionary process. He explained that choices about initial equity, reinvestment of earnings, and intra-firm debt are made at different intervals and stages of investment. In other words, each component has its intrinsic features and may respond differently to the same economic fundamentals. Several studies examine the determinants of FDI on disaggregated components, for instance, on equity (see, Hau & Rey, 2006; Loree & Guisinger, 1995) and reinvested earnings (see, Auerbach et al., 1993; Chakravarty & Xiang, 2011; Lundan, 2006; Nguyen, 2016; Oseghale & Nwachukwu, 2010; Wolff, 2007). Unlike this essay which focuses on all three components, most previous studies have explored individual components separately due to data limitations (Chakravarty & Xiang, 2011). For instance, Hau & Rey (2006) focused on equity capital. They found a positive association between the appreciation of the exchange rate in a host country and equity flows.

When examining the impact of the exchange rate on reinvestment of earnings, Lundan (2006) posited that a currency depreciation of the host country was linked with discouraging repatriation. In other words, there is scope for firms to reinvest their earnings. In a related study, Oseghale & Nwachukwu (2010) examined the effect of a set of explanatory variables on United States firms' reinvested earnings

in some countries. The study applied a fixed-effect regression model covering the period from 1994 to 2006. The results showed a positive relation between reinvested earnings and the macroeconomic variables of a host country, such as the exchange rate and profitability of existing operations. In a related study, Nguyen (2016) investigated the determinants of reinvested earnings of subsidiaries of multinational enterprises in emerging economies. Using the ordinary least squares, Nguyen found that reinvestment of profits was influenced by several factors, including the quality and reliability of the host country's financial infrastructure.

Looking at the effect of macroeconomic variables on intra-company debt, Wolff (2007) argued that empirical predictions are difficult. For instance, host countries with high tax rates are linked with less inward FDI flows, as investments to such countries are perceived as less profitable. However, firms could, in large part, opt to use debt instruments in host countries with high taxes as opposed to equity because interest payments originating from financial credits are only charged in the home country and not in the host country.

2.3.4 Policy and Investment

Numerous studies explain the link between policy changes and the level of investment (e.g., Bernanke, 1983; Canh et al., 2020; Globerman & Shapiro, 1999; Loree & Guisinger, 1995; Shapiro & Globerman, 2003). Brewer (1993) presented a comprehensive theory on the relationship between FDI and host country policies. He suggested that several policies influence investment decisions and that components of FDI may respond differently to the same macroeconomic variables. In earlier studies, Bernanke (1983) and Pindyck (1991) presented theoretical arguments that irreversible investment is sensitive to increased volatility, leading to reduced investment. Looking at determinants of equity, Loree & Guisinger (1995) argued varying effects of policies on equity capital. Shapiro & Globerman (2003) explored the impact of policies on FDI focusing at the sectoral level (i.e., energy, financial services and manufacturing). They found that government policies had to some extent, influenced FDI flows. More recently, Canh et al. (2020) presented empirical evidence that a rise in domestic policy uncertainty significantly and adversely affects inward FDI flows.

2.4 Theory & hypotheses

The hypotheses are constructed from the literature on neoclassical investment and the determinants of foreign investment. The literature on trade integrated models and models of financial behaviour provides a basis for analysing the relationship between

the exchange rate and FDI (see, Kosteletou & Liargovas, 2000, for a discussion on these models). The study also benefits from the macroeconomic analysis of Dunning & Lundan (2008), which makes useful distinctions between the types of foreign investment activities; market-seeking, efficiency-seeking, resource-seeking, and strategic asset or capability-seeking. The work of Wells (1998) provides arguments on how decisions involving the financing of subsidiaries in developing countries are driven, in part, by exchange rate controls and currency stability in the host country.

Zambia is rich in natural resources. Like most natural resource exporting countries, FDI is primarily directed toward the extractive industries (Asiedu & Lien, 2011). The extractive sector is dominated by copper mining. This implies that the country is immensely reliant upon the mining industry and highly exposed to the copper price. In addition, a stable policy environment is essential to multinationals in the extractive sectors. This is because exploration and extraction of minerals require an initial large-scale capital intensive investment and have long gestation periods (Asiedu & Lien, 2011). Likewise, the exchange rate impacts the foreign investors' decisions by altering relative costs or wealth (Alfaro et al., 2004). For example, Froot & Stein (1991) suggested that a depreciation of the home country's currency raises the relative wealth of foreign-owned firms, leading them to expand their investment abroad. Moreover, policy uncertainty can significantly elevate the uncertainty associated with foreign firms' activities and influence their behaviour (Nguyen et al., 2018).

The impact of the exchange rate on FDI depends on the destination of the goods, i.e., whether they serve the domestic market or export market (e.g., Bénassy-Quéré et al., 2001). Resource-seeking inward FDI flows are usually linked to production intended for the export market, i.e., FDI and trade are complements. A depreciation in the exchange rate increases competitiveness through reduced labour and capital costs. This will likely increase the foreign investors' assets' relative value and, consequently, inward FDI flows. Similarly, an increase in the commodity price (copper price) can increase inward FDI flows. This is particularly applicable to resource-seeking investment, where an increase in the commodity price may induce expansion of production capacity, which can be actualised by an increase in inward FDI flows.

A more robust Zambian kwacha/US$ exchange rate would benefit the country. For instance, it would lower the value of foreign denominated debt in the local currency and boost the opportunity for the Central Bank to accumulate international foreign reserves. It would also reduce the cost of imports for the country, including mining equipment, which would increase the inward FDI flows in the mining sector. It would appear, however, that exporting firms would be less harmed by a depreciation in the exchange rate because they would only convert less foreign currency to meet their

domestic obligations, such as taxes, labour costs and payments to local suppliers. This seems to be supported by the systematic decline and low supply of foreign currency from exporters before 2012 (see Figure 2.2), as well as the holding of export earnings in offshore accounts (Bank of Zambia, 2008, 2013). Holding export earnings in offshore accounts created a shortage of foreign currency in the domestic foreign exchange market, which fuelled the weakening of the local currency.

To reverse this trend, the Government implemented currency management policies in 2012 and 2013. Government policy has the scope to directly or indirectly affect FDI. Brewer (1993) argued that monetary policies relating to the exchange rate in a host country indirectly affect inward FDI flows. The implementation of the currency management policies implied that export earnings had to be repatriated back to Zambia. The increased supply of foreign currency would provide scope for the appreciation and stability of the local currency. Since a depreciation lowers the value of the foreign currency that firms require to meet their domestic obligations, the assumption is that firms may have devised measures to maintain the local currency weak. Against this background, the following hypotheses are proposed:

H1a. *FDI within firms is positively related to the price of copper.*

H1b. *FDI within firms is positively related to exchange rate depreciation.*

Parent companies can finance their foreign subsidiaries using either equity capital, reinvested earnings, or intra-company debt. Equity is irreversible. It is predominantly the initial primary source of financing and determines the ownership structure when several investors are involved. There is scope for investors to use their funds in the form of equity in acquiring assets in subsidiary enterprises when the local currency is weak since it is cheaper. In other words, there is greater scope for parent companies to use their own funds to expand their investments in Zambia when the kwacha depreciates. The prediction that equity flows within firms is positively associated with exchange rate depreciation will be tested. Similarly, it is plausible to suggest that an increase in the commodity price would lead to investors increasing their equity to raise their ownership share in firms with more shareholders. Based on the discussion above, the following hypotheses are proposed:

H2a. *Equity capital within firms is positively related to the price of copper.*

H2b. *Equity capital within firms is positively related to exchange rate depreciation.*

Inward FDI is linked to increased productivity, which boosts the scope for increased profits. Increased profits boost the scope for increased reinvested earnings. Reinvested

earnings constitute income earned within a firm but not distributed to firm owners as dividends. The decision to either retain the income earned by a foreign affiliate in the host country or repatriate it to the parent firm in the home country is governed by several factors, including the exchange rate and firm profitability. For instance, a host country may implement an exchange rate policy to address the balance of payments needs, but a firm may react in a manner that could undo the desired objective. Lundan (2006) suggests that exchange rate movements have an effect through repatriation — a depreciation of the currency in the host country is linked with discouraging repatriation. Similarly, a host country's regulation to encourage the reinvestment of profits by restricting profit repatriation might unsettle foreign firms. The use of reinvested earnings is a cheap source of financing. Likewise, an increase in commodity prices is likely to induce expansion of production capacity, which would be financed through reinvested earnings. From the above discussion, the following hypotheses are proposed:

H3a. *Reinvested earnings within firms are positively related to the price of copper.*

H3b. *Reinvested earnings within firms are positively related to exchange rate depreciation.*

Since firms are driven by profit maximisation, it is reasonably fair to assume that they are motivated to maintain their investment behaviour as long as their objective is met under macroeconomic conditions. However, any change to the policy environment whose potential impact on the firms is unknown or threatens to affect their profits, firms may adjust their behaviour to continue maximising profits. For example, firms may prefer debt to equity, owing to its tax advantage (e.g., Hennessy & Whited, 2005; Jermann & Quadrini, 2012).

Tripathi & Thukral (2016) suggested that parent companies use intra-company debt to finance their foreign subsidiaries and to contain risks presented by political instability and the legal environment in the host country. Similarly, Kraus & Litzenberger (1973) suggested that debt financing was preferred because it reduced the company's corporate income tax liability and raised its after-tax operating earnings. Potentially, this lends credence to the argument that firms can use debt to avoid taxes by fiddling with their intra-company debt positions (such as overstating the interest rate on their debt obligations). This is supported by Chowdhry & Nanda (1994), who suggested that parent firms used external and intra-company debt to finance their foreign affiliates abroad. To lessen their tax burden, the firms charge higher interest rates on intra-company debt, as permitted by tax authorities. Based the above discussion, the following hypotheses are proposed:

H4a. *Intra-company debt within firms is positively related to the price of copper.*

H4b. *Intra-company debt within firms is positively related to exchange rate depreciation.*

2.5 Data

This study uses a new database constructed from anonymised confidential firm-level data held by BoZ.[3] The primary source of the database is the private capital flows dataset based on information compiled through the annual survey on private capital flows.[4] The coverage of the survey is comprehensive with most firms that have foreign assets and liabilities included in the sample, selected using a sampling technique. The information is collected using questionnaires administered physically by visiting the firms. This survey is undertaken following the OECD Benchmark Definition of Foreign Direct Investment, the International Monetary Fund (IMF) Balance of Payments and International Investment Position Manual Sixth Edition (BPM6) and the Coordinated Direct Investment Survey (CDIS). The survey also complies with the United Nations Conference on Trade and Development (UNCTAD) requirements for compiling Foreign Affiliates Trade in Services (FATS).[5]

The private capital flows surveys capture information on gross flows and the stocks of foreign private capital, specifically, on FDI, portfolio investments and private sector external debt. The information on FDI is disaggregated into equity capital, reinvested earnings and intra-company debt, defined by IMF (2009) and the Glossary of Foreign Direct Investment Terms[6] as follows:

(i) Equity capital — represents the owners' funds in the institutional unit. It consists of all instruments and records that acknowledge claims on the residual value of a corporation or quasi-corporation, after the claims of all creditors have been met

[3]Obtained from the Bank of Zambia on 22 July 2019.

[4]The survey is conducted by BoZ in collaboration with the Zambia Development Agency (ZDA), an investment promotion agency that seeks to foster economic growth and development through the promotion of trade and investment to facilitate private sector led economic development, [External link], the Zambia Statistics Agency (ZamStats), a public body that has the power to collect, compile or disseminate statistics [External link] and other institutions. I have participated in these surveys and to the best of my knowledge, this is the first time that this dataset is being used for such analysis.

[5]FATS include information on employment, sales/turnover, tax on income, value addition, output, assets, net worth, exports and imports of goods and services, total liabilities (excluding equity), compensation of employees, gross fixed capital formation, research and development (RD) expenditures, purchases of domestic goods and services. The other variables include profits/loss after tax, net operating surplus (or loss), payment of royalties and license fees, management fees, and total dividends distributed/declared. The data is validated with the audited company accounts and official government records. Published survey results are consolidated at the country level.

[6]Obtained from International Monetary Fund, accessed on 20 February 2022, [External link].

(IMF, 2009, p. 83). It comprises equity in branches, all shares in subsidiaries and associates (except nonparticipating, preferred shares, which are treated as debt securities and included under direct investment, other capital), and other capital contributions.

(ii) Reinvested earnings — represent the direct investors' proportion, in terms of equity held, of the earnings that foreign subsidiaries and associates do not distribute as dividends (IMF, 2009, p. 190). They comprise direct investors' shares, in proportion to equity, held of earnings that foreign subsidiaries and associated enterprises do not distribute as dividends (i.e., reinvested earnings), and earnings that branches and other unincorporated enterprises do not remit to direct investors (i.e., undistributed branch profits).

(iii) Intra-company debt (other capital) — covers the borrowing or lending of funds between direct investors and subsidiaries, branches, and associates—including debt securities, suppliers' credit, and nonparticipating, preferred shares (which are treated as debt securities), loans, trade credits, financial leases etc.

The firm-level data on inward FDI flows are available from 2008. The main advantage of using this dataset is that it captures most of the foreign owned firms. It contains reports for about 400 firms, although the number of firms varies from year to year. However, variables for some firms are missing or cannot be linked over time. Accordingly, the analysis is restricted to mining firms for several reasons. First, mining firms are major exporters and importers of goods and services, hence the dataset allows me to explore what happened to FDI financing within firms, before and after the implementation of the currency management policy. Second, mining firms are large and about the same size. This takes care of the endogeneity caused by firm size. Third, the mining sector receives the bulk (over 60%) of Zambia's FDI. Finally, most mining firms have most observations that can be linked over time, because they are consistent in responding to the surveys.

Foreign currency transactions data are matched with the private capital flows dataset. The foreign currency transactions data are also maintained at the Central Bank and capture information on all transactions relating to foreign currencies, by individual economic agents, sectors and amounts traded. The information on foreign currency trades is supplied to the Central Bank by commercial banks that conduct the transactions. These data contain daily trades, which are consolidated at the end of the month, quarter and year. They are comprehensive because they capture every transaction in the foreign currency market. Thus, the advantage of using these data is that all participants in the foreign exchange market are captured, including the amounts

traded. Both the purchases and the sales of foreign currency by commercial banks are captured. These variables are used as additional proxies for firm activities (i.e. foreign currency purchases for missing exports and a measure of earnings, and foreign currency sales for missing imports and a measure of expenses).

The level of annual average observations of the kwacha/US$ exchange rate is obtained from BoZ. The kwacha/US$ exchange rate is defined as the amount of the Zambian kwacha (ZMW) needed to purchase one United States dollar, such that an increase (decrease) represents a depreciation (appreciation). The copper price is defined as the London Metal Exchange copper price in United States dollars per metric tonne.

2.5.1 Descriptive statistics

This study estimates the effects on the components of inward FDI flows of macroeconomic variables within firms in Zambia for the period 2008-2017. The main variables of interest are the copper price and the exchange rate. The estimates include control variables for firm-level observable characteristics, which include foreign currency purchases and foreign currency sales. The dataset is unbalanced because not all the firms are represented throughout the ten years for different reasons.[7]

Table 2.3 presents summary statistics of the main variables used in the analysis. The primary estimation sample will contain 182 firm-year observations for the sub-sample of mining firms and 1,908 firm-year observations for all firms. The values for the variables are within the expected ranges. From the mean values of the individual components, intra-company debt accounts for the most significant part of aggregated FDI flows, followed by equity capital. The mean for the reinvested earnings component is negative, suggesting that it contributed to the reduction of aggregated FDI flows during the study period. This seems to be corroborated by a large minimum value of the reinvested component, which may illustrate the inclination for investors to repatriate their profits, especially during periods of policy uncertainty. The nominal values of inflows and stocks of FDI and the individual components of FDI are translated into constant United States dollars. But Zambia has no specific FDI deflator. Sohn (2016) claims that using deflators such as the United States CPI deflator could engender distortions. In this regard, I choose to compute the constant United States dollars using the country's GDP deflator accessed from the World Bank's World Development

[7]Some firms that existed at the beginning of the review period either ceased to operate or changed ownership from foreign to domestic. In addition, some firms were established after the beginning of the review period, while some domestic firms might have changed their status to foreign.

Indicators database.[8] The focus of the study is restricted to mining firms with at least two observations of interest during the survey period.

TABLE 2.3: Descriptive statistics for components of FDI and foreign exchange sales/purchases, 2008-2017

	Mean	Std.Dev.	Min.	Max.	Obs.
Mining firms					
Equity (US$ million)	7.1	48.6	-43.3	598.6	182
Reinvested earnings (US$ million)	-9.3	157.3	-1,047.4	785.7	182
Intra-comp. debt (US$ million)	44.1	180.1	-470.3	1,154.7	182
FDI flows (US$ million)	41.9	208.2	-1,021.8	1,151.2	182
FDI stock (US$ million)	140.7	447.9	-33.2	3,110.9	182
Foreign currency purchases (US$000)	85.4	176.8	0.0	1,060.1	182
Foreign currency sales (US$000)	4.3	12.7	0.0	118.6	182
All firms					
Equity (US$ million)	1.1	17.5	-230.6	598.6	1,908
Reinvested earnings flows (US$ million)	0.6	52.3	-1,047.4	785.7	1,908
Intra-comp. debt flows (US$ million)	5.0	59.3	-470.3	1,154.7	1,908
FDI flows (US$ million)	6.7	69.8	-1,021.8	1,151.2	1,908
FDI stock (US$ million)	66.7	299.0	-552.0	4,765.9	1,908
Foreign currency purchases (US$000)	13.7	69.2	0.0	1,060.1	1,908
Foreign currency sales (US$000)	5.8	20.1	0.0	389.8	1,908

Notes.- author calculations using the the anonymised confidential firm-level database, the foreign currency trades dataset held by the Bank of Zambia and the World Bank, World Development Indicators database.
Nominal United States dollars of FDI flows, stocks and individual components of FDI are translated into constant United States dollars using the Zambia's GDP deflator.

2.6 Estimation & Results

This section presents the estimation technique to be used in this essay and the key results. The standard fixed effects estimator is adopted. This approach is preferred because it controls for unobserved group heterogeneity (Gormley & Matsa, 2014). All standard errors are clustered at the firm level to correct for serial correlation (Desai & Foley, 2004). Estimates are performed on annual firm-level data for the period 2008-2017. The analysis is restricted to the sample of mining firms in Zambia.

Since the bulk of FDI to Zambia is resource-seeking, especially in the mining sector, it could be argued that access to natural resources is the primary driver of investment. This means that demand factors may be less important in attracting FDI to Zambia. What might be more pertinent in such a case would be how easy companies can export their merchandise. The foregoing guides the rationalisation of the selection of the explanatory variables. Suffice to mention that the main independent variables

[8] Accessed from the World Bank website on 21 August 2022; [External link].

used in this essay have been applied in previous research. However, the interpretation might differ for some of the variables.

I have four dependent variables: the gross annual firm-level of total inward FDI flows; equity capital flows, reinvested earnings flows; and intra-company debt flows. I start by estimating the impact of selected independent variables on the total inward FDI flows. After that, I estimate the impact of the selected independent variables on gross flows of equity capital, reinvested earnings, and intra-company debt to understand their effect within firms. Some of the observations for these variables are negative. Negative FDI financial transactions occur when there is disinvestment in assets; an affiliate extends a loan to a parent company, the subsidiary repays a loan in full from its parent or if reinvested earnings are negative.[9] Using the logarithm of these variables then imposes to drop the negative observations, which could cause selection bias. Some authors have used different methods as solutions to evade this problem. For instance, Bénassy-Quéré et al. (2007) add a relatively small constant a to work with $ln(a+FDI)$, instead of $ln(FDI)$. For this study, however, like Loree & Guisinger (1995), I use levels. The models of the following order will be estimated:

$$\begin{aligned} FDIComp_{i,t} = &\alpha + \beta_1 CopPri_{i,t} + \beta_2 ExcRat_{i,t} + \beta_3 InwFDISto_{i,t} \\ &+ \beta_4 DumPol_{i,t} + \beta_5 ForPur_{i,t} + \beta_6 ForSal_{i,t} + \lambda_i + \varepsilon_{i,t} \ . \end{aligned} \tag{2.1}$$

where $FDIComp_{i,t}$ denotes the level of one of the four dependent variables, gross inward FDI flows ($InwFDIFlo$) and its three components discussed in Section 2.5, equity (Equ), reinvested earnings ($ReiEar$) and intra-company debt ($IntComDeb$), to explore how each one of them reacts to the macroeconomic variables. All four variables are measured in United States dollars and deflated using the GDP deflator. The subscripts i and t denote individual firm and calendar years, respectively. α and $\beta_{1,2,\ldots,6}$ are parameters to be estimated. $CopPri$ represents the annual average copper price, measured in United States dollars per metric tonne. $ExcRat$ denotes the annual average exchange rate, expressed as kwacha to United States dollar (kwacha/US$). The conjecture is that when the demand for copper expands and the copper price continues to increase, the inward FDI flows will increase as foreign investors seek to gain from this trade.[10]

[9] Disinvestment occurs when a direct investor sells their interest in a direct investment enterprise back to the direct investment enterprise or a third party. Negative reinvested earnings arise when the subsidiary makes a loss or if the direct investors are paid greater dividends than the income recorded in that period. Accessed from the Organisation for Economic Co-operation and Development on 9 September 2020; [External link].

[10] When the real effective exchange rate ($ReeEffExcRat$) is considered as an alternative to the $ExcRate$, but the results are not significantly different.

InwFDISto denotes the total inward FDI stock expressed in United States dollars. It is the value of foreign investors' equity, reinvestment earnings, and net loans in enterprises resident in Zambia measured in United States dollars annually. The nominal United States dollars of FDI stocks are translated into constant United States dollars using the country's GDP deflator. *DumPol* denotes the policy dummy to account for a macroeconomic policy change, representing the implementation of the currency management measures in 2012 and 2013. Foreign currency purchases (*ForPur*) represent the amount of foreign currency banks purchase from firms, which is included to proxy for export earnings. *ForSal*) denotes foreign currency sales that firms purchase from banks, which is a proxy for expenses. *Growth* represents the annual percentage growth rate of GDP measured at market prices based on the constant domestic currency. The assumption is that growth generates demand for skills and raises the potential of economic rents that could attract foreign investors Globerman & Shapiro (1999). Thus, GDP is expected to have a positive relationship with FDI inflows. λ captures firm fixed effects, and ε is the error term.

2.6.1 Key Results

The results of the fixed effects estimation of Equation (2.1) for the restricted sample of the mining firms are presented in Table 2.4. Columns (I)-(IV) present the estimated effects of the copper price and the exchange rate on: total inward FDI flows in column (I); equity financing in column (II); reinvested earnings financing in column (III), and intra-company debt in column (IV). These estimates include firm fixed effects. Columns (V)-(VIII) display results that include FDI stock and the policy dummy as additional variables. Results in Table 2.5 include additional controls, foreign currency purchases and foreign currency sales by commercial banks on the right hand side of Equation (2.1). Estimates in these two tables show that few key variables are significant. For those that are not significant, there are logical explanations.

The results in column (I) suggest that copper prices positively impact firms' total inward FDI flows. An increase of US$1,000 in the average copper price results in an average US$1 million rise in total inward FDI flows annually, all other variables held constant. Although the relationship is statistically insignificant, it supports the theory. For the relationship between the exchange rate and total inward FDI inflows, the estimates suggest that an appreciation in the exchange rate results in a decline in the total FDI flows within firms, albeit not significant. This result supports other theoretical and empirical evidence (e.g., Froot & Stein, 1991; Klein & Rosengren, 1994).

TABLE 2.4: Estimated effects of macroeconomic variables on FDI inflows within Zambian firms, 2008-2017

Dependent variables	FDI (I)	Equity (II)	RE (III)	Debt (IV)	FDI (V)	Equity (VI)	RE (VII)	Debt (VIII)
Copper price (US$)	0.916	-1.200*	1.121	0.995	2.184**	-0.816	1.108	1.892*
	(0.828)	(0.627)	(0.815)	(1.052)	(1.018)	(0.677)	(1.321)	(1.010)
Exchange rate ($\times$1000)	-0.697	-0.506*	-0.338	0.147	-0.061	-0.338	-0.393	0.670
	(0.821)	(0.283)	(0.411)	(0.975)	(0.778)	(0.388)	(0.459)	(1.064)
FDI stock					0.115***	0.034	-0.002	0.083***
					(0.040)	(0.028)	(0.048)	(0.029)
Policy dummy					0.376	-0.369	-0.972	1.717
					(4.928)	(0.436)	(3.433)	(3.211)
Firm FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N of firm obs.	178	178	178	178	178	178	178	178
R^2	0.013	0.016	0.012	0.003	0.117	0.098	0.012	0.090

Notes.- Firm fixed effects are estimated as per Equation (2.1) for the period 2008-2017 where dependent variables are FDI, equity, returned earnings and intra-firm debt (see Table 2.3 for sample descriptives).
Standard errors in parentheses are robust to serial correlation at the firm-level.
***, ** and * denote statistically significant differences from zero at the 1%, 5% and 10% levels, respectively.

When the results in column (I) are compared to the results in column (V), the estimates suggest that the effect of the copper price is stronger within firms controlling for FDI stock and policy dummy. The coefficient on the copper price increases and is statistically significant at the 5% level. Similarly, the estimates suggest that an exchange rate appreciation leads to a decline in the total inward FDI inflows. However, the coefficient is not significant. Furthermore, the estimates show that total inward FDI flows are positively impacted by the FDI stock within firms. The relationship is statistically significant at the 1% level. The results also show a positive association between firms' total inward FDI flows and the policy dummy. Although the estimate is not statistically significant, this evidence suggests that inward FDI flows within firms increased following the implementation of the currency management policies in 2012 and 2013.

A similar pattern is observed in column (I) of Table 2.5. Controlling for foreign currency transactions, the copper price significantly impacts the total inward FDI flows within firms. The coefficient of the copper price is higher than that of columns (I) and (V) of Table 2.4 and is statistically significant at the 5% level. The estimates also show that the effect of a depreciation of the exchange rate on the inward FDI flows is positive when controlled for the policy dummy and the foreign currency transactions. However, the coefficient is not statistically significant. The impact of the FDI stock in column (I) of Table 2.5 is higher than in column (V) of Table 2.4. The impact is statistically significant at the 1% level. The impact of the policy dummy is also positive but insignificant. These results support the H1a and H1b predictions. The results also suggest that implementing the currency management policies positively impacted the total inward FDI flows within firms.

The evidence in column (II) of Table 2.4 shows a statistically significant negative effect of the copper price on the equity flows within firms. The effect is statistically significant at the 10% level. The results also show that an appreciation in the exchange rate negatively impacts equity capital flows. The relationship is statistically significant at the 10% level. Compared to estimates in column (VI), the signs of the coefficients of the copper price and the exchange rate are similar to those in column (II). Still, the copper price has a negative relationship with equity capital flows, and an exchange rate appreciation negatively impacts equity capital. Further, the estimates in column (VI) indicate that the effect of FDI stock on equity capital is positive, while the policy dummy negatively impacts equity flows within firms. All estimations in column (VI) are not statistically significant.

Column (II) of Table 2.5 shows a similar pattern to columns (II) and (VI) of Table 2.4 after controlling for foreign currency transactions. The effects of all the

coefficients are not statistically significant. The relationship between the copper price and the equity capital within firms is negative. An appreciation in the exchange rate leads to a decline in the new equity flows within firms. The FDI stock has a positive, but weak association with equity capital within firms. The coefficient of the policy dummy is positive but relatively small. The effect of foreign currency transactions on the new equity capital within firms is negative.

The weak relationship between the copper price and the exchange rate on new equity within firms could partly be explained by the fact that a change in equity would have implications on the relative ownership structure when there are several investors involved. Changing equity would be more costly than changing other forms of financing such as intra-company debt. By this reasoning, it is expected that equity financing would be less sensitive to copper prices, exchange rate and policy changes. This evidence confirms does not support the H2a prediction and confirms H2b with a qualification.

The results in column (III) of Table 2.4 show that reinvested earnings within firms are positively associated with the copper price. However, the effect is not statistically significant. Notwithstanding, this result suggests that investors used their own funds to expand operations when the annual average copper price increased. This is intuitively logical and expected as an increase in the copper price would be perceived as offering a good investment opportunity, which supports Lundan (2006). The estimates also show that reinvested earnings financing within firms decreases with respect to an appreciation in the exchange rate. The potential explanation for this response is that an appreciation in the domestic currency would trigger repatriation of profits, as argued by Lundan (2006). This finding supports the prediction of H3a.

In column (VII) of Table 2.4, the effect of copper price on reinvestment earnings is positive as expected but insignificant. Notwithstanding, this result suggests that when the copper price increases, firms finance their investment using reinvestment earnings. As in column (III), the effect of the exchange rate appreciation on reinvestment earnings is negative and not statistically significant. Further, the evidence in column (VII) suggests a negative association between reinvested earnings financing within firms and the policy variable. This implies that firms may have reacted negatively to the currency policy implementation by reducing their reinvested earnings financing. In other words, the introduction of currency management policies may have triggered the withdrawal of reinvested earnings within firms.

When controlled for foreign currency transactions, the copper price and exchange rate coefficients in column (III) of Table 2.5 have the expected signs. Likewise, the

effect of FDI stock on reinvestment earnings is positive, as expected. All coefficients in column (III) of Table 2.5 are not statistically significant.

TABLE 2.5: Estimated effects of macroeconomic variables on FDI inflows within Zambian firms, 2008-2017

Dep. variables	FDI (I)	Equity (II)	RE (III)	Debt (IV)
Copper price (US$)	2.413**	-0.676	1.457	1.632*
	(0.959)	(0.699)	(1.406)	(0.842)
Exchange rate (×1000)	0.204	-0.228	-0.088	0.520
	(0.551)	(0.418)	(0.613)	(0.942)
FDI stock	0.125***	0.041	0.013	0.071***
	(0.037)	(0.031)	(0.051)	(0.018)
Policy dummy	2.717	0.598	1.733	0.386
	(4.741)	(0.394)	(3.842)	(2.800)
Forex purchases	-0.008	-0.009	-0.021	0.022
	(0.036)	(0.006)	(0.017)	(0.025)
Forex sales	-0.172	-0.026	-0.115	-0.031
	(0.194)	(0.019)	(0.113)	(0.096)
Firm FEs	Yes	Yes	Yes	Yes
N of firm observations	178	178	178	178
R^2	0.127	0.118	0.033	0.110

Notes.- Firm fixed effects are estimated as per regression model (2.1) for the period 2008-2017 where dependent variables are FDI, equity, returned earnings and intra-firm debt (see Table 2.3 for sample descriptives).
Standard errors in parentheses robust to serial correlation at the firm-level.
*** Statistically significant at the 1% level; ** at the 5% level; * at the 10% level.

Column (IV) of Table 2.4 shows that the effect of the copper price is positive on intra-company debt financing within firms. Although the coefficient is insignificant, the result suggests that firms use internal loans to finance investments. The results also suggest that the depreciation of the exchange rate has a positive effect on debt financing within firms. However, the coefficient is not significant. Compared to the results in column (VIII), the copper price significantly positively affects intra-firm debt financing. The coefficient is statistically significant at the 10% level. This suggests that controlling for the policy variable leads to increased intra-firm debt financing. The effect of the exchange rate depreciation is positive as expected but is not significant. FDI stock is positively associated with intra-company debt. The effect is statistically significant at the 1% level. Estimates also show that intra-company debt within firms rises with respect to the policy variable. Although this result is weak, it is fundamentally important. The coefficient is more robust than the other two components, i.e., equity and reinvestment earnings. This suggests that intra-company

debt was the preferred financing method after the implementation of the currency management policies. These estimates support other empirical literature suggesting that when exposed to a macroeconomic policy shock, such as an exchange rate crisis, firms prefer debt to equity (see, for example, Hennessy & Whited, 2005; Jermann & Quadrini, 2012). The findings support H4a and H4b.

The estimates in column (IV) of Table 2.5 show effects on intra-firm debt controlling to foreign currency transactions as an additional variable to those in column (VIII) of Table 2.5. The impact of copper price is positive and statistically significant at the 1% level, indicating that mining firms tend to use internal loans to finance their investment in response to higher copper prices. Likewise, the exchange rate depreciation effect is positive as expected but statistically insignificant. The evidence suggests that the FDI stock significantly positively affects intra-company debt within firms at the 1% level.

Finally, I explored whether the aggregate FDI flows and the individual components are affected by controlling for growth as an additional variable to those in Table 2.5 column (IV). Appendix Table A.1 reports the fixed effects estimator results of Equation (2.1). The model estimates show that the copper price's positive effect tends to be higher on the aggregate FDI than the individual components. The effect is statistically significant at the 5% level. The exchange rate depreciation positively affects the aggregate FDI flows, reinvestment earnings and intra-firm debt, but these effects are insignificant. The policy variable tends to have more effects on equity capital. The effect of copper price on aggregate FDI flows is statistically significant at the 5% level. GDP growth positively affects aggregate FDI, equity capital and reinvestment earnings but is negative on intra-firm debt. Although these effects are statistically insignificant, they seem to support Brewer (1993) that the components of FDI may respond differently to the same macroeconomic variables.

2.6.2 Robustness and other discussions

Robustness is tested by estimating Equation (2.1) on the entire sample. Although the total sample includes firms that may not directly be involved in mining, their investment decisions might still be influenced by the mining sector, which has a catalytic effect on the entire economy. Accordingly, the copper price developments may still affect firms not directly involved in mining. By this reasoning, I re-estimate Equation (2.1) on the total sample of firms. Estimates from the unrestricted sample are qualitatively the same as the restricted mining sample. However, I do not report them in this essay, but they are available on request.

The analysis in this essay has demonstrated that each of the three individual components of FDI responds differently to the macroeconomic variables. Consistent with the literature, this research confirms that commodity prices (i.e., copper price) tend to positively affect total inward FDI flows, especially for firms in the mining industry. The relationship between the total inward FDI flows within firms and the exchange rate appreciation is negative, although the result is not statistically significant across all models. This result suggests that investment in the commodity sector is less sensitive to exchange rate movements and corroborates the findings of previous work (e.g., Pain & Welsum, 2003). This study also confirms that the current level of FDI stock plays a vital role in boosting inward FDI flows. The empirical results show a positive relationship between the policy dummy and total inward FDI flows. However, the result is weak, which is somewhat surprising because the country recorded the highest total inward FDI flows when the currency management policies were implemented in 2012 and 2013 (see Figure 2.1).

The estimates of individual components of FDI provide essential insights into the financing behaviour within firms. The evidence indicates that an exchange rate appreciation negatively impacts firms' equity financing. This is an unsurprising outcome. However, the surprising outcome is the copper price's negative effect on firms' equity financing. This is somewhat counterintuitive. This result suggests that analysing the response of equity capital to the macroeconomic variables is less helpful in unravelling the financing strategy within firms in the mining sector, as it shows minimal signs of adjustment.

The response of reinvested earnings to macroeconomic variables within firms is interesting. All the coefficients are insignificant. Nonetheless, the results are fundamental. For instance, the relationship between reinvested earnings and copper price is favourable, suggesting that mining firms tend to reinvest a portion of their profits when the price of copper increases. High copper price boosts the scope for increased profits, increasing the scope for increased reinvested earnings. And "[a]s long as a firm has positive earnings, it has the choice to reinvest or to repatriate a lower or a higher proportion of those earnings" (Lundan, 2006, p. 59). The effect of the exchange rate appreciation tends to encourage the repatriation of profits.

The breakdown of the three components of FDI in Figure 2.1 shows that reinvested earnings were a major source of financing for total annual inward FDI flows for most years before 2012. This suggests that firms had positive earnings when firms reinvested high proportions of their profits. However, this was followed by huge reinvestment earnings outflows or profit repatriation in 2009, 2012, 2013 and 2015. The low reinvested earnings reported in 2009 could be attributable to the global economic

crisis. But it isn't easy to find a convincing explanation for the reinvestment outflows for other years. It is plausible that the change in the firm's financing behaviour was motivated by the uncertainty following the Government's implementation of the currency management policies in 2012 and 2013. Firms may have interpreted the Government's decision as an attempt to restrict profit repatriation through exchange controls. According to Itagaki (1989), foreign investment is constrained by policy uncertainty about restrictions on profit repatriation. By this reasoning, it would be logical to assume that inward FDI flows would have been constrained during the period of uncertainty as suggested by Canh et al. (2020). Surprisingly, however, this is the opposite of what happened. During this period, Zambia recorded phenomenal growth in inward FDI flows (see Figure 2.1). Possibly, the policy change triggered the change in tax avoidance from one form to another.

The various model specifications show that the response of intra-firm debt to copper price tends to be positive at varying levels of significance. Likewise, the exchange rate depreciation effect tends to be positive on intra-firm debt. Although the effects are insignificant, this finding suggests that intra-firm debt was an important source of investment financing.

This study reveals that massive reinvested earnings outflows were recorded when the Government implemented the currency management policies. At the same time, intra-company debt was used to finance the enormous expansion of FDI inflows. The substitution of intra-company debt for reinvested earnings as the primary source of financing FDI suggests that the policy changes triggered aggressive repatriation of profits and phenomenal growth in intra-company debt.

The analysis of firm profits in Section 2.2.2 suggests that a non-trivial proportion of firms recorded zero change and reducing profits throughout the review period. There seems to be a contradiction here. On the one hand, firms reported zero change and reducing profits, while on the other hand, firms used reinvested earnings to finance their growth. It is plausible that this inconsistency may partly be attributed to measurement errors. It would therefore be interesting and valuable to explore the extent to which these errors influence the results in future research.

The findings in this study have several practical implications for Zambia and other commodity dependent countries. With the widespread international competition for investment resources, government policies must be balanced to attract investment that benefits the country. Relevant investment policies must be robust and cognisant that reinvested earnings and intra-company debt are the most sensitive forms of financing. Perhaps more importantly, the policy must recognise that "[a]s the stock of FDI

matures globally, reinvestment will contribute a growing share of the flows of FDI, and consequently, they should be relevant to policies aimed at investment attraction and retention" (Lundan, 2006, p. 60).

Given these facts, it would be prudent to consider developing policies encouraging reinvestment of profits. To the extent that profits repatriated to the parent companies are considered a deduction from the national income and reinvested earnings as promoting economic growth in the host country (Itagaki, 1989), Government policies should target the integration of foreign subsidiaries with local firms. For instance, investment policies that facilitate the establishment of firms that will promote value addition to copper. This will enable Zambia to derive maximum value from its natural resources. In addition, implementing policies that restrict potential tax avoidance using intra-company debt financing would be beneficial, provided they don't harm inward FDI flows.

Further, Government should consider hiring former senior executives of foreign-owned firms. Senior executives are involved in planning and coordinating the operational activities of their firms. They are responsible for formulating firm strategies and implementing parent firms' policies. In other words, former executives may possess valuable insights into their former employers' investment objectives and motivations. While firms may change their strategies, employing former top executives may still benefit the government in formulating appropriate investment policy interventions. These policy considerations may not only apply to Zambia but may be generalised to other developing countries, especially resource-rich African countries.

2.7 Conclusion

This study investigated the response of the components of FDI flows to macroeconomic variables within firms in Zambia for the period 2008-2017. The study uses a new database constructed from anonymised confidential firm-level data. The study presents the following facts. Estimates show that FDI inflows are positively associated with copper prices. Also, the empirical evidence shows a negative relationship between currency appreciation and total inward FDI flows. The effect of the macroeconomic variables on the individual components of FDI shows that they respond differently. For instance, equity capital financing is negatively associated with the copper price. Likewise, the exchange rate appreciation hurts equity flows. In addition, equity financing is weakly associated with the policy variable. In other

words, equity financing tends to show minimal signs of adjustment in response to policy change.

Reinvestment earnings financing is positively impacted by copper price. The results also show that reinvested earnings financing declines in response to an appreciation in the exchange rate. Also, the estimates show that policy change tends to hurt reinvested earnings financing. The results further show that intra-company debt financing tends to increase when there is a rise in the copper price. At the same time, depreciation in the exchange rate has a positive effect on intra-company debt financing. The policy change has a positive impact on inward FDI flows. Generally, the evidence suggests high substitutability between reinvested earnings and intra-company debt when the policy measures were implemented in 2012 and 2013.

Given that a non-trivial proportion of the reported intra-company debt was not verified, it is reasonable to suggest that part of it could be phantom debt. If that is the case, the evidence may indicate that the policy change triggered the aggressive repatriation of profits and phenomenal growth in phantom intra-company debt. Whereas some results in this study may be attributed to measurement errors, it is highly doubtful that the observed firm behaviour could purely be a statistical artefact. There is substantial evidence to suggest that this observed firm behaviour may be attributable to other explanations, such as the extensive tax sophistication of foreign firms (Dharmapala, 2014).

Overall, the study provides interesting findings on the determinants of FDI flows in the mining sector in Zambia and how the individual components respond to macroeconomic variables. The results also suggest that firms may have engaged in aggressive profit shifting. Future research should explore the extent to which these firms may have engaged in profit shifting.

Chapter 3

Tax avoidance by multinationals: A case study of the Zambian manufacturing sector

Note: This essay was presented at the 48th Academy of International Business (UK & Ireland Chapter)/8th Reading International Business Conference, Doctoral Colloquium (April 2022). By the time of final submission, this research will have been presented at the University of Reading Department of Economics PhD Workshop (June 2022). In addition to those already acknowledged, I am greatly indebted to Sjoerd Beugelsdijk for his advice and comments.

3.1 Introduction

Tax avoidance is generally defined as the practice of lowering tax obligations without breaking the law. The Organisation for Economic Co-operation and Development (OECD), the originator of the Model Tax Treaty and a leader in framing cross-border tax policies defines it as " . . . a term that is generally used to describe the arrangement of a taxpayer's affairs that is intended to reduce his tax liability and that although the arrangement could be strictly legal, it is usually in contradiction with the intent of the law it purports to follow."[1] Corporate tax avoidance is a key feature of international corporate tax planning and is driven by the desire to lower the tax burden on profits (Beebeejaun, 2018; Payne & Raiborn, 2018; Slemrod & Yitzhaki, 2002).

[1] Accessed from the Organisation for Economic Co-operation and Development (OECD) website on 1 November 2021; [External link].

Taxing multinational enterprises (MNEs) has been a persistent global problem for government policymakers (Foss et al., 2019; Lyon & Silverstein, 2019). There has been increasing public concern about the low tax revenues paid by MNEs who exploit weaknesses in current international corporate tax arrangements (Crivelli et al., 2016; Nebus, 2019). Several mechanisms can be used to shift profits from high-tax to low-tax jurisdictions, as explained below. These mechanisms exploit increasing opportunities for concealment afforded by complex global value chains and corporate structures (Foss et al., 2019).

There are three key mechanisms that MNEs can use to avoid tax: transfer pricing, mis-pricing of internal loans, and overcharging for notional services. Transfer pricing imputes prices to intermediate products traded between different legal entities within a firm (e.g. between two subsidiaries, or between a subsidiary and a parent). By undervaluing internal exports a firm can reduce ad valorem tariff payments and thereby gain advantage over two independent domestic firms trading with each other in the same product (Cooper & Nguyen, 2020). Transfer pricing is easy to disguise when there is no arm's length market for the product, or where quality is variable and the quality premium is uncertain (e.g. licensing of knowledge from one country to another) (see, Baldenius et al., 2004; Davies et al., 2018; Hyde & Choe, 2005). Tax authorities expect intra-firm transactions to be priced at their market price, or the price, if there is no quoted market price, then the price that would otherwise be paid in an arm's length transaction (see, OECD, 2012; Davies et al., 2018).

Mis-pricing of internal loans can be effected in two main ways. The first involves the mis-pricing of a genuine loan and the second involves contriving two self-cancelling loans that carry different rates of interest. The first is exemplified by a parent firm in a low-tax country that advances a loan to a subsidiary in a high tax country to finance a real investment (e.g., a new factory); by charging an interest rate above the market rate the firm can transfer profit from the host country to the source country, where it incurs lower tax (Sadiq, 2020). The second approach is exemplified by a virtual loan from a parent that is repaid by the subsidiary through an identical loan back to the parent firm. The initial loan carries a high rate of interest and the second loan has a low rate of interest, so that interest income is transferred from the high-tax subsidiary country to the low-tax parent country. The proliferation of these back-to-back loans since c.2000 is reflected in FDI statistics, which have, since then present a distorted view of actual flows. FDI flows have traditionally been measured by the value of equity and loans invested by a parent firm in a foreign subsidiary, on the implicit assumption that an MNE subsidiary spend their loans on acquiring additional local resources in order to scale up local activity. But if the loan is immediately repaid

to the parent at a lower rate of interest then all that is transferred to the host country is an opportunity to pay less local tax than before. Developing countries are affected by both types of mispricing because they are both major recipients of genuine loans, and host profitable foreign-owned operations that are liable to high rates of domestic tax (UNCTAD, 2015). These countries often lose tax income through the size of the usually higher interest rates charged on such internal loans. These two strategies are considered excessive debt loading or thin capitalisation for the earlier and transfer mis-pricing for the latter.

Overcharging for notional services refers to applying a higher price on notional services flowing from low tax countries to high tax countries. A notional service is said to be supplied when a service is offered when no actual real service was provided. In other words, a firm can overcharge for a service and also charge for a service that does not exist. Potential notional services include insurance, internal loans, interest payments, management support and technical consultancy. To avoid tax, a multinational can supply a notional service such as unnecessary internal insurance to production and distribution operations (Casson, Forthcominga). The use of notional services can appropriate a substantial proportion of the operating profit from production and distribution, which would lower profits reported in the high tax countries, and at the same time, generate considerable profits in the low tax country. Moreover, charging for notional services facilitates the shifting of profits from products and services that ordinarily may have been harder to mis-price through transfer pricing (Casson, Forthcomingb). As a result, the overall tax obligation of the MNE is significantly reduced.

All three mechanisms involve internal mis-pricing of a flow to facilitate income redistribution from a high tax to a low tax country. The distinction is that transfer pricing mis-prices a real flow, often by understating its value, while mis-pricing of internal loans mis-prices a financial flow, by overstating its value, and notional services mis-price a notional flow almost every time overstate its value. A growing body of literature focuses on these mechanisms from various disciplines, including global value chain experts or development economists, tax accountants and internalization theorists. Each of these disciplines has its views on these three aspects. For instance, internalization theorists argue that these techniques encourage internalization. The global value chain experts suggest that these techniques facilitate tax avoidance. The accountants say that these mechanisms enable firms to minimize tax bills and improve profit performance. Developing countries are more vulnerable to tax avoidance due to ineffective law enforcement (Fuest et al., 2011; Johannesen et al., 2020; OECD, 2015).

Yet, developing countries need tax revenues for developmental purposes. This essay investigates these issues in the context of the Zambian manufacturing sector.

This study supposes that multinationals engage in tax avoidance. This proposition is explored using a case study involving a detailed investigation of a single subsidiary of a large multinational operating in the manufacturing sector. The firm was selected based on the following criteria. First, financial information regarding its operations is accessible to some extent (e.g., through publicly available annual reports), which is rare for multinationals (Clausing, 2003; Swenson, 2001; Ylönen & Laine, 2015). Second, the company is a subsidiary of a large foreign multinational, and it produces consumer goods. Third, the enterprise is viewed as a good corporate citizen. Fourth, the company is not a mining firm. The Zambian economy is dominated by mining. As such, mining is the most researched sector. This study departs from that tradition. Central to this decision is that non-mining firms are as equally important as the mining sector in contributing to economic development in Zambia. This study contends that the increased focus on the mining sector has minimised the importance of the other sectors. Consequently, the *wrongs* taking place in other sectors almost go unnoticed. Moreover, firms that have adopted good organisational practices, like the current case study firm, have the potential to improve their productivity and taxable income but escape critical scrutiny from the government (Bilicka & Scur, 2021). Yet, the greater adoption of these practices may also facilitate a more efficient shifting of profits across countries, leading to a successful lowering of actual taxable income, as demonstrated by Bilicka & Scur (2021).

This study has the rare advantage of using detailed firm-level information that is usually inaccessible to most researchers. The analysis is conducted using a unique dataset constructed from multiple sources combining many company records, such as annual reports and other official sources. The data include production output, trade volumes and earnings (i.e., domestic and exports to related parties and unrelated buyers), debt (including intra-firm loans), management and technical fees, and other transactions. I also utilised data from the corporate websites of the case study firm and the related parties. Moreover, this information was corroborated by the anonymised firm-level panel dataset held by the local Central Bank. The dataset captures information on foreign owned firms operating in Zambia, which includes shareholding structure, income tax, sales/turnover, output, exports and imports of goods and services, research and development (RD) expenditures, profits/loss after-tax, net operating surplus (or loss), payment of royalties and license fees, management fees and total dividends distributed/declared. To my knowledge, this is the first work that uses this dataset to explore the deployment of tax avoidance instruments by

foreign multinationals operating in Zambia. Specifically, the study examines three propositions.

The first proposition is that all three tax avoidance methods are cost-effective. This proposition is accepted. The second proposition is that firms will specialise in whichever one of the methods is cheapest. The alternative hypothesis is that firms use all three methods. The alternative view is accepted. This finding suggests two plausible reasons, concealment and robustness purposes. The firm may have used all three strategies to conceal its actions. Relying on one might be obvious and increase the chance of detection. Likewise, it is plausible that the firm may have used all three mechanisms for robustness reasons. If detected on one, it can continue using the other two options as it already has experience using them. The third proposition is that the form of transfer pricing used is adapted to the specific commodity or country involved. The alternative hypothesis is that the methods used are the same. The evidence shows that the null hypothesis is accepted. There is no strong evidence suggesting significant differences in applying the methods within the company. Moreover, this finding indicates that the company was using a formulaic approach. This fits the idea that the firm was not applying a super-refined strategy. Instead, the firm could be using a package that processes things routinely.

Overall, the research is revelatory. It provides in-depth longitudinal descriptions and detailed accounts of specific patterns that enable the firm to systematically reduce its tax obligations by efficiently shifting taxable profits across countries. The essay establishes that the firm's systematic deployment of tax-motivated instruments may have enabled it to successfully avoid paying tax on approximately US$607 million from 2008 to 2020. As a proportion of total non-mining export earnings, reported at US$24,726 million in the balance of payments by the Bank of Zambia, the loss in taxable income translates to about 3%.[2] It also represents approximately 17% of the total non-mining corporate tax estimated at US$3,688 million[3] collected during the period. Likely, the potential tax loss on this income may almost never be fully compensated with the firm's personal income tax and corporate social responsibility (CSR) payments. To the extent that tax avoidance is about hiding resources from tax authorities, it is plausible that the use of sophisticated strategies may have also hidden resources from the minority shareholders (Wang et al., 2020). I argue that the tax avoidance strategies described in this essay mirror a broader phenomenon among large MNEs.

[2]Accessed from the Bank of Zambia website on 21 December 2021 [External link].

[3]Estimated from various Zambia Revenue Authority Annual Reports, accessed from the Zambia Revenue Authority website on 24 December 2021 [External link].

This essay makes three contributions. First, it contributes to the literature on MNE corporate tax planning. This literature identifies the main instruments deployed in MNE corporate tax planning (Cooper & Nguyen, 2020). This essay complements and extends this literature and the existing broader empirical research by documenting the deployment of these instruments using a case study. Second, this study provides new empirical evidence on how large multinationals and their subsidiaries avoid paying taxes. This is done by presenting the key findings from a case study of a subsidiary operating in a developing country. Third, it proposes a methodology for estimating the extent of tax avoidance by MNEs through each of the three mechanisms (i.e., transfer pricing, mis-pricing internal loans, and overcharging for notional services). Moreover, this study helps bridge the gap in the absence of comparative studies and diversity in geographic representation (Cooper & Nguyen, 2020), especially for developing countries.

The remainder of the essay is structured as follows. Section 3.2 gives an overview of the past related literature and develops hypotheses; Section 3.3 provides the data and methodology used in this study; Section 3.4 presents the case study; Section 3.5 discusses the evidence and the implications of the findings; and Section 3.6 concludes.

3.2 Related Literature & hypotheses

3.2.1 Literature Review

This study contributes to the different strands of the vast literature on tax avoidance. In this section, the focus is on three key mechanisms of mis-pricing: transfer mis-pricing, mis-pricing of internal loans, and mis-pricing of notional services. Cooper & Nguyen (2020), Dharmapala (2014), Hanlon & Heitzman (2010), Riedel (2018) and Wang et al. (2020) provide comprehensive reviews of such literature, both theoretical and empirical. Scholars that provide empirical evidence of tax-motivated income shifting by MNEs to countries with lower tax rates include Akamah et al. (2018), Beuselinck et al. (2015), Dischinger & Riedel (2011), Lall (1973), Klassen & Laplante (2012), Newberry & Dhaliwal (2001), and Rego (2003). Studies relating to transfer pricing of intra-firm transactions include Al-Eryani et al. (1990), Clausing (2003), Cobham (2005), Contractor (2016), Cristea & Nguyen (2016), Fowler (1978) and Taylor & Richardson (2012). The literature examining the use of intra-firm debt to finance affiliates in high tax countries include Altshuler & Grubert (2003), Buettner & Wamser (2013), Coppola et al. (2021), Desai et al. (2007), Egger et al. (2010), Grubert (2003), Huizinga & Laeven (2008), Mintz & Weichenrieder (2010), Ramb et al. (2005), Schindler et al. (2013), Sikka (2010) and Weichenrieder (1996). Studies

focusing on notional services, such as interest payments, include Auerbach (2002), Casson (Forthcominga), Contractor (2016) and Mooij (2012). Using a case study, this study provides evidence on how large multinationals utilise these different practices to reduce their tax burden.

The manipulation of intra-firm trade transfer prices is one of the historical mechanisms used by multinationals to shift profits to low tax countries from high tax countries (Fowler, 1978; Lall, 1973). Significant part of the literature on trade acknowledges that multinationals play a substantial role in international trade. They trade between themselves and unrelated buyers and within the group. The trade takes place in a market. According to Aspers & Beckert (2011), a market is where products produced by firms are placed for their value to be assessed through judgments of the opportunities and risks involved. Lazonick (1993) characterises the market as impersonal relations between the buyers and sellers. In other words, the market must be dominated by independent, competing firms.

In contrast, intra-firm trade involves buyers and sellers that are part of the same decision-making structure, which defies the standard market economy because of the absence of 'competitive' and 'impersonal' relationships (Ylönen & Teivainen, 2018). Moreover, intra-firm trade transactions violate the arm's length principle and are protected by the veil of corporate secrecy. Yet, a considerable share of international trade is conducted in the form of intra-firm trade between subsidiaries within the same multinational and is planned in group headquarters (Lanz & Miroudot, 2011; UNCTAD, 2004, 2015; Ylönen & Teivainen, 2018). This study will analyse the level of trade of a manufacturing subsidiary between affiliated parties.

Pricing of goods exchanged between affiliated parties is one of the vehicles that MNEs use to shift income to lower their global tax burden (Cristea & Nguyen, 2016). Many scholars suggest that MNEs use intra-firm trade to manipulate their transactions to reduce tax burdens. Early examples of research into transfer pricing include Fowler (1978), Lall (1973) and Horst (1971). They argued that MNEs manipulate their transactions by selecting optimal transfer prices for goods shipped between subsidiaries to influence their reported profits and maximise the group's overall profits. Jacob (1996) argued that the most significant opportunities and incentives for transfer price manipulation exist for firms with large proportions of cross-border intra-firm trade and large variations in corporate tax rates between countries. Therefore, it is expected that exports exchanged between the host subsidiary and related parties would be disproportionately underpriced compared to goods supplied domestically if transfer pricing existed. Desai et al. (2006) showed the importance of intra-firm trade by establishing a direct link between the volume of intra-firm cross-border trade and

observable profit shifting. They found that firms headquartered in the United States were more likely to export to foreign affiliates using tax haven subsidiaries. An earlier study by Clausing (2000) found that tax minimisation strategies of multinationals influenced the United States' intra-firm trade flows. Specifically, the study found that intra-firm trade balances involving United States firms were less favourable in countries with low taxes.

Similarly, Clausing (2003) found evidence suggesting the existence of transfer pricing for purposes of income shifting to low tax countries. These views are shared by Ylönen & Teivainen (2018), who suggested that one of the critical objectives of intra-firm trade is shifting profits across borders through transfer pricing to avoid taxes. Sikka & Willmott (2010) presented several cases of multinationals engaged in profit shifting using transfer pricing schemes across different industries. Also, Hansen et al. (1992), in an earlier study, presented a typical case study of transfer pricing manipulation by a multinational. The case study dealt with a manufacturing firm that manufactured all its products in the United States but had marketing operations in Europe. The study demonstrated how the MNE manipulated transfer prices for its intra-firm trade and foreign transactions. This case study reflects some elements similar to the current study. For example, this study will estimate the potential amount of income shifting due to transfer price manipulation on intra-firm transactions.

A large volume of published studies describe the role of tax havens and subsidiaries in facilitating tax avoidance. For example, Desai et al. (2006) suggested that tax havens facilitate tax avoidance through transfer pricing by allowing the reallocation of taxable income to countries with low corporate tax rates. They explained that large tax havens were used to reallocate taxable income, while small tax havens were used to postpone the volume of domestic taxes on foreign income. Further, they explained that reallocation of income is done via manipulation of transfer pricing by shipping goods from high tax countries to tax havens at the lowest possible price. MNEs favour the use of tax havens as conduits for such transactions because of tax considerations. Jones et al. (2018) suggested that MNEs use complex tax haven networks as part of their tax planning. At the centre of tax planning is deciding where profits are reported. The process of where profits are reported produces winners (low tax jurisdictions) and losers (high tax countries) when profits are shifted from high tax countries to low tax countries (Cobham & Janský, 2019). Thus, tax aggressive firms are incentivised to set up subsidiaries in such jurisdictions to circumvent domestic corporate taxes on their foreign income. This demonstrates that subsidiaries in tax havens potentially play a major function for the entire MNE group, such as controlling the treasury, business, insurance, and licensor (Taylor & Richardson, 2012).

Another channel for tax avoidance is intra-firm loans. MNEs use intra-firm loans and interest deductions to effectively shift profits between countries with different tax rates to reduce their tax liability by engaging in intra-firm loan mis-pricing and excessive debt loading (Sadiq, 2020). When a firm borrows money to purchase assets, it is likely to report low earnings before tax. The low earnings could be because of genuinely servicing debt. But it may also potentially be an outcome of tax avoidance. While governments permit borrowers to deduct interest payments on loans as an expense, Contractor (2016) argued that if the borrower and the lender are subsidiaries within the same multinational but in different countries, then the MNE has a sure path to paying less tax in high tax jurisdictions. The conjecture is that the MNE can make its subsidiaries in low tax countries extend intra-firm loans to its subsidiaries in high tax countries. The tax deduction on the interest payment is juicier. Although there is a considerable difference in methodologies and specifications of past studies, ample support suggests that internal debt is a vehicle for shifting profits from high tax to low tax countries. Differences in corporate income tax rates between countries incentivise lending from low tax jurisdictions to subsidiaries in high tax jurisdictions. This debt shifting lowers the MNE's overall tax obligation, although the overall group debt may remain the same in some cases. The presence of debt shifting is confirmed by empirical research (e.g., Altshuler & Grubert, 2003; Buettner & Wamser, 2013; Desai et al., 2007; Fuest & Riedel, 2010; Grubert, 2003; Huizinga et al., 2008; Mintz & Weichenrieder, 2010; Ramb et al., 2005; Schindler et al., 2013; Weichenrieder, 1996).

Buettner & Wamser (2013) claimed that multinationals with affiliates in low tax countries use internal debt more, and this increases when the spread between the lowest tax rate among all affiliates and the host country tax rate. This is supported by Ting (2017), who explained that the popularity of this mechanism to avoid tax could be attributed to its simplicity. It can easily be created without the involvement of third parties and does not require the movement of assets or personnel within the MNE. He further explained that intra-firm loans could be manipulated easily to benefit the multinational. According to Fuest et al. (2011), debt shifting is more prevalent in developing countries, with the impact on taxes being double that in developed countries. The deployment of profit shifting will be explored in this case study. A significant share of debt on the host country subsidiary's books may confirm debt shifting.

More recently, attention has focused on the provision of notional services to avoid tax. Casson (Forthcominga) provided a theoretical illustration of how the supply of notional services, such as unnecessary internal insurance or expensive internal loans to production and distribution operations, can be used in tax avoidance. He illustrated

this using three subsidiaries, one in a low tax country and two national subsidiaries (both involved in production and distribution) in high tax countries through which these services are routed. This would appropriate a substantial proportion of the operating profit from production and distribution. He explained that this would reduce the profits of the national subsidiaries through which the notional services are routed. He further explained that this would lower profits reported in the high tax countries and, at the same time, generate considerable profits in the low tax country. As a result, the overall tax obligation of the MNE is significantly reduced. In other words, when the profits are consolidated in the annual group accounts, the MNE and its shareholders benefit. At the same time, the host governments of the two subsidiaries in high tax countries and their citizens lose out since the tax paid is not full (Casson, Forthcominga). Whereas it is difficult to ascertain whether a service is genuine or notional, some patterns could help identify such services. For instance, the frequency of these services and the proportion of subsidiaries using these services and the revenue spent on these services relative to total imports of goods and services would provide signs of the use of notional services for tax avoidance purposes.

Scholars show that some notional services are more prone to price manipulation, such as management fees which are "particularly notorious" as the parent company can overcharge affiliates (Reuter, 2012). Yet, it isn't easy to measure the actual value of such services. Another notional service is related to debt. A large volume of published studies describes the role of interest payments in tax avoidance. Interest payments on loans are considered an expense of doing business in accounting principles. As such, they are deductible for corporate income tax (Mooij, 2012; Contractor, 2016). Conversely, equity returns do not receive similar treatment because they are viewed as business income. Consequently, the favourable tax treatment at the corporate level of interest payments incentivises the debt finance of investments. From an economic perspective, the tax discrimination between the two alternative returns on capital yields a 'debt bias' that generates considerable welfare losses (Mooij, 2012). Debt bias creates distortions (Auerbach, 2002; Mooij, 2012), including lowering tax obligations. Granted, interest payments are a cost for the payer. Still, when the creditor and debtor are subsidiaries in different jurisdictions with varying tax rates, the MNE is motivated to reduce its tax obligations in high tax countries. This can be done by making a group subsidiary in a low tax jurisdiction extend loans to subsidiaries in high tax countries as they can enjoy large tax deductions on interest payments (Contractor, 2016; Sadiq, 2020). This would reduce profits in those countries while transferring those profits to a low tax country via an interest payment.

Researchers have also identified some firm characteristics that facilitate tax avoidance, such as multinationality (Cooper & Nguyen, 2020) and corporate structure (Badertscher et al., 2013). Multinationality (i.e., international diversification) is an activity that has gained awareness in the literature (Hennart, 2007; Majocchi & Strange, 2012). Majocchi & Strange (2012) suggest that multinationality can have several benefits. It is acknowledged that firms go abroad to create new advantages and to expand their competitive advantages, as well as to utilise the advantages (Dunning, 2003). An empirical study by Gu et al. (2018) found that multinationality positively impacted emerging economy multinationals' performance.

Other scholars argue that multinationals expand to reduce corporate taxes. For instance, Slemrod (2001) claimed that multinationals locate operations in low tax countries to shift income from high tax countries and exploit differences in the tax rules of different countries to reduce corporate taxes. This is like the view held by Rego (2003), who argued that a multinational with extensive foreign operations could have the incentive and opportunity to engage in tax avoidance when it uses efficient tax planning practices across all its subsidiaries. She found that multinationals are more successful in tax avoidance using their extensive operations and inter-firm trade. Similarly, Dyreng et al. (2008) found that a more comprehensive international footprint presents firms with more opportunities to engage in tax avoidance mechanisms. This corroborates earlier research by Jacob (1996), who investigated the relationships between taxes paid by firms and the profits they reported in different jurisdictions. He found that the magnitude of income shifting was associated with the volume of cross-border intra-firm trade and variations in tax rates between the United States and foreign subsidiaries.

3.2.2 Hypotheses

Based on the literature reviewed and existing arguments, the following hypotheses have been developed.

H1. *All three methods of tax avoidance are cost-effective.*

The first hypothesis predicts that using any of the three tax avoidance methods is feasible in economic terms because the administrative cost of adopting any practice is less than the savings and the tax effected. In other words, a firm can either use transfer pricing or mis-pricing internal loans or overcharging for notional services because all three mechanisms are cost-effective. If the firm uses any of the methods at any given time, then this prediction will be supported.

H2. *Firms will specialise in whichever one of these methods is cheapest for them.*

The second hypothesis predicts that firms specialise in whichever mechanism is cheapest. The conjecture is that although some of these methods, such as mis-pricing loans, might be administratively cheaper than others, such as transfer pricing, in practice, firms will specialise in whichever one of these methods is most affordable for them. The corresponding null hypothesis is that firms use all three methods. This hypothesis predicts that nothing stops a firm from simultaneously engaging in all three tax avoidance mechanisms to facilitate income redistribution from a high tax to a low tax country. For instance, it can mis-price real, financial, and notional flows supplied to affiliates. The argument to support the null hypothesis is that a firm will use a bit of all three methods for two reasons, concealment and robustness purposes. The concealment argument is that a firm may engage in all three to avoid detection. Relying on one might be obvious and increase the chances of detection. The robustness argument is that a firm might still be detected if it does all three mechanisms. But when that happens, it can continue to use the other two methods as it already has experience in using them. Therefore, if we observe that a particular tax avoidance mechanism is consistently used for a specific country, we will infer that H2 is accepted. However, if the evidence shows that all methods are being used without bias towards one, we will infer that the null hypothesis is accepted.

H3. *The form of transfer pricing used is adapted to the specific commodity or specific country involved.*

This hypothesis supposes that the mechanism of tax avoidance used is adapted to the specific commodity or specific country. This predicts that a firm uses a super-refined tax avoidance strategy for each commodity and country. If the data shows that a firm is selective in applying the three methods for each country or market, this prediction will be supported. The corresponding alternative hypothesis is that a firm employs the same technique across all countries. The null hypothesis will be accepted if the data shows no adaption of specific methods to specific countries/markets. The null hypothesis is interesting as it suggests that a firm is somewhat using a formulaic approach. This would fit with the idea that the company purchased a kind of package from a consulting company, which does these things and is applied routinely.

3.3 Data & methodology

The empirical data in this research consists of an in-depth analysis of a thoughtfully selected subsidiary of a large multinational. The enterprise was selected based on

the criteria discussed in Section 3.1. The study will focus on the period 2008-2020, using a unique dataset constructed from a set of sources combining many publicly available company records, such as annual reports and other documents. The dataset summarises production output, trade volumes and earnings (i.e., domestic and exports to related parties and unrelated buyers), debt (including intra-firm loans), management and technical fees, and other transactions. Further, the company's annual reports provided helpful information concerning the corporate and financial structure and transactions with other subsidiaries, including those in tax heavens. All the information was compiled manually. I also utilised data from the corporate websites of the case study firm and the related parties.

Moreover, this information was corroborated by the anonymised firm-level panel dataset held by the local Central Bank. The dataset contains most of the foreign-owned firms operating in Zambia. It captures information that includes shareholding structure, income tax, sales/turnover, output, value addition, assets, net worth, exports and imports of goods and services, total liabilities, compensation of employees, research and development (RD) expenditures, profits/loss after-tax, net operating surplus (or loss), payment of royalties and license fees, management fees and total dividends distributed/declared. This information was used in building the case and was the key to unlocking the analysis. This dataset gives the study a rare advantage over most studies as it combines information that is ordinarily inaccessible to most researchers.

The investigation in this research will take the form of a case study like Finér & Ylönen (2017), Ting (2014), and Ylönen & Laine (2015). This approach departs from most past studies on tax avoidance which use econometric regressions (e.g., Becker et al., 2012; Büttner & Wamser, 2007; Clausing, 2003, 2016; Johansson et al., 2017; Kosi & Valentincic, 2013; Markle & Shackelford, 2009). Most econometric research on tax avoidance typically use approaches and variables that are too straightforward (Finér & Ylönen, 2017). Yet, some of the variables commonly applied in such studies, such as income tax rates, play minimal roles in case studies (Finér & Ylönen, 2017). Thus, the case study approach helps illuminate complex social phenomena (Yin, 2009). Specifically, this study follows Finér & Ylönen (2017) by combining both quantitative and qualitative analysis as it helps to answer the research questions and test the hypotheses. Combining quantitative and qualitative analysis is preferred because of the subsidiary's position and nature in the firm's structure. For example, by employing the qualitative mode of enquiry, the study highlights the in-depth analysis of the legal and societal factors underlying the firm actions, which may not be possible using quantitative methods, such as econometric regression. According to Bédard & Gendron (2004), "qualitative research often is the most effective method to conduct

empirical investigations aimed at better understanding phenomena occurring in their natural context" (p. 202).

Moreover, this approach helps to illustrate the inherent complexities of tax avoidance practices which are usually not easily accessible (Lisowsky, 2010; Sikka & Willmott, 2010; Wilson, 2009). To a large extent, this study overcomes the usual limitations on the information because the financial and trade statistics are accessible to some extent. In addition, data on the flow of coordination with other related parties are available. The available information is adequate to draw valuable conclusions according to the study's objective. By conducting an in-depth case enquiry, the study provides generalisable evidence (Yin, 2009) on how foreign-owned subsidiaries operating in Zambia deploy methods, opportunities, and tools to avoid paying taxes.

3.4 The case study

This section discusses the case study, starting by describing the history of the company's operations. The case study firm, affiliates and goods are anonymised for confidentiality. In this regard, the case study firm is identified as firm A, while the ultimate company and subsidiaries are identified as firm B, C, D, . . . , V, and their host countries are identified as country 1, 2, 3, . . . , 11. Unless stated otherwise, the financial information and details on activities discussed in this section are obtained from various sources, as mentioned in Section 3.3. Although the local currency, the Zambian kwacha (ZMW), is used in the source documents, the financial figures in this study are presented in United States dollars (US$). The BoZ's average exchange rate of the ZMW to US$ is used for the conversions. The company's annual financial statements are prepared in line with International Financial Reporting Standards (IFRS) and meet the requirements of the Zambian accounting laws.

Before going into the analysis, it must be borne in mind that tax planning techniques employed by MNEs are hugely complex and overly difficult to unpack in detail. Thus, this study is not an attempt to cover a detailed technical discussion and analysis of all the issues and their possible solutions but rather to explore practices that enable tax avoidance. However, this is not an easy task as some of these practices are not directly visible to company outsiders (Bilicka & Scur, 2021). The good news, however, is that certain trends are essential enablers of tax avoidance (Bilicka & Scur, 2021). Giving a comprehensive analysis of tax planning techniques is beyond the scope of this study.

3.4.1 Description of the company

Firm A is a listed manufacturing enterprise that produces homogeneous consumer goods. It was founded in the mid-1960s by firm B but was later nationalised in the early 1970s. Two decades later, firm B reacquired its former subsidiary to become the majority shareholder. Minority shareholders include institutional investors and individuals. Around the early 2000s, firm C incorporated in country 1 acquired firm B, and consequently, firm A as the majority shareholder. Firm D incorporated in country 2, acquired firm C, a few years later to become the ultimate holding company of firm C and, subsequently, firm A. Firm D is headquartered in Europe and has a complex aggregation of several subsidiaries spread across Africa, the Americas, Asia, Australia, and Europe. Firm C is the intermediate holding company for the group's subsidiaries in Africa. Firm A is an essential subsidiary of the group. It contributed over one-third of the intermediate holding company's operating profit about seven years ago. Table 3.1 provides a list of firm D's subsidiaries that have direct relationships with firm A at different levels of coordination, while Appendix Table B.1 presents additional details on the host countries.

Nearly a decade after its acquisition by firm C, firm A reported a reorganisation of its corporate and financial structures, with the introduction of firm E as the new immediate parent company. Firm E is incorporated in country 3, a European low tax country and a subsidiary of firm C. Five years later, firm A reported another change, introducing a new majority shareholder, firm F incorporated in country 4, an African low tax jurisdiction. Firm F is a holding company wholly owned by firm C. About two years later, there was another corporate and financial structure reorganisation as the company reported a new holding company, firm G, as a new immediate parent company. Firm G is a wholly owned subsidiary of firm C incorporated in country 1.

Moreover, firm G operates as the centralised procurement office of the group for procurement requirements for all operations in Africa. Recently, another change in firm A's corporate and financial structure configuration was reported. A new holding company, firm H, incorporated in country 2, and a wholly owned subsidiary of firm C, was reported as the new immediate parent company. Firm H is also the group's agent for coordinating, marketing, selling, and distributing all exports, except to country 5, which is done by firm J, incorporated in country 4 and a wholly owned subsidiary of firm C. Firm D manages its global operational interests through firm I incorporated in country 2.

Appendix Figure B.1 illustrates the flow of raw materials through the value-adding processes, involving a connected sequence of activities relating to the coordination and

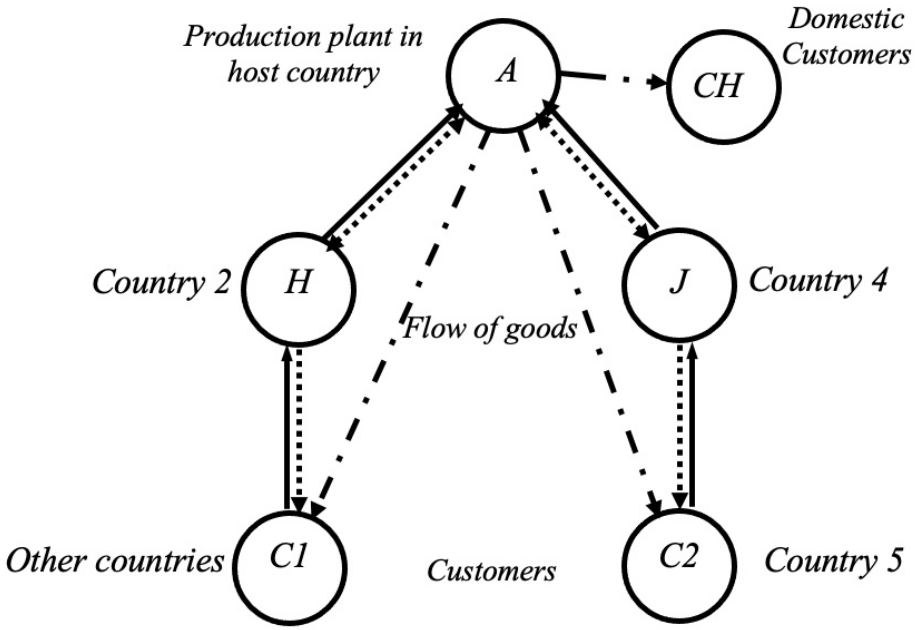
TABLE 3.1: Summary of the ownership structure for Firm A and its transactions with related parties

Firm	Function (s)	Location	Transactions with the host firm
A	Subsidiary in the manufacturing sector	Host country	Operates a production plant and coordinates distribution of goods in the host country.
B	Ultimate parent company of firm A until the early 2000s	Country 1	Reacquired firm A from the state in the 1990s.
C	Intermediate holding company offers operational support services	Country 1	Acquired firm A in the early 2000s. Paid management and operational support fees.
D	The Ultimate holding company	Country 2	Acquired firm C and indirectly owned firm A.
E	Subsidiary of firm C and immediate parent company of firm A from around 2010	Country 3	Immediate parent company from around 2010.
F	Immediate parent company from around 2015, issued intra-firm debt	Country 4	Paid loan repayments, interest payments and dividends.
G	The Immediate parent company from around 2017 and operates as a centralised procurement office for procurement requirements	Country 1	Immediate parent company.
H	Holding company from around 2020, coordinates and manages the marketing, sale, and distribution of exports to all countries in Africa, except to country 5	Country 2	Paid export commissions and dividends.
I	Subsidiary of firm D manages the Group's globally interests.	Country 2	Manages firm A on behalf of Firm D.
J	Subsidiary of firm C, coordinating, marketing, selling, and distributing exports to country 5	Country 4	Paid export commissions and receives payments from export sales on behalf of firm A.
K	Subsidiary of firm D, coordinating, marketing, selling, and distributing exports to Europe	Country 6	Paid export commissions.
L	Subsidiary of firm D, coordinating, marketing, selling, and distributing exports to Europe	Country 2	Paid export commissions.
M	Subsidiary of firm C offers management and operational support services; issues intra-firm debt	Country 7	Paid management and operational support fees, loan repayments and interest payments.
N	Subsidiary of firm C imports goods from firm A	Country 8	Pays for its imports through firm H; paid management fees.
O	Subsidiary of firm C imports goods from firm A	Country 9	Pays for its imports through firm H; paid management fees.
P	Subsidiary of firm C offers air freight services to Group subsidiaries	Country 1	Paid air services fees.
Q	Subsidiary of firm C handles export logistics for third parties.	Country 1	Paid export logistics fees associated with third party transactions.
R	Subsidiary of firm C source of intra-company debt	Country 4	Paid loan repayments and interest payments.
S	Subsidiary of firm C handles third party export transactions	Country 2	Receive export revenues and pays through firm J
T	Subsidiary of firm C imports goods from firm A	Country 10	Pays for its imports through firm H.
U	Subsidiary of firm D imports goods from firm A	Country 2	Pays for its imports.
V	Subsidiary of firm D imports goods from firm A	Country 11	Pays for its imports through firm H.

Notes.- The information was retrieved from various annual reports and websites of the case firm and subsidiaries.

control of raw materials, manufacturing, packaging, and distribution of final goods to customers. The primary raw materials are sourced mainly within the group in the host country. The production process and packaging of the goods are done within firm A. The firm has adopted advanced technology, and its processed goods are of high quality. Processed goods are packaged in different sizes to satisfy the firm's commercial and industrial consumer preferences. In other words, all finished products leave the factory packaged in readiness for retailing and wholesaling. The final goods are consumed both locally and abroad. The supply of goods to the domestic market is distributed using local facilities. At the same time, exports are coordinated and distributed by other subsidiaries (firm H to all but one African country and firm J to country 5 only). Moreover, the proportion of final goods supplied to commercial and industrial customers in the domestic and foreign markets is somewhat similar. Figure 3.1 presents a simple diagrammatic representation of production, coordination, distribution, and goods flow.

FIGURE 3.1: Mapping of trade arrangements of firm A and other subsidiaries in Africa showing the flow of goods and services



Notes.- The plot shows the trade arrangements of firm A and other subsidiaries. Key: *Circle*: representative of decision-makers. *solid lines*: flow of intra-firm services that are sold to firm A by firm H and firm J. *dash dot lines*: flow of goods to customers (including intra-firm exports); *round dot line*: ownership boundary of firm A. *notation*: *A*: firm A; *H*: firm H; *J*: firm J; *C1*: customers in all Africa markets (including subsidiaries), except country 5; *C2*: customers in country 5; *CH*: customers in the host country.

Specifically, Figure 3.1 illustrates the location of the production plant, *A* operated by firm A is based in the host country, while firm H, *H* and firm J, *J* coordinate and

distribute exports. The customers are represented by *C1* for customers in Africa and other markets (i.e., including subsidiaries), except country 5, *C2* represents customers in country 5, and *CH* represents customers in the host country. The quantities of goods exported and supplied to the domestic market and the revenue earned are reported in the annual reports. This information is later used in Section 3.5 to compute the total goods that firm A exported and supplied to the domestic market. Also, the information is used to compute the total revenue earned from exports and domestic sales. The *solid lines* illustrate the flow of export agency services supplied to firm A by firm H and firm J in the form of coordinating and distributing its exports. Firm A is billed for export agency services. The export agency fees paid to *H* and *J* by firm A are reported in firm A's annual reports. Later, the export agency fees are sunned to derive the total amount paid in export agency fees. The *dash dotted lines* illustrate the flow of goods from the production plant to customers, *C1*, *C2* and *CH*. The *round dotted lines* represent the flow of financial assets – payments for exports from customers, *C1*, *C2* and *CH* to firms *H* and *J* which are also designated as collection points of export earnings. re collection. After that, the export earnings are remitted to firm *A*. This is illustrated by the *round dotted lines* from firms *H* and *J*.

To conclude this section, the information presented here provides important insights into the case firm. For example, it demonstrates that firm A belongs to a complex network of subsidiaries. It also illustrates that some group subsidiaries are holding companies, with some located in tax havens. The information describes the corporate reorganisations of firm A. The relevance of this information will become more apparent in Section 3.5. This information has profit and tax implications for firm A and the group. Crucially, the location of some holding subsidiaries in low-tax jurisdictions may be an avenue for shifting profits within the group. In other words, it is highly plausible that the holding companies are special purpose entities whose income includes profits earned from firm A.

3.5 Evidence & implications

Section 3.2 laid out hypotheses to be tested. In this section, the focus shifts to attempting to verify the hypotheses and discuss their estimated implications empirically. A vital aspect of the hypothesis testing here is to describe the patterns that suggest tax avoidance behaviour and evaluate the potential tax losses to Zambia, where production is conducted. This is done by quantifying the potential taxable income otherwise not taxed. The following are regarded as symptoms of using any of the three methods of tax avoidance highlighted in Section 3.1. We would infer transfer pricing suppose the export earnings are disproportionately lower than domestic

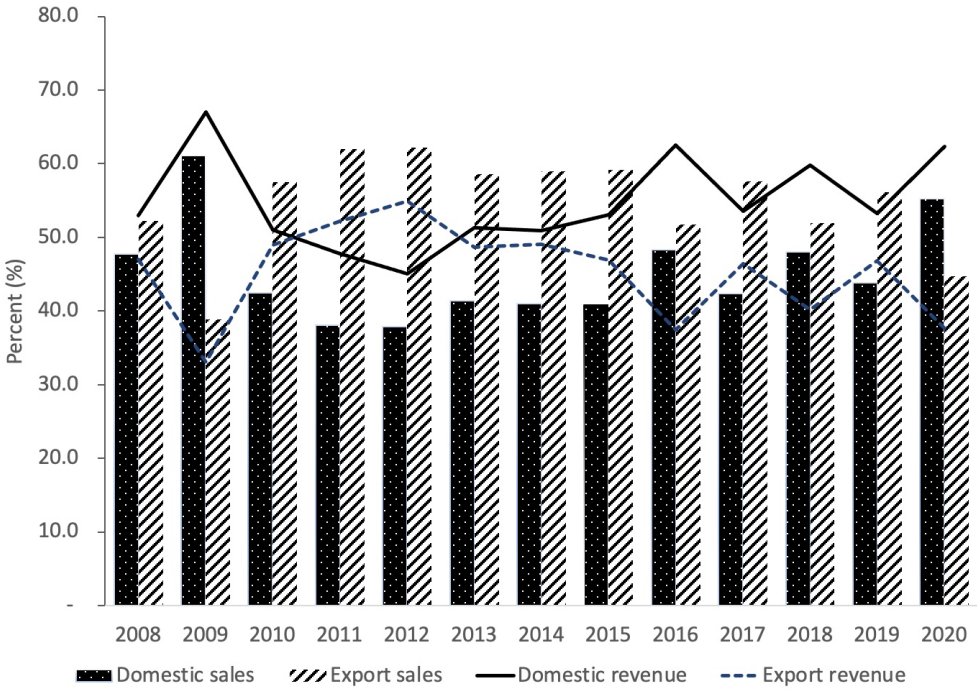
sales for the same quantity of goods. Otherwise, we would conclude arm's length pricing. Similarly, an increased amount of internal loans coupled with high interest rates charged on the loans plus margins would suggest the mis-pricing of internal loans. If not, then we would infer the opposite. Likewise, if we observe continued use of specific services and seemingly higher fees, this could imply supply and overcharging of notional services. Otherwise, we would infer the opposite.

3.5.1 Intra-firm trade and transfer pricing

First, I describe trade statistics extracted from the firm's annual reports. These reports contain important data that allows for a detailed analysis of the case firm to a large extent. The reports present the quantities of goods exported to each market and the revenue earned. A review of this information shows that firm A's sales increased by about 62% between 2008 and 2020. The volume of goods supplied domestically grew by 80% during the same period, while the quantities of products exported grew by 33%. Figure 3.2 provides the share of the volume of goods supplied domestically and the share of goods exported as a percentage of the total quantity sold. I use percentages to avoid exposing the firm if I use the actual amounts of goods supplied. The share of the volume of goods exported is represented by diagonal striped bars, while the volume of the goods supplied domestically is illustrated by dotted bars. The figure shows that the share of goods exported was generally higher than the volume of the goods supplied domestically. Export volumes were consistently above 50%, except in 2009 and 2020. The best estimate is that approximately 55% of firm A's traded goods during the study period were supplied internationally, while 45% were supplied domestically. To put this in context, the firm supplied more goods, approximately over 500 thousand tonnes, internationally than domestically in thirteen years. All firm A's exports were coordinated, marketed, sold, and distributed by subsidiaries within the group.

Figure 3.2 also shows the share of revenue earned from domestic and export sales as a percentage of total revenue. The share of income earned from domestic sales is illustrated by the solid line, while the dotted line shows the share of export earnings. The figure reveals that firm A earned higher revenue from the goods supplied in the domestic market than goods supplied to the international markets. The proportion of revenue from domestic sales was consistently above 50%, except in 2011 and 2012. On average, the proportion of income from goods supplied domestically was 55%, while the proportion of revenue from goods supplied internationally was 45%. An inspection of the revenue earned by the firm revealed that it earned approximately more than US$201 million from domestic sales than export earnings in thirteen years. Figure 3.3 displays the annual differences between domestic revenue and export

FIGURE 3.2: Share of the volume of goods supplied locally and exported as well as the share of domestic and export revenue as percentages of total goods supplied and total revenue, respectively, 2008-2020

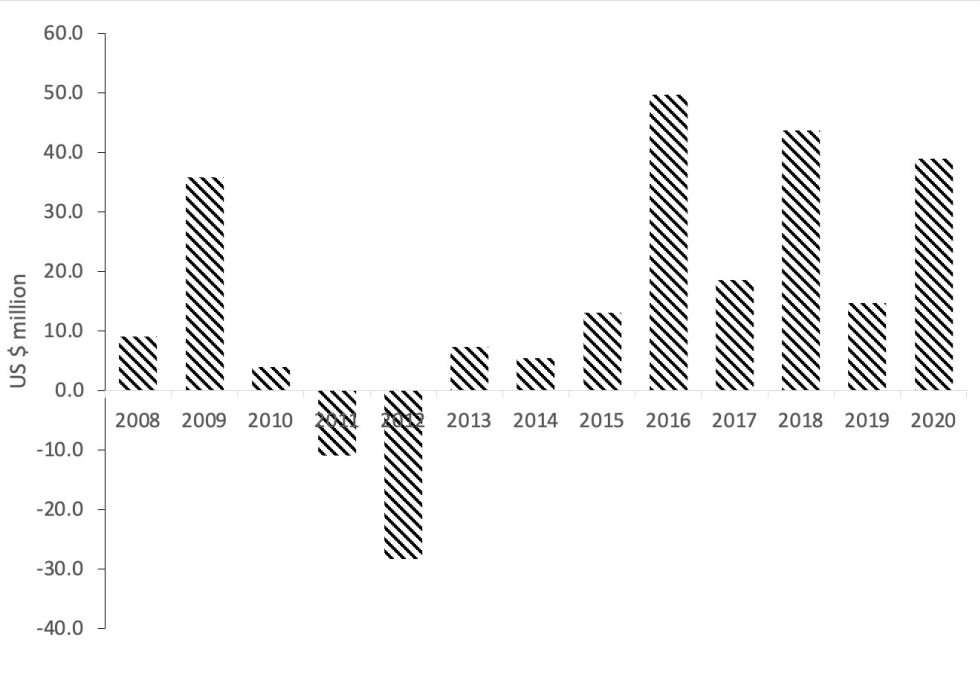


Notes.- author's own calculations. The plot shows the composition of the share of goods supplied locally and exported, as well as the proportion of revenue generated from domestic and export sales. The dotted bars illustrate the percentage of the volume of goods supplied in the domestic market as a proportion of total sales. The diagonal stripes bars show the percentage of the volume of goods exported as a proportion of total sales. The solid line shows the proportion of revenue earned from domestic sales as a percentage of the total revenue. The square dot line represents the proportion of revenue earned from exports as a percentage of the total revenue.

earnings. The differences are computed by subtracting the domestic yearly sales from export earnings.

Figures 3.2 and 3.3 show that apart from 2011 and 2012, export earnings were consistently lower than domestic revenue, despite the volume of goods exported being higher than the volumes of goods supplied domestically. The persistent low export earnings across the years suggest that firm A's exports were under-priced compared to domestic sales. This suggests a consistent practice of price discrimination across markets. Gullstrand et al. (2014) claim that firms engage in such price discrimination across markets when they can exert some market power, and arbitrage costs exist. The market-power prerequisite assumes the existence of an imperfect market and firms' ability to set prices higher than their marginal costs. The second condition entails that it is costly to resale, and this prerequisite has been subjected to empirical investigation. The results indicate that deviations from the law of one price across international

FIGURE 3.3: Difference between domestic and export earnings in US$ million, 2008-2020



Notes.- author's own calculations. The plot shows differences in the domestic and export earnings in millions of United States dollars. Apart from 2011 and 2012, the trend suggests that the firm persistently reported low export earnings across the years despite reporting higher quantities of exports compared to quantities sold locally.

markets are because of various reasons such as trade barriers, transportation costs and exchange-rate volatility (Engel & Rogers, 1996; Gullstrand et al., 2014; Verboven, 1996) These arguments provide insights into firms' markups and pricing strategies across international markets. In other words, the above discussion sheds light on why firm A would charge different prices, for example, in country 5 and other African countries.

However, these arguments may not fully explain a pricing strategy where exports are consistently disproportionately priced lower than domestic prices. Such firm pricing behaviour is at variance with empirical findings. For instance, Jafari et al. (2022) studied the effect of markups on firms' decisions to export and found that firms obtained larger markups by entering and remaining in those markets, which is the case with the current case study. Similarly, De Loecker & Warzynski (2012) found that, on average, exporters price higher markups and the markups increase upon export entry. Also, Bellone et al. (2016) found that markups are higher for exporters. The firm's pricing strategy is not commercially justifiable in an ideal setup and defies common sense. Yet, this appeared to be an entrenched business strategy. The pattern observed here is a firm exporting more goods but disproportionately earning less revenue than

it earns from domestic sales. It is highly doubtful that this is not a case of transfer pricing and aggressive tax avoidance behaviour. Transfer pricing is defined as "the method of establishing prices of raw materials, goods, or services transferred within the corporation among the parent and its subsidiaries, or among different subsidiaries" (Martinson et al., 1999, p. 92). Here we see a firm transferring goods within the group to other subsidiaries at disproportionately low prices. This is a pattern observed across the years, suggesting that firm A's pricing behaviour is part of an essential strategy of the MNE's corporate-wide goals. This evidence is consistent with the theory regarding tax-driven income shifting behaviour (Clausing, 2003).

A review of the company documents reveals that the firm emphasises getting its products to the right markets at the right price. This suggests that the firm's pricing structure, where exports are disproportionately under-priced than local goods, is a deliberate strategy. It is a pricing arrangement that benefits the multinational, but highly doubtful that the host country also benefits. It is highly plausible that the prices are determined at the corporate headquarters of the MNE (Ylönen & Laine, 2015). Thus, it is logical to conclude that this intra-firm transfer pricing practice enabled the firm to shift profits more efficiently away from the host country where the production is done. Subsequently, the firm avoided paying tax on the shifted profits. It is, however, difficult to determine the approximate amount that firm A may have avoided paying in tax due to profit shifting on account that the transaction-level datasets are not available. Thus, the unit prices of goods supplied domestically and internationally are not available. In this regard, I indirectly make the best approximation of the shifted profits using the data on total earnings and volumes of international shipments since this information is readily available. This is not unusual because most transfer pricing studies do not use actual price data (Bernard et al., 2006).

To derive the extent of transfer pricing, it is assumed that the unit value of the goods exported was equivalent to the market value of goods supplied domestically. If there is evidence suggesting undervaluing of internal exports, we will infer transfer pricing. Simple and transparent calculations are used to estimate the amount that the firm may have successfully avoided paying tax. The calculations are done in four stages using publicly available data. First, the unit price of goods traded domestically is approximated by dividing the revenue generated from goods supplied domestically by the quantity supplied locally. Second, the difference in volumes of goods exported and supplied locally is derived by subtracting the latter from the former. Both computations are performed on annual data. Third, the estimated unit value and the difference in volumes derived in the first and second stages are multiplied. All the yearly amounts estimated in stage three are summed up to approximate the total for the entire period.

These calculations conservatively estimate that firm A may have earned additional export revenue of US$201 million, assuming that the exports were priced at the same unit value as goods supplied locally. In other words, intra-firm transfer pricing may have enabled the firm to avoid paying any tax on approximately US$201 million in export revenue between 2008 and 2020. This amount could easily be more if the actual export prices were higher. This is logical and not far-fetched. The opposite may also be true, although it is doubtful. Despite the relative simplicity of the estimation used, it yields ample evidence supporting transfer pricing.

Alternatively, the reported low export revenues could be attributed to systematic misstating of export values, a topic that has received attention in the literature. Kellenberg & Levinson (2019) suggest that misstating of trade statistics are functions of taxes, corruption, tariffs, taxes, and the quality of auditing and accounting standards. Using the United States and China trade data, Ferrantino et al. (2012) examined several patterns of tax evasion, tariff evasion, tax evasion, and avoidance of capital controls to establish what leads to misstating trade statistics. They also found evidence of tariff evasion for subsidiary transactions and indirect evidence of transfer pricing, which aligns with the current study's findings.

Moreover, the potential loss to the host country due to transfer pricing may have translated into higher profits for the holding companies resident in low-tax countries. However, such firm behaviour may be challenging for the government to detect (Bilicka & Scur, 2021) legally. Yet, this behaviour may have enabled the firm to systematically avoid paying taxes on millions of dollars by shifting a sizeable proportion of its profits away from Zambia to the low tax jurisdictions where group subsidiaries are located. Zambia's corporate tax rate is higher than all foreign countries where subsidiaries that trade with firm A are domiciled (see Appendix Table B.1).

3.5.2 Mis-pricing of internal loans

As discussed in Section 3.1, the mis-pricing of internal loans can be effected through either the mis-pricing of a genuine loan or contriving two self-cancelling loans that carry different rates of interest. The following symptoms will guide the identification of potential profit shifting from the host country to the source country. First, if a loan advanced by a parent firm to firm A to finance a real investment is charged at an interest rate above the market rate, and the tax rate in the host country is higher than in the source country. Second, if the subsidiary repays a virtual loan from a parent through an identical loan back to the parent firm, the initial loan carrying a high interest rate, while the second loan has a low interest rate. Information on firm A's loans was extracted from the annual reports. A review of firm A's debt composition

reveals that most loans were issued by either the parent or subsidiaries within the group. For instance, in 2019, intra-firm debt was about US$115 million. The debt-equity ratio (interest-bearing obligations divided by total equity) ranged between 67% and 239% between 2008 and 2020. Part of this debt may have been used to finance genuine operations and expansions. But it is also possible that the multinational may have aggressively exploited the tax advantage of debt by shifting debt from subsidiaries in low tax jurisdictions to the host country. Moreover, it is generally acknowledged that companies with higher debt-to-equity ratios are likely to be more efficient at lowering group income taxes (Desai et al., 2006; Taylor & Richardson, 2012). Therefore, it is highly likely that the motive for such high intra-firm debt levels was to avoid tax by shifting debt from subsidiaries in low tax countries to firm A, which is based in a high tax country. It is plausible that part of the debt was phantom.

Analysis of the interest structure on intra-firm debt extended to firm A revealed reasonable evidence suggesting a pattern of charging a higher price on loans between affiliated parties. As expected, the intra-firm debt on firm A's books is interest-bearing. In addition to the interest, the debt attracts varying additional margins, ranging from 2-6%. For example, in 2010, firm A reported intra-firm loans denominated in Euro and United States dollars. These loans were obtained from the holding company, firm F, registered in a low-tax jurisdiction, country 4. Each of the two loans attracted an applicable interest at the 90-day LIBOR at the start of every month, plus an additional 6% margin. Likewise, another intra-firm loan was obtained from firm M, resident in a low-tax jurisdiction. The loan was denominated in the local currency, which attracted interest at a weighted average rate for the three-year host country's government bond dated three years earlier, plus an additional 2% margin. There is no doubt that the margins make intra-firm loans expensive, with the principal objective of avoiding tax. Between 2008 and 2020, the estimated total interest payments and margins paid on intra-firm debt were US$225 million. The annual reports do not distinguish between the interest paid and the margins. Out of that amount, about US$107 million was paid to firm R between 2015 and 2020. Firm R is wholly owned by the intermediate holding company, firm C and registered in country 4.

To the extent that interest bearing debt can potentially give rise to deductions of income in a year, it is highly plausible that the multinational seized the incentive to minimise the group's tax liabilities through high interest rates on intra-firm debt. To this end, it is doubtful that the high interest rate (the margins of 6% and 2%) was not used to increase the interest expense to lower long-run corporate income taxes successfully (Taylor & Richardson, 2012). In other words, the multinational may have been using interest expenses as an enabler for reducing the tax obligations of firm

A. The analysis here suggests that the firm employed two strategies of internal loan mis-pricing, i.e., excessive debt loading and transfer mis-pricing.

3.5.3 Overcharging notional services

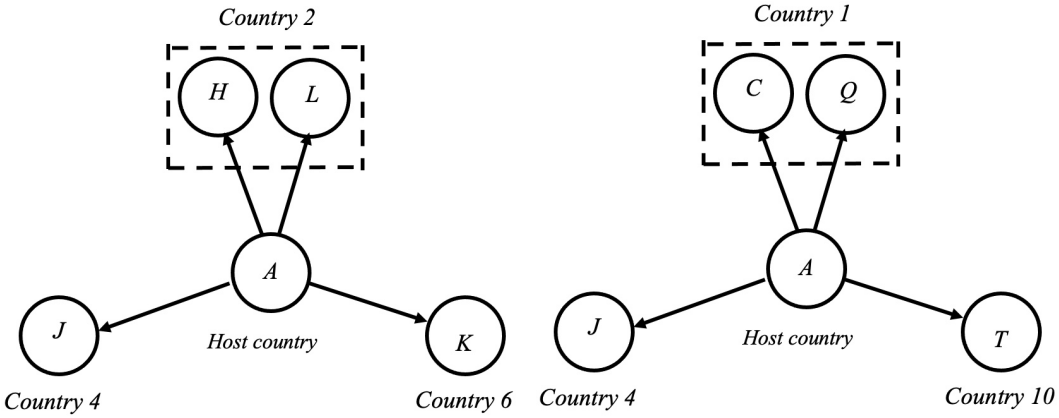
Firm A belongs to a group whose operations are extensively internalised. Most of its transactions were conducted with affiliates (see, Table 3.1). The following symptoms may imply overcharging for notional services. For instance, charging higher prices on services (i.e., management support and technical consultancy and export agency) flowing from low-tax countries to the high-tax host country. Specifically, higher commission rates charged on services by a parent or subsidiary would suggest overcharging.

An inspection of the firm's records revealed that it was supplied with potential notional services, including export agency, financial, management and operational support consultancy, air freight and interest payments. Firm A paid substantial internal expenses for services. For example, the firm paid for the marketing, coordination and distribution of goods supplied to foreign markets handled by other subsidiaries. As all firm A's exports were routed internally, the subsidiaries that dealt with the exports (i.e., firm H and firm J) were paid commissions, as discussed earlier. Firm H handled exports to most countries for which it was paid a commission of 1% on all export revenues. Firm J handled exports to one country and received a commission of 3%. Before 2017, firm J handled all exports for which it received a commission of 1% on gross export revenues. However, the goods often never physically transited through the countries where firm H and firm J are domiciled.

Figure 3.4 illustrates a schematic representation of the flow of export commissions and export logistics payments made by firm A to other subsidiaries. Figure 3.4(a) shows the flow of export commissions paid by firm A to firms *H*, *J*, *K*, and *L* for the supply of export agency services. Figure 3.4(b) indicates the flow of export logistics fees paid by firm A to firms *C*, *J*, *Q*, and *T* for the supply of export logistics services. The data on the amount of export commissions and export logistics fees paid by firm A to each subsidiary are reported in the annual reports. Figure 3.4 partly illustrates the complex network of subsidiaries that the case enterprise belongs to. For instance, subsidiaries in certain countries undertake similar activities. On the face of it, it seems like duplication, but it demonstrates the interconnectedness and complexity of the group. One of the potential sources of profit shifting relates to a firm's complex interdependencies within and between multiple host centres (Meyer et al., 2011).

FIGURE 3.4: Schematic representation of the flow of export commissions and export logistics fees, 2008-2020

(a) Flow of export commissions, 2008-2020 (b) Flow of export logistics fees, 2008-2020



Notes.- The plot depicts the flow of export commissions and logistics fees paid by firm A to other subsidiaries. Key: *Circle*: representative of individual subsidiaries. *Solid lines*: flow of intra-firm payment of export fees; *Long Dash lines*: boundary of subsidiary location. *Notation*: *A*: firm A; *C*: firm C; *H*: firm H; *J*: firm J; *K*: firm K; *L*: firm L; *Q*: firm Q; and *T*: firm T.

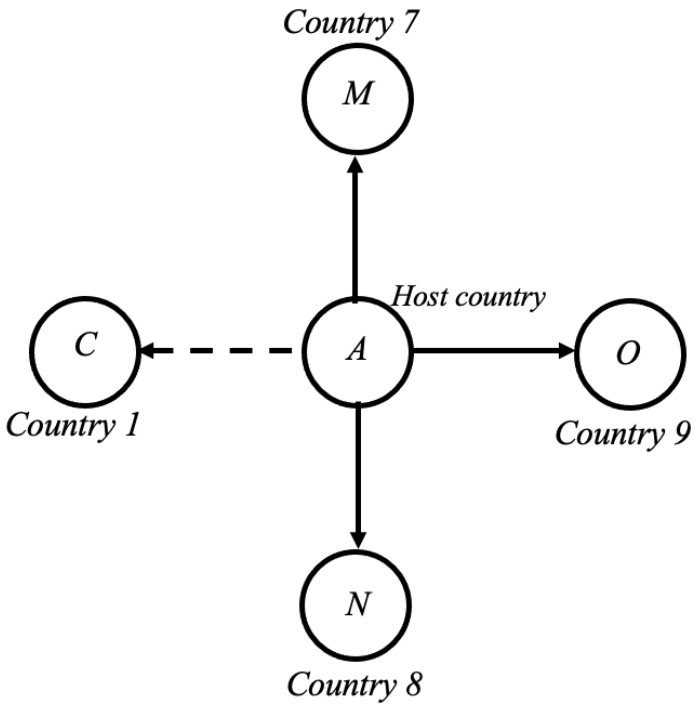
Company records show that between 2008 and 2020, about US$43 million was paid in export commissions to both firm H and firm J. Out of which, about US$18 million was paid to firm J between 2011 and 2020, while about US$3 million was paid in commissions to firm H between 2018 and 2020. For exports to Europe, in 2012 and 2013, export commissions of approximately US$19 million were paid to firm K, incorporated in country 6, and another about US$3 million was paid to firm L, incorporated in country 2, in 2012. Furthermore, firm A paid export logistics fees of approximately US$20 million. These costs are associated with third party transactions to other African national related parties. Of this amount, about US$5 million was paid to firm C, about US$7 million to firm J, about US$8 million to firm Q incorporated in country 1, and about US$.02 million to firm T incorporated in country 10. All these export commissions and logistics fees were likely booked as profits in locations detached from the production location, Zambia. In other words, the intra-company trade arrangements enabled the multinational to provide notional service and avoid paying any tax on an additional US$63 million.

Another notional service supplied to firm A related to management and operational support. Figure 3.5 displays subsidiaries that were paid management and operational support fees. The yearly payments to firms *C*, *M*, *N*, and *O* were extracted from the annual reports. The amounts were added on a firm-by-firm basis to establish how much each firm was paid for the supply of the management and support services. An estimated US$97 million was paid as management and operational support services

fees. Operational support fees are costs related to providing business and technical support and operations of a centralised procurement office. Out of this amount, about US$78 million was paid to firm M, incorporated in country 7, a European low tax jurisdiction, and approximately US$16 million was paid to an intermediate holding group company, firm C, for operational support costs between 2015 and 2020.

Other management and operational support fees were paid to firm N, registered in country 8, for about US$2 million, and to firm O, registered in country 9, for about US$0.4 million. Management and operational support fees are linked with legal tax avoidance, primarily because it is hard to verify their genuineness (Hearson & Brooks, 2010). Therefore, it is logical to assume that the motive behind such payments is associated with reducing tax obligations. Firm A also paid for air freight services to an affiliated entity, firm P, incorporated in country 1, estimated at US$21 million which was mainly paid in 2008 and 2009. Again, it is difficult to determine the reasonableness of these costs and if a real service was supplied. While part of these expenses may have been genuine, it is also possible that these payments were for a notional service and conduit for lowering tax obligations.

FIGURE 3.5: Schematic representation of the flow of management and operational support fees, 2008-2020



Notes.- The plot shows the flow of management and operational fees paid by firm A to other subsidiaries. Key: *Circle*: representative of individual firms. *Solid lines*: flow of intra-firm payment of management fees. *Dash lines*: flow of intra-firm payment of operational support fees. *Notation*: *A*: firm A; *M*: firm M; *C*: firm C; *N*: firm N; *O*: firm O.

As discussed earlier, Tables 3.1 and Appendix Table B.1 show that all subsidiaries are incorporated in countries with low corporate taxes compared to Zambia. The difference in corporate taxes between Zambia and some countries that supply services, such as export agency, management, and operational support (see Figures 3.4 and 3.5) and air freight is enormous. For example, the differences in corporate tax between Zambia and country 7 and country 4 are 21% and 20%, respectively. From the preceding discussion, it is apparent that the group subsidiaries located in low tax jurisdictions serve different functions that affect the taxable income of firm A. Some act as agents for marketing, selling, and distributing exports.

Although the goods do not physically go through countries where these subsidiaries are resident, they are collection centres for export commissions and logistics fees. Others are issuers of debt for which they set the interest rates and collect interest payments and margins. Likewise, others act as collection centres for management and operational support fees and air freight travel fees. Between 2008 and 2020, an estimated US$190 million was paid to subsidiaries in tax havens for export commissions and logistics fees, management and operational support services fees, and interest payments and margins. In other words, firm A may have paid this amount for notional services. These payments were treated as expenses before tax for firm A. Hence, they were deductible and paid no tax. Of this amount, approximately US$26 million was paid to firm J located in country 4 for export commissions and logistics. Most of firm A's exports to foreign markets, both affiliates and unrelated customers (mainly Africa), are routed through firm J. Given that country 4's tax rate is 20% lower than Zambia's, the group paid less tax on this amount. Similarly, firm A paid an estimated US$78 million in management and operational support fees and US$10 million in interest payments and margins to firm M located in country 7, with a difference of 23% in corporate tax rates between Zambia and country 7.

It is difficult to verify the legitimacy and reasonableness of the services and the fees paid. Moreover, the credibility of charging for notional services for low tax countries depends on the fact that these services can be effectively delivered remotely. Thus, digital communications facilitate the offshoring of various forms of support services. Essentially, the digital revolution has made it more plausible to argue that services can meaningfully be supplied from places where somebody lives and delivered digitally. In other words, the digital supply of services has made it more plausible to construct notional services and the price to charge. Similarly, the digital revolution has made it more apparent to claim that services can be delivered from countries that don't necessarily have a lot of engineering infrastructure. Therefore, it is highly likely that these payments were used to lower tax obligations for firm A while increasing the

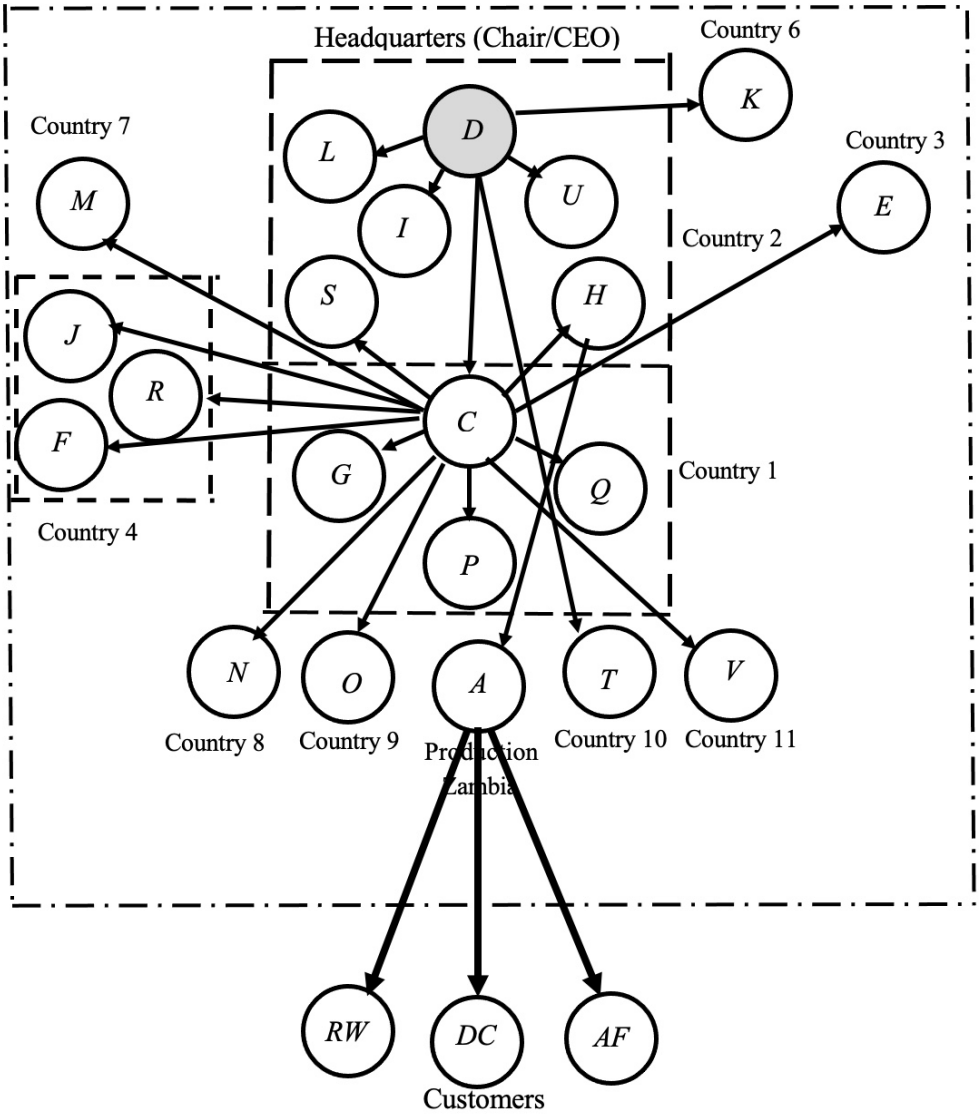
profits for the multinational, as they were either not taxed or were lowly taxed in low tax locations. This evidence further supports the use of mis-priced notional services.

3.5.4 Firm characteristics

This section discusses some firm characteristics that may facilitate tax avoidance. As illustrated earlier, firm A belongs to an extensive complex network of subsidiaries located in several countries. Figure 3.6 displays a schematic representation of the flow of coordination within the group. Taken together with Table 3.1 and Appendix Table B.1, the information illustrates the role played by each entity, their locations, and the characteristics of each country. Twenty-one entities (firm A, C, ..., V) in eleven countries (country 1, 2, 3, 4, 6, ..., 11 and the host) were involved in this flow of coordination within the internal structure. This means that some countries host more than one affiliated firm. For instance, country 2 hosts the ultimate parent company (Headquarters) and four subsidiaries, country 1 hosts the intermediate firm and three subsidiaries, and country 4 hosts three subsidiaries. The host country has the highest corporate tax rate of all the countries, meaning shifting income from the host country to any other country would lower the multinational's tax obligations. While each affiliated entity in the structure had a specific role, the evidence shows that certain subsidiaries coordinated functionally similar roles, such as firms H and J, which coordinated, marketed, and distributed firm A's exports. This duplication of functions was unnecessary and unjustifiable as it could be done by one firm if practically necessary. Alternatively, firm A could perform it. Each subsidiary that coordinated a function was paid. Some payments cannot be reasonably justified nor genuinely verified. Yet, it is highly possible that taxable income was shifted from firm A to low tax countries, thereby lowering the profit and tax obligation reported by firm A. In other words, it is highly plausible that the multinational used the multiplicity of locations of its subsidiaries to provide more opportunities for profit shifting (Contractor, 2016; Foss et al., 2019; Nebus, 2019; Cooper & Nguyen, 2020). The analysis presented here suggests that firm A may have been used by the multinational as an enabler in achieving its corporate strategy of utilising the advantages of multinationality.

The comprehensive, in-depth analysis of firm A's shareholding structure in Section 3.4 demonstrated that its corporate and finance structure was reorganised several times between 2010 and 2020. The first reorganisation occurred around seven years ago from firm E resident in country 3 to firm F domiciled in country 4. This changed from a higher tax rate of 25% in country 3 to a lower one of 15% in country 4. The implication is that any payments made to the new immediate parent firm would be taxed at a low rate. This would increase the profit for the multinational. For example,

FIGURE 3.6: Schematic representation of the flow of coordination of subsidiaries



Notes.- The plot shows the flow of coordination and direction of authority. Key: *Circle*: represents an individual decision-maker; *Dark grey Circle*: highest-ranked decision-maker (chairperson/CEO); *Thick black lines*: flow of coordinating services; the direction of the arrow indicates the line of authority; *Long Dashed Dot*: ownership boundary of the firm; *Long Dash lines*: boundary of headquarters and subsidiary location (countries 1; 2; and 4); Notation: *A*: firm A; *C*: firm C; (Intermediate holding company) *D*: firm D (Headquarters); *E*: firm E; *F*: firm F; *G*: firm G; *H*: firm H; *I*: firm I; *J*: firm J; *K*: firm K; *L*: firm L; *M*: firm M; *N*: firm N; *O*: firm O; *P*: firm P; *Q*: firm Q; *R*: firm R; *S*: firm S; *T*: firm T; *U*: firm U; and *V*: firm V; *DC*: domestic customers; *AF*: African customers; and *RW*: rest of the world customers.

it would be juicier for the new immediate company to issue loans to firm A. During this period, firm F issued loans to firm A and was paid loan repayments, interest payments, margins, and dividends. The possibility of the multinational benefiting from this reorganisation is very high. The following change was to firm G resident in country 1. This is the same home country for the intermediate company. While country 1's tax rate at 28% is higher than country 4's, still, it is higher than the host country at 35%. It was an unnecessary duplication, which tax avoidance motives may have necessitated.

Consequently, this change still led to a reduction in tax obligations for firm A and a higher profit for the multinational. The recent change to firm H domiciled in country 2 implied moving to a lower tax rate of 19% from 28%. Firm H is a holding company that coordinates and manages the marketing, sale, and distribution of exports to most countries in Africa. Again, this change provided an incentive to the multinational on the loans issued to firm A. In addition, firm H received export commissions and dividends invariably taxed at a lower rate. Despite all these changes, firm C, which owns all the different firms designated as immediate companies, remained an intermediate holding company of firm A and performed some headquarters functions. For instance, it offered operational support services for which it was paid. It also prepared consolidated financial accounts for all the operations it directly controlled. Overall, the subsidiaries designated as immediate parents were probably established as centres for reallocating profits from the host (high tax) country to low tax countries. Thus, it is highly plausible that tax avoidance drove these changes as the multinational would benefit from the tax arbitrage due to differences in corporate tax rates.

3.5.5 Discussion & implications

The evidence presented here supports the first prediction that all three tax avoidance methods are cost-effective. The firm at least used all three methods at some point, suggesting that all mechanisms are cost-effective. The second hypothesis that firms will specialise in whichever one of the methods is cheapest for them is not supported. However, the corresponding null hypothesis that firms use all three methods is accepted. There are two plausible explanations for this. The first could be that the firm used all three strategies to conceal its actions, as relying on one could be obvious and increase the chance of being detected. The second is a robustness argument. If the firm is detected on one mechanism, it can continue to use the other two as it already has experience using them. The third prediction that the form of transfer pricing used is adapted to the specific commodity or country involved is not supported. Instead, the corresponding alternative hypothesis that the methods used are the same is accepted. I don't find strong evidence of significant differences within the company. Moreover, the evidence suggests that the company is somewhat using a formulaic approach, which would fit the idea that it purchased a package from a consulting company. The firm is not applying a super-refined strategy; instead, it is just using a package that processes things routinely.

3.5.6 Implications for future research

The evidence is revelatory about the behaviour of multinationals concerning their deployment of tax avoidance mechanisms. The study has demonstrated how a seemingly good corporate citizen systematically deployed tax-motivated instruments that enabled it to avoid paying taxes successfully. The analysis indicates that case studies are a powerful tool for illuminating complex social phenomena. Also, the evidence suggests that a single case study, not necessarily a large sample of firms, can still generate robust findings. Furthermore, the study indicates that it is possible to successfully investigate a firm's tax avoidance strategies using information compiled from different sources without interviewing the firm managers.

The analysis here offers implications for future research. It is reasonable to consider that these findings can be generalised to other manufacturing firms. However, this depends on some factors. In this regard, more case study work is required to assess the generalisability of these findings. Likewise, it is possible that these conclusions could be generalisable to other sectors. Again, this is plausible provided there is either a tradable product or tradable proprietary knowledge, or both. For example, a technology-based firm that produces locally in every market can transfer price by mis-pricing access to its technology. In other words, a firm can trade in knowledge and not necessarily in a product. In this respect, headquarters as a centre of expertise can charge for headquarter services.

Moreover, the presence of essential resources that can be digitally supplied, such as bookkeeping and payment processing and the multiplicity of locations used by multinationals offer increased opportunities for profit shifting (Cooper & Nguyen, 2020; Nebus, 2019). And recently, there has been a rise in the digital economy, making the effective use of highly mobile intangible assets more common (Ting & Gray, 2019). This suggests that overpricing notional services from low tax countries is advantageous when relying on digital services.

Another consideration concerns the genuineness of loans. It is plausible that a firm can use internal loans to avoid tax. This is because legitimate loans can be created to increase physical capital and infrastructure in a host country. Thus, it is easier to include fabricated ones when there are genuine loans. However, if there is no conceivable reason for a host country to contract a loan, it is problematic to invent phantom loans when there is no genuine reason for such. It is easy to include a few fake loans when there are already outstanding real loans, hoping this goes unnoticed. It is conventional wisdom and common knowledge that poorer countries which typically have higher tax rates are natural, easy targets in the eyes of multinationals for

mis-pricing of internal loans. This is because capital-rich countries where MNEs' headquarters are based supply loans to poorer countries with undeveloped capital markets.

Finally, the suggested case studies should be developed and applied in various settings. They should be undertaken with specific intentions and designed to meet the qualifications mentioned above. A critical parameter for the case studies should be the presence of a transferrable resource. Suffice it to state that most multinationals own transferrable resources.

3.6 Conclusion

This essay investigated the use of tax avoidance instruments by large multinational enterprises (MNEs), using a case study of a Europe headquartered MNE manufacturing in Zambia. This detailed study synthesizes information from multiple sources. International business theory identifies three key tax avoidance mechanisms: transfer pricing, mis-pricing of internal loans, and overcharging for internal management services. Drawing on a single case study, the study finds that the firm used all three mechanisms from 2008 to 2020. While the evidence may be subject to multiple interpretations, it is possible that specific patterns enabled the firm to systematically lower group tax obligations by shifting taxable income to low tax jurisdictions. The evidence suggests that the firm may have avoided paying tax on approximately US$607 million. As the proportion of total non-mining export earnings reported at US$24,726 million in the balance of payments, the loss in taxable income translates to about 3%. It also represents approximately 17% of the total non-mining corporate tax estimated at US$3,688 million collected during the period. In Zambia, this amount is enormous. The potential tax loss on this income may almost never be fully compensated with the firm's payments in personal income tax and CSR.

These findings provide a fair understanding of the association between a multinational group's complexity and internal mis-pricing. But this story is essentially partial. It is plausible that these patterns may have been going on for longer than the period covered in this study and after that. However, it is difficult to quantify the full magnitude of these practices because of the secrecy shrouding these transactions and the additional layers of secrecy associated with low tax jurisdictions (Finér & Ylönen, 2017). For instance, it was not possible to obtain financial accounts of the holding companies. A review of the accessible consolidated financial statements of the intermediate company, which owns the other holding companies, revealed that the financial information for holding companies and non-national subsidiaries are

aggregated at the "group operations" level. The reduced transparency is potentially a strategy to hide the group's tax-avoidance undertakings (Akamah et al., 2018), which is in sync with Hope et al. (2013), who found that financial reporting behaviour was associated with firms' tax-avoidance behaviour.

The non-disclosure of this information means that the estimates of the potential loss of taxable income to the host country rely on the annual financial reports of the host country subsidiary. For example, the estimates of mis-pricing of traded products are made on the assumption that the unit value of the goods exported was priced at the same market value as the goods supplied domestically. However, relying on the firm's information has its challenges, as it is difficult to verify whether there is complete information disclosure. In this regard, it is possible that these estimates are underestimated and could easily increase if the export prices were higher than what is projected, which is logical and not far-fetched. Conversely, the opposite may also be correct, although highly unlikely. These limitations require further investigations to determine the full extent of the loss to the host country due to intra-firm transactions. Another area for potential study is to determine the extent of transfer pricing. This essay's estimation of transfer pricing does not use actual price data between Zambia and the trading partners. Future research could use actual price data to establish the extent of this practice.

Notwithstanding, the evidence in this study has provided insights into the tax avoidance arrangements deployed by large multinationals. The case company is a classic example of a subsidiary of a group with complex layers of corporate and finance structures, which has adopted higher organisational practices that have enabled it to shift profits more efficiently across tax jurisdictions. Subsequently, lowering its actual taxable income in a host country where production occurs. It is concerning that the case company aggressively avoided paying its fair share of taxes while at the same time increasing its profits by transferring them to low tax countries. These profits were untaxed as they were out of reach from the Zambian tax authorities. As a result, the country was deprived of resources to provide vital public services and infrastructure such as hospitals, schools, and roads. In a country with poverty levels above 50%,[4] the effect of the loss of tax implied that the government held back the fight against poverty. This may have occurred by either cutting budgets for social services or higher tax rates on poorer people to collect more revenue to make up for the shortfall. In both cases, the poor citizens were the losers. In other words, Zambia's poor people were exploited while the multinational company and its wealthy shareholders got richer (Akamah et al., 2018). Surprisingly, the case firm is regarded as a good corporate citizen. It

[4] Accessed from the World Bank website on 29 March 2022 [External link].

is plausible that the evidence described in this essay mirror a broader phenomenon among large multinationals operating in developing countries. However, more case study work is required to assess the generalisability of these findings.

This case study raises a policy issue regarding privatisation vis-à-vis curbing the outflow of taxable incomes. If the company had remained state owned, some of the taxable profits allocated to other jurisdictions might have been retained domestically, increasing the taxable income. This could be a case where the privatisation policy of Zambia in recent decades driven by the IMF and the World Bank may have been unsuccessful.

Chapter 4

Do natural resources and FDI tend to erode or support the development of national institutions?

Note: A version of this essay has been submitted for consideration to be published in The World Economy in February 2022. The working paper version of ths essay has been published as the University of Reading Department of Economics Discussion Paper Series No. 2022-02. The essay is also publicly available at RePEc: https://ideas.repec.org/p/rdg/emxxdp/em-dp2022-02.html. This research was co-authored with Carl Singleton, who is Head of Department in the Departments of Economics (from August 2022) and an Associate Professor in Economics at the University of Reading; c.a.singleton@reading.ac.uk. Carl has agreed that this essay can appear within this thesis and that it represents a significant contribution on my part. This essay was presented at the University of Reading Department of Economics PhD Seminar Series and the Scottish Economic Society (SES) 2022 Annual Conference (April 2022). A version may appear on the scientific programme of the SES. In addition to those already acknowledged, we are grateful to Kaelo Mpho Ntwaepelo for her helpful comments.

4.1 Introduction

A growing literature suggests that natural resources can be more of a curse than a blessing for some countries. Generally, countries with abundant natural resources are also among the poorest and slowest growing (e.g., Sachs & Warner, 1995). However, not all resource-rich economies are necessarily affected in this way (Butkiewicz &

Yanikkaya, 2010; Mehlum et al., 2006b); the curse is more likely to be felt by countries with poor institutions – the "rules of the game in a society or, more formally, ... the humanly devised constraints that shape human interaction" (North, 1990, p. 3).[1] It has been argued that natural resource owners can especially take advantage of weak institutions and trade openness to disadvantage the growth of other sectors (e.g., Bulte et al., 2005; Butkiewicz & Yanikkaya, 2010; Torvik, 2002).

Weak institutions are potentially responsible for a number of economic challenges in developing countries, such as slow productivity growth, reduced investment, and reduced per capita income (Jude & Levieuge, 2017). The institutions of a host country can affect a firm's profitability through the costs of doing business (North, 1990). This would imply that institutions are a key determinant of the location and investment choices of multinational enterprises (MNEs) (Kinoshita & Campos, 2003). One conjecture would be that the firms already in situ and able to extract monopoly rents may prefer particular institutions to be weak. For example, corruption can create barriers to entry for new investors by increasing the costs attached to foreign direct investment (FDI) (Bénassy-Quéré et al., 2007; Wei, 2000). However, estimating the causal relationship between institutions and FDI is difficult because it operates in both ways. A growing body of published work provides evidence that sound institutions of host countries encourage inward FDI flows (e.g., Alfaro et al., 2008; Ali et al., 2010; Beazer & Blake, 2018; Benáček et al., 2014). Thus, using least squares estimators would bias the results. We, therefore, use the system generalized method of moments (GMM) to correct the bias by eliminating time- and country-specific effects, instrumenting the lagged differences and levels of endogenous variables, including FDI.

Several researchers have empirically explored the theory of a resource curse and the mechanism of institutional development. For instance, Demir (2016), De Rosa & Iootty (2012), and Mehlum et al. (2006a,b) all found that natural resources play a role in the development of institutions. Most countries with abundant resources are popular destinations for FDI, but their growth is nonetheless sluggish compared to countries with more limited natural resources (e.g., Sachs & Warner, 1995, 1999). Demir (2016) tested whether this interaction between FDI flows and natural resources tended to affect institutions, finding that FDI flows from developed countries to natural

[1] Institutions are referred to differently throughout the related literature. For instance, in Persson (2005) they are called *social infrastructure*, in Hall & Jones (1999) they are referred to as *structural policies*, while in Rodrik et al. (2004) the concept used is *institutions*, and in Acemoglu et al. (2005) they are referred to as *economic institutions*. In this work, we use the general term institutions in the same manner as Rodrik et al. (2004).

resource rich developing countries tended to improve institutions, while FDI flows between developing countries harmed institutional development.

Central to these issues is the fact that most resource-rich countries are dependent on a single sector or resource, which is also the dominant destination for FDI (Poelhekke & van der Ploeg, 2013). We suppose that firms operating in an economically important or intrinsic sector can exert the sort of societal power that is more commonly connected with sovereign states (Finér & Ylönen, 2017). The MNEs or very large local or state-backed enterprises that tend to make up such sectors can undermine the prevailing quality of domestic institutions, and any prospects of improving them, through lobbying and exerting undue pressure on policy makers in government (Long et al., 2015). This can be done through political elites and influential non-state actors, who advocate or criticise policies deemed to affect the profitability of the enterprises. For instance, there are several cases on the United States Department of Justice's website revealing that a number of European MNEs have been found guilty of engaging in corrupt practices in global South countries. A typical example is the case of a multinational financial services firm, Deutsche Bank Aktiengesellschaft (Deutsche Bank), headquartered in Frankfurt, Germany, agreeing to pay the United States $130 million for falsifying records to conceal bribes and other corrupt payments that were made to third-party intermediaries, as well as concerning a commodities scheme.[2]

In this essay, we empirically re-examine these viewpoints and relationships using a dataset of 69 countries over the period 1970–2015. First, we find negative and significant effects of natural resource use or extraction on the development of national institutions, focusing especially on legal and property rights. This aligns with a theory that abundant natural resources lead to the weakening of institutions because of greater potential for firms to invest in actions that help to secure and capitalise on monopoly rents. Second, we find no effect of net FDI inflows on institutions after conditioning on natural resource abundance, which suggests that the latter tends to result in eroded institutions regardless of whether the resources are exploited through increased foreign investment into the local economy. Third, we find that well-known national measures of government size, freedom to trade internationally, regulation, political stability, and the absence of violence and terrorism, all appear to respond negatively to an increased share of natural resources in a country's output.

We contribute to the existing literature in two main ways. First, we provide new evidence on the average relationships across countries between natural resources, FDI,

[2]A press release issued by the United States Department of Justice on Friday, January 8, 2021: "Deutsche Bank Agrees to Pay over $130 Million to Resolve Foreign Corrupt Practices Act and Fraud Case"; [External link].

and institutions, which could be helpful for future policy formulation in resource-rich developing countries. For instance, our results suggest that policymakers whose objectives include strengthening domestic institutions should be wary (and possibly renew their resolve) when their countries develop new opportunities to extract natural resources rent. We also provide empirical evidence of the effects of the dominant natural resource sector on institutions across countries. We selected these countries for the following reasons. They have abundant natural resources but are arguably among the poorest and slowest growing (e.g., Sachs & Warner, 1995). And it has been suggested that the most affected are those with poor institutions. Thus, the sample enables us to test our theoretical hypotheses. We also provide empirical evidence of the effect of the dominant natural resource sector on institutions across countries. Second, we provide new evidence on the impact of FDI inflows on institutional development controlling for natural resource rents. This suggests that the latter tend to erode institutions regardless of whether those resources are exploited alongside increased foreign investment into the local economy.

The remainder of the essay is organised as follows: Section 4.2 highlights some relevant literature; Section 4.3 discusses our dataset; Section 4.4 presents the estimation methodology and results; and Section 4.5 concludes.

4.2 Relevant Literature

In this section, we review the main results from previous empirical research on the relationships between FDI, natural resources, and institutional development. Table 4.1 provides a summary of some studies closely related to this one, in the order that they are described in the text below. For each study, the table highlights the authors, sample sizes and time periods covered, the institutional factors considered and their data sources, the main methodological approaches, and the key results.

4.2.1 FDI and Institutions

The relationship between FDI and institutions has received considerable attention by scholars (e.g., Alfaro et al., 2008; Ali et al., 2010; Asiedu, 2006; Benáček et al., 2014; Bénassy-Quéré et al., 2007; Bevan et al., 2004; Brunnschweiler & Bulte, 2008; Buchanan et al., 2012; Gastanaga et al., 1998; Jensen, 2003; Kinoshita & Campos, 2003; Rygh et al., 2022; Yu & Walsh, 2010). However, most of the literature examining this relationship has focused on the direction of causality going from the institutions of destination countries to FDI. This is on the premise that good institutions are a predictor of FDI inflows. Our study is interested in exploring the reverse causality,

that is, the effect of FDI on the institutions in recipient countries. The motivation for exploring this reverse causality is that foreign investors are an important vehicle for facilitating institutional reforms (Libman, 2006). In recent years, there has been an increasing amount of literature, albeit comparatively low in overall volume, exploring the dynamics of this other potential direction of the relationship. Most of these studies have focused on individual institutional factors, such as corruption, democracy, government effectiveness, labour rights, political institutions, property rights, and tax rates.

When investigating the impact of FDI on corruption, Larraín & Tavares (2004) and Kwok & Tadesse (2006) both found similar results despite applying somewhat different methodological approaches. Larraín & Tavares (2004) found that FDI is a robust determinant of corruption, with higher FDI inflows linked to lower corruption levels in the host country. They used ordinary least squares (OLS) and instrumental variables (IV) estimators for data covering the period 1970-1994, averaged into five-year periods for a broad cross section of countries. Likewise, Kwok & Tadesse (2006) looked at a cross-country sample of 140 countries for the period 1970-2004, using a multivariate empirical model and finding that FDI generally leads to lower levels of corruption. Kwok & Tadesse attempted to address the endogeneity problem from potential reverse causality in several ways, including regressing corruption on lagged FDI values, exploring the interaction effects of FDI with other variables, and employing an IV estimation approach.

Looking at a different institutional measure, Li & Reuveny (2003) assessed the effects of globalisation on the level of democracy for 127 countries covering the period 1970-1996, using a pooled time-series cross-sectional statistical model. They found that FDI flows have a positive and significant association with democracy, but this weakened over the sample period. For a smaller sample of 19 Organisation for Economic Co-operation and Development (OECD) countries covering the period 1981-2001, Garretsen & Peeters (2007) investigated the impact of FDI on corporate tax rates. Using a pooled two-stage least squares (2SLS) estimator, they found that FDI flows lead to lower corporate tax rates. Specifically, they found that the effective corporate tax rate decreased by 0.5% in response to a 1% increase in FDI flows. This result was confirmed by Long et al. (2015), who provided firm-level evidence suggesting that the presence of FDI was positively associated with lower levels of tax and fee burdens in the host regions of China. Long et al. established that a 100% rise in the FDI level led to 4.0% drop in the tax rate applicable to domestic firms. They also estimated that the number of fee items that firms paid to different governments dropped significantly in response to an increased level of FDI inflows.

TABLE 4.1: Summary of related studies on the effects of FDI and natural resources on institutions

Authors	Sample and period	Institutional factors considered	Data sources	Methodological approach and key results
Larraín & Tavares (2004)	20 largest countries in 1990, 1970-1994	Corruption	ICRG[1] and Mauro (1998)	Instrumental Variables (IV) approach. FDI is significantly associated with lower corruption levels.
Kwok & Tadesse (2006)	140 countries, 1970-2004	CPI[2]	Transparency International	"Multivariate empirical models". FDI leads to lower corruption.
Pinto & Zhu (2016)	95 countries, 2000-2004	CPI[2]	Transparency International	Two-stage least squares (2SLS). FDI is linked with increased corruption levels in less developed countries, but the opposite in developed countries.
Li & Reuveny (2003)	127 countries, 1970-1996	Democracy	Polity III data	Estimates "pooled time-series cross-sectional" models. FDI inflows have a positive and significant effect on democracy, but this weakens over time.
Garretsen & Peeters (2007)	19 OECD countries, 1981-2001	Corporate taxes	Devereux et al. (2002)	Pooled 2SLS estimator. FDI flows lead to lower corporate tax rates.
Mosley & Uno (2007)	90 developing countries, 1986-2002	Labor rights	DoS, ILO and ICFTU[3]	Follows Beck & Katz (1995), using OLS with panel-corrected standard errors. FDI is associated with better collective labor rights.
Ali et al. (2011)	70 developing countries, 1981-2005	Property rights	Cal. from ICRG Data[4]	Cross-sectional analysis of La Porta et al. (1999) Beck et al. (2003) and Levine (2005), using OLS, random effects (RE), fixed effects (FE), and system GMM. FDI inflows have a positive and significant effect on property rights.
Fon et al. (2021)	56 countries, 2003-2015	average of WGIs	Cal. from World Bank	Follows Demir (2016) and Long et al. (2015), using OLS and FEs estimator. No significant effect of bilateral greenfield FDI inflows on institutional quality, but aggregate inward FDI has a significant positive impact.

Notes.- [1] ICRG stands for International Country Risk Guide constructed by Political Risk Services (PRS). [2] CPI stands for Corruption Perception Index. [3] The data is collected from the United States Department of State's Annual Reports on Human Rights Practices; the International Labor Organization (ILO) Committee of Experts on the Applications of Conventions and Recommendations, and Committee on Freedom of Association reports; and the International Confederation of Free Trade Unions (ICFTU) Annual Survey of Violations of Trade Union Rights. [4] The index is calculated from the ICRG.

TABLE 4.1: Summary of related studies on the effects of FDI and natural resources on institutions (cont.)

Authors	Sample and period	Institutional factors considered	Data sources	Methodological approach and key results
Di Tella & Ades (1999)	52 countries, 1980-1983; 31 countries, 1989-1990	Corruption	BI, EIU & EMF Foundation[5]	OLS and FE estimates. A positive and significant effect of natural resources (fuel and minerals) on corruption.
Brunnschweiler & Bulte (2008)	60 countries, 1970–1994	Political institutions	Beck et al. (2001)	Follows Bulte et al. (2005) and Isham et al. (2005), using 2SLS and three-stage least squares (3SLS) regressions. Institutional quality is positively affected by resource abundance. The data on institutions is supplemented with Persson & Tabellini (2004).
De Rosa & Iootty (2012)	110 countries, 1996-2010	WGIs & GCI	World Bank and WEF[6]	Pooled OLS, FEs and system GMM. A high degree of dependence on natural resources leads to worse government effectiveness and lower levels of competition across the economy.
Demir (2016)	134 countries, 1990-2009	Latitude	Cal. from ICRG data[7]	FE estimates. FDI flows have a negative and significant effect on host country institutions. Natural resources have a negative effect on institutions.
Feulefack & Ngassam (2020)	5 Africa countries, 1996-2017	WGIs	World Bank	Follows Dumitrescu & Hurlin (2012), causality tests and a pooled mean group (PMG) approach. Resource abundance weakens institutions.
Pan et al. (2020)	63 countries, 2003-2016	WGIs	World Bank	Uses FEs and difference GMM. FDI improves the quality of institutions (rule of law and regulatory quality) in the host countries.

Notes.- [5] The data on corruption is from two different sources – the Business International Corporation (BI), a private company which is now incorporated into The Economist Intelligence Unit (EIU) and the second source is from the Geneva based EMF Foundation's publication, the World Competitiveness Report (WCR). [6] The Worldwide Governance Indicators (WGI) are compiled by the World Bank and the Global Competitiveness Index (GCI) is compiled by the World Economic Forum (WEF). [7] The study uses the ICRG political risk rating constructed by PRS as proxy for all the different aspects of institutional development.

Using property rights as a measure of institutional development, Ali et al. (2011) tested the effects of FDI on institutions within a panel dataset of 70 developing countries for the period 1981–2005, using an array of estimation methods. Ali et al. lagged all potentially endogenous variables in their dynamic panel models by one period, or 5 years, and used system generalized method of moments (GMM) estimation. Their results provided evidence that FDI tends to have a robust positive effect on property rights, while varying control variables and estimation methods across different model specifications. Ali et al. (2011) concluded that their findings were consistent with foreign investors having the incentive to influence institutional development when experiencing poor property rights and a poor business environment. In a study specifically focused on workers' rights, Mosley & Uno (2007) investigated the impact of FDI on this more particular measure of institutions in 90 developing countries, for the period 1986-2002, using OLS estimation and panel-corrected standard errors. They found that FDI was positively and significantly associated with the rights of workers, but increased trade competition tended to have the opposite effect. Fon et al. (2021) explored the effect of bilateral FDI inflows from advanced and developing countries on the level of institutional quality for 59 countries covering the period 2003-2015, using OLS and fixed effects estimator. They used an aggregate institutional measure calculated from the six World Bank's WGIs instead of a single institutional measure. They found that bilateral greenfield FDI inflows from developed and developing countries had no significant effect on institutional quality. In contrast, aggregate FDI from advanced and developing countries had a significant positive impact on the institutional quality of the host countries.

In all the studies discussed thus far, across the use of different model specifications, different dimensions and measures of institutions, different samples of countries, and different estimation periods, FDI was recognised as having a positive effect on institutions. In contrast, Demir (2016) suggested that high FDI flows could weaken institutions by expanding the pool of funds available for bribery. This was similarly argued by Pinto & Zhu (2016), who explored the effect of FDI on corruption. Using a 2SLS estimator on a sample of 95 countries, covering the period 2000-2004, they found that FDI is linked with increased corruption levels in less developed countries. Moreover, the relationship between institutions and FDI may not be straightforward. There are some methodological challenges when attempting to model and empirically estimate the impacts of FDI on institutions. Institutions persist, such that past levels and development strongly influence current levels (North, 1990). Reverse causality is one potential source of endogeneity, whereby FDI flows and the institutions of a host country may influence each other. To address this, Ali et al. (2011), used an IV approach and lagged the dependent variable, in a dynamic panel setting with system

GMM estimators, which we will also do in our own analysis. Including the lag of the dependant variable in the model helps to capture the persistence of institutions (Acemoglu et al., 2008; Pan et al., 2020).

There are several channels through which FDI can influence the strength of national institutions in host countries. As discussed above and demonstrated by Mosley & Uno (2007) concerning labour rights, FDI may have different effects. For instance, MNEs may share with policymakers in host countries knowledge of the institutions in other countries where they operate. If the host country is receptive to the transfer of knowledge and best practices, domestic institutions could be strengthened (Fon et al., 2021. Alternatively, MNEs could threaten to divest and relocate their operations to other jurisdictions with favourable institutions to coerce policymakers in host countries into implementing institutional reforms. The fear to forego benefits that are associated with FDI, such as tax revenues and jobs for citizens could force host governments to implement favourable reforms to enhance institutional quality Fon et al. (2021); Olarreaga (1999). Given the above discussion, we formulate the following hypothesis:

H1. *FDI positively affects the quality of national institutions in host countries.*

4.2.2 Natural resources and institutions

There is a growing literature examining the effects of natural resource dependence on institutions (e.g., Brunnschweiler & Bulte, 2008; Demir, 2016; De Rosa & Iootty, 2012; Di Tella & Ades, 1999; Feulefack & Ngassam, 2020; Pan et al., 2020). Alonso & Garcimartín (2013) have argued that natural resource richness may affect institutions through facilitating rent-seeking behaviour and the switching of tax revenues for less transparent revenue sources associated with minimal accountability. This is supported by Di Tella & Ades (1999), who investigated the proposition that the level of corruption in an economy is generally determined by the level of rents. Based on varying cross-country samples covering the period 1980-1990, they found that higher corruption levels tend to exist in countries where firms enjoy higher rents.

De Rosa & Iootty (2012) explored whether natural resource dependence poses a negative influence on various factors of institutional strength. They tested this over 110 countries in the period 1996-2010, finding that resource dependence leads to poor government effectiveness, coupled with lower competition levels within a country. This was supported by Demir (2016), who examined the effects of FDI flows on bilateral gaps in institutional development across countries and whether such effects were dependent on the direction of the flows. Demir confirmed the presence of a natural resource curse. From studying five African countries over the period

1996-2017, Feulefack & Ngassam (2020) also found that "in the presence of abundant resources, the quality of institutions shatters" (Feulefack & Ngassam, 2020, p. 148).

Although the studies mentioned above and conventional wisdom predict negative effects of natural resource abundance on institutions, there are other studies that predict otherwise. For instance, through a sample of 60 countries for the period 1970-2000, Brunnschweiler & Bulte (2008) showed that institutional quality is positively affected by resource abundance. Brunnschweiler & Bulte used geographic latitude as an instrument for institutional quality, under the assumption that a country's latitude has a zero direct effect on its economic performance, and any observed effects of latitude only arise through institutions (see also Hall & Jones, 1999). Pan et al. (2020) also found positive effects of natural resource abundance on institutions within a sample of 63 countries for the period 2003-2016, using fixed effects and difference GMM estimators. Pan et al. further found that FDI from China tended to improve the rule of law and regulatory quality in a recipient country. However, this study may have suffered from a methodological weakness associated with difference GMM (see for example Baum, 2006. We address this by adopting a system GMM estimator. Our study also looks not only at the WGI measures of institutions but also those compiled by the Fraser Institute.

As discussed above, the effects of natural resource dependence on the quality of institutions (i.e., natural resource curse) have been widely researched (De Rosa & Iootty, 2012). The conjecture is that rents flow easily from natural resource exports which could lead to a rentier state, leaving the government with no incentive to improve its institutional quality (Demir, 2016). From the above, we present the following hypothesis:

H2. *Natural resources negatively affect the quality of national institutions in host countries.*

4.2.3 Summary

The studies reviewed in Table 4.1 have used several estimation techniques to investigate the potential relationships between FDI, natural resources and institutions. Similarly, those studies have used different measures of institutions, different data sources, and different samples of countries and time periods. Like most of the the studies discussed above that have focused on individual institutional factors, we will mainly focus on testing whether a single measure of institutional development, property rights, tends to be affected by FDI and natural resources use or extraction. However, we will also broaden our analysis and present model estimates using several

other institutional factors as dependent variables. In this way, we will add comparable evidence over a range of institutional factors, using the same methodological approach, the same sample of countries, and the same sample period. We will also address the concern that focusing on only one institutional factor, with the measure of this factor collected from a single data source, could lead to selective conclusions about the general relationships between FDI, natural resources, and institutional development. Our study is most closely related to Ali et al. (2011). Compared with their study, we slightly modify the sample of countries, extend the sample period, study multiple institutional measures as the dependent variables, and test the role of natural resources abundance in institutional development.

4.3 Data

In this section, we describe the key variables of our empirical analysis and the creation of the estimation sample. Our choice of variables is guided by the existing literature on the determinants of institutions. The variables included are selected in line with the different theories that can explain determinants of institutions, namely: economic, political, and cultural (Ali et al., 2011; La Porta et al., 1999) and endowments (Brunnschweiler & Bulte, 2008; Levine, 2005). Descriptions of all the variables and the countries included in our sample are provided in Appendix Tables C.1 and C.2. We arrived at our final estimation of 69 developing countries over the period 1975-2015 based on the availability of data for our three main variables: FDI flows, natural resource rents, and institutional factors.[3] In addition, these countries were selected for the following reasons. They have abundant natural resources but are arguably among the poorest and slowest growing (e.g., Sachs & Warner, 1995). And it has been suggested that most affected countries have poor institutions. Thus, the sample enables us to test our theoretical hypothesis.

We obtained the aggregate net FDI inflows data from the World Bank, World Development Indicators database, covering the period 1970-2015.[4] The FDI data are expressed as a percentage of GDP to account for country size (Ali et al., 2010). Our choice of FDI measure is based on the argument that net FDI inflows capture the degree of change in FDI in developing countries, which mounts pressure on host governments to better institutions (Ali et al., 2011). We obtained data on GDP per capita and total natural resource rents from the same source.[5] GDP per capita is expressed in

[3]We restricted our sample selection to developing countries with at least data for the key variables: FDI flows, natural resource rents, and institutional factors in every study period. The list of developing countries was accessed from the United Nations website on 30 April 2021; [External link].

[4]Accessed from the World Bank website on 25 April 2021; [External link].

[5]Accessed from the World Bank website on 25 April 2021; [External link].

current United States dollars and natural resource rents are measured as percentages of domestic GDP.

The main data on institutional factors are obtained from the Fraser Institute.[6] These components collectively are summarised into a composite index, of which the key ingredients are freedom of choice, the protection of private property, and the autonomy of the individual (Gwartney et al., 1996; Gwartney & Lawson, 2003), with sub-parts measuring the following:[7]

(i) Legal system and the security of property rights — a government's function of protecting persons and private property rightfully acquired. This indicator is associated with sub-components such as impartiality of courts, judicial independence, military interference in the rule of law and politics, the protection of property rights, legal enforcement of contracts, the integrity of the legal system, and reliability of police. A higher value implies greater protection of private property.

(ii) Size of government — reflects how countries depend on the government to distribute resources, goods, and services. It includes indicators such as tax rates, transfers and subsidies, government consumption, and government enterprises and investment. A higher score means that the government is effective in distributing resources, goods, and services.

(iii) Sound money — includes components such as money growth, freedom to own foreign currency bank accounts, and inflation.

(iv) Freedom to trade internationally — designed to measure a wide variety of limitations that affect international exchange. It includes components such as tariffs, regulatory trade barriers, black-market exchange rates, and controls of the movement of capital and people. A higher value indicates higher freedom to trade internationally.

(v) Regulation — focuses on regulatory limitations that restrain the freedom of exchange in labour, credit, bureaucracy costs, and product markets.

Despite concerns about data measurement and validity that may be associated with the Fraser Institute dataset, it is widely used (e.g., Ali et al., 2010; Berggren & Jordahl, 2005; Dawson, 1998; Gwartney et al., 1999, 2006; Norton, 2003), and we contend that

[6] Accessed from the Fraser Institute website on 2 May 2021; [External link].

[7] The Fraser Institute data is available in 5 year intervals from 1970, 1975, 1980, ..., 2000, and annually thereafter through to 2015.

it is both a useful and generally robust source, as others have also argued (e.g., De Haan et al., 2006). Nonetheless, we also collected data for World Governance Indicators (WGI) from the World Bank, covering the narrower available period of 1996-2016.[8] The WGI comprise six composite measures of different dimensions of governance (Kaufmann et al., 2005, 2010):

(i) Control of corruption — summarises perceptions of the extent to which public power is applied for private gain, including all forms of corruption, and state "capture" by private interests and elites.

(ii) Rule of law — measures perceptions of the extent to which agents have trust in and follow the rules of society, particularly, the police, property rights, the quality of contract enforcement, and the courts, as well as the possibility of violence and crime.

(iii) Government effectiveness — captures perceptions of the quality of the civil service, quality of public services and the level of its independence from political influence, the degree of policy formulation and implementation, and the integrity of the government's commitment to such policies.

(iv) Regulatory quality — measures perceptions of the capacity of the government to formulate and implement sound policies and regulations that allow and encourage private sector development.

(v) Political stability and absence of violence/terrorism — measures perceptions of the possibility of political instability and/or politically induced violence, including terrorism.

(vi) Voice and accountability — captures perceptions of the extent to which a country's citizens can participate in electing their government, including freedom of association, freedom of expression, and a free media.

4.3.1 Descriptive statistics

Our analysis will look at the institutional development within countries over the period 1975–2015, using some lagged values of variables when estimating our models. Like Barro (1999) and Glaeser et al. (2004), we will focus on 5-year periods, dropping the observations for years that are not multiples of five or ten, and thus we will not be concerned with very short-run dynamics.

[8] Accessed from the World Bank website on 15 September 2021; [External link].

Summary statistics of the main variables used in our analysis are reported in Table 4.2. Our main estimation sample will contain 558 country-year observations, but this sample size will be reduced when we consider sub-categories of natural resource rents and particular measures of institutions, due to small numbers of missing values. We list the variables in Table 4.2 as used in our model estimations, including the variables that are lagged by 5-years. Since our models will later be estimating the dynamic effects of FDI and natural resource use or extraction on institutional development within countries, we also present in Table 4.2 the descriptive statistics of 5-year changes for all variables, providing a reference point for the amount of variation that countries tend to experience in these variables over 5-year periods.

TABLE 4.2: Descriptive statistics, all years and countries in the estimation sample, 1975-2015

	Obs.	Std.Dev.	Mean	Min.	Medium	Max.
GDP per capita (US$000s)	558	3.04	5.41	0.10	1.25	55.65
5-year change GDP per capita	558	1.67	0.70	-2.60	0.25	17.28
Economic growth (5-year, %)	558	0.27	0.38	-1.09	0.26	1.80
5-year change economic growth	509	0.56	-0.06	-1.83	-0.06	2.39
Net FDI (% of GDP)	558	2.65	4.80	-4.09	1.37	58.52
5-year change net FDI	556	3.58	0.50	-18.50	0.10	36.77
Lag nat. res. (total % of GDP)	558	8.06	9.81	0.00	4.14	56.94
5-year change nat. res.	558	6.05	0.06	-35.72	0.00	33.75
Lag coal rents (% of GDP)	493	0.12	0.49	0.00	0.00	6.09
5-year change coal rents	493	0.27	-0.01	-3.30	0.00	2.71
Lag forest rents (% of GDP)	558	2.65	4.43	0.00	0.79	44.60
5-year change forest rents	558	3.24	-0.03	-35.66	-0.01	33.92
Lag gas rents (% of GDP)	520	0.16	0.53	0.00	0.00	6.65
5-year change gas rents	520	0.36	0.06	-1.87	0.00	5.50
Lag mineral rents (% of GDP)	558	1.42	3.63	0.00	0.08	35.20
5-year change mineral rents	558	2.20	0.00	-25.30	0.00	11.44
Lag oil rents (% of GDP)	522	4.00	8.68	0.00	0.01	53.21
5-year change oil rents	522	4.89	0.03	-28.56	0.00	28.91
Lag freedom to trade	541	5.45	2.12	0.00	5.69	9.97
5-year change freedom to trade	537	1.36	0.28	-6.20	0.15	5.18
Lag government size	558	6.47	1.43	1.46	6.60	9.46
5-year change government size	558	1.00	0.09	-3.65	0.07	3.63
Property rights	558	1.23	4.45	1.71	4.38	8.04
Lag property rights	558	1.24	4.38	1.71	4.29	8.04
5-year change Property rights	558	0.47	0.08	-1.45	0.02	2.78
Lag sound money	558	6.43	2.17	0.00	6.60	9.79
5-year change sound money	558	1.64	0.20	-5.98	0.15	6.50
Lag regulation	541	5.78	1.20	2.94	5.71	9.43
5-year change in regulation	540	0.64	0.19	-2.18	0.13	3.27

Notes.- The data were compiled from the World Bank, World Development Indicators, The Fraser Institute and Authors' calculations. Observations for each country are all separated by 5 years, i.e., 1970 (for lagged values), 1975, 1980, . . . , 2010, 2015.

One of our key independent variables is net FDI inflows measured as a percentage of GDP, which is substantially different across countries. The median extent of net FDI

inflows in the analysis dataset is 1.4%, and the standard deviation is 2.7 percentage points (ppts). The median 5-year change in net FDI inflows is 0.1 ppts of GDP, while the standard deviation is 3.6 ppts. Our other key independent variable is natural resource abundance. As its proxy, we use total natural resource rents as a percentage of GDP. We will lag this variable in our models by 5 years, or one period, to account for delayed effects. The maximum lagged value of total natural resource rents as a percentage of GDP is 56.9% (Republic of Congo in 2000), the median is 4.1%, and the standard deviation is 8.1%. The maximum 5-year change in natural resources rents is 33.8 ppts of GDP (Uganda in 1985), with a median of 0.0 and a standard deviation of 6.1 ppts. Our key dependant variable serving as a proxy of institutional quality is the Fraser Institute's index of a country's legal system and property rights (henceforth referred to only as 'property rights'). The maximum level of this index in the estimation sample, over the period 1975-2015, is 8.0 (Singapore in 2000), with a median of 4.4 and a standard deviation of 1.2.

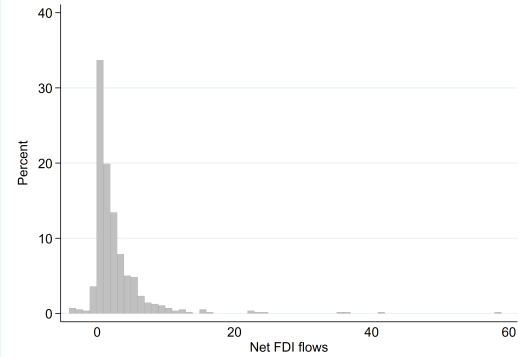
To demonstrate the variation in the key variables, Figure 4.1 shows histograms of the empirical distribution of levels and 5-year changes in net FDI inflows, natural resource rents, and the property rights index. Each histogram pools all 69 countries and years, transformed into 5-year intervals, representing our main estimation sample. Figure 4.1(a) shows the distribution of pooled net FDI inflows for all countries for the period 1975-2015. The peak is concentrated around the 0-2% range, with the majority of countries in the sample and period having reported positive net FDI inflows. Figure 4.1(b) shows that the peak in 5-year changes of pooled net FDI inflows is concentrated around zero. Nonetheless, the majority of countries recorded a positive change in net FDI inflows for the 5-year periods in the sample.

Figure 4.1(c) shows that a nontrivial number of countries and periods in the estimation sample reflected large shares of natural resource rents in GDP. However, Figure 4.1(d) shows that about half of the country-years in the sample had relatively small 5-year changes of $\leq \pm 3\%$ in the contribution of natural resource rents to GDP. Figure 4.1(e) displays the pooled property rights levels for all 69 countries for the period 1975-2015, but, more importantly, Figure 4.1(f) demonstrates that there is considerable variation within the pooled estimation sample for 5-year changes in the property rights measure.

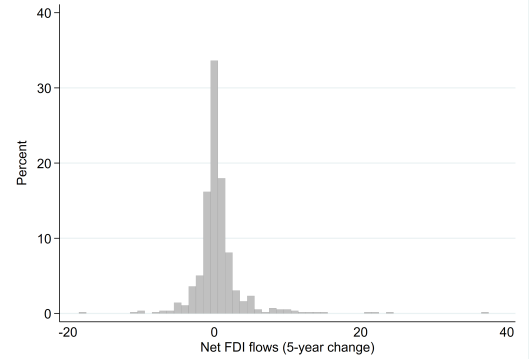
Figure 4.2 displays scatter plots for the property rights measure against net FDI inflows and natural resource rents. As in the case of the histograms, we show two plots for each pair of variables: one for levels and one for 5-year changes, over all countries and periods in the estimation sample. Figure 4.2(a) shows a positive correlation between net FDI inflows and property rights in the dataset, driven by a

FIGURE 4.1: Distributions of levels and 5-year changes in net FDI inflows, natural resource rents, and property rights, pooled, all years and countries in the estimation sample

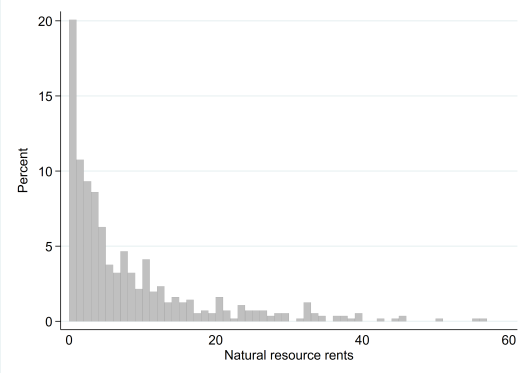
(a) Net FDI inflows (% of GDP), 1975-2015



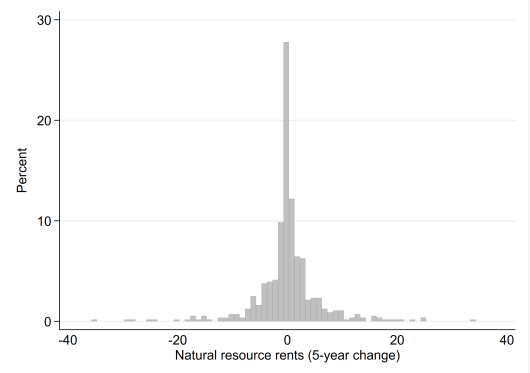
(b) 5-year change in net FDI inflows, 1975-2015



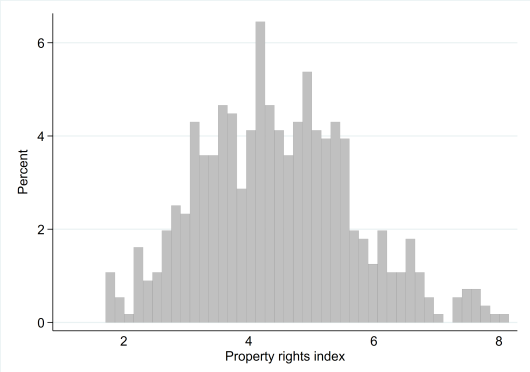
(c) Nat. res. (total % of GDP), 1970-2015



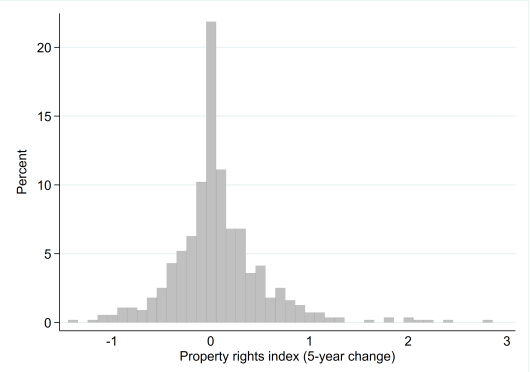
(d) 5-year change in nat. res., 1975-2015



(e) Property rights, 1975-2015



(f) 5-yr change in property rights, 1975-2015



Notes.- author calculations using data from the World Bank, World Development Indicators and The Fraser Institute. Sub-Figures (a), (c) & (e) show respectively the pooled distributions for all sample countries at 5-year intervals of: net FDI inflows measured as a percentage of GDP, natural resources rents measured as a percentage of GDP, and a measure of property rights taking values between 0 and 10. The Sub-Figures (b), (d) & (f) show pooled distributions over the sample countries and period for 5-year changes in the aforementioned variables.
The bin sizes are 1 for Sub-Figures (a)-(d), with the bin to the right of zero containing values which are positive but not greater than 1. The bin size is 0.15 for Sub-Figure (e), and is 0.1 for Sub-Figure (f).

small number of cases with very high net FDI inflows as a share of GDP that also correspond to high values of the property rights index. However, Figure 4.2(b) shows that this correlation disappears when instead comparing 5-year changes of these two variables. Figures 4.2(c) and 4.2(e) show negative correlations between the property rights index and both contemporaneous and 5-year lagged natural resource rents as a share of GDP. In both cases, this correlation diminishes in Figures 4.2(d) and 4.2(f) when instead comparing 5-year changes in these variables, and in the latter case, the correlation between the change in property rights and the change in natural resource rents becomes marginally positive.

4.4 Estimation & Results

Our regression models and estimation methods somewhat follow and extend those used by Ali et al. (2011), Demir (2016), and La Porta et al. (1999). We estimate models of the following form:

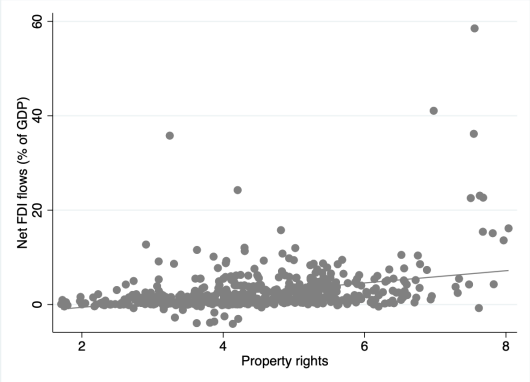
$$\begin{aligned} Inst_{i,t} =& \alpha + \beta_1 Inst_{i,t-1} + \beta_2 GDPperCap_{i,t} + \beta_3 Growth_{i,t} + \beta_4 NetFDI_{i,t} \\ &+ \beta_5 NatRes_{i,t-1} + \beta_6 (NetFDI_{i,t} \times NatRes_{i,t-1}) + \phi_i + \lambda_t + \psi_{R(i,t)} + \varepsilon_{i,t} \quad . \end{aligned} \tag{4.1}$$

where $Inst_{i,t}$ denotes a measure of institutions as the dependent variable, given by one of the five components of the Fraser Institute index or one of the six WGI measures discussed in Section 3.3. The subscripts i and t denote countries (e.g., $i = 1, 2, \ldots, 69$) and periods (e.g., $t = 1975, 1980, \ldots, 2015$), respectively. We also incorporate a lagged institutions term, $Inst_{i,t-1}$, to address the persistence of institutional change, as recommended by North (1990). α and $\beta_{1,2,\ldots,6}$ are parameters to be estimated. *GDPperCap* represents the level of GDP per capita, expressed in current United States dollars, and is included to account for the different levels of economic development within and across countries over time; increasing levels of income have been shown to lead to better quality institutions (e.g., Demir, 2016). We also include GDP growth over the previous five years, denoted by *Growth*, to capture the particular effects of recent economic development on institutions.

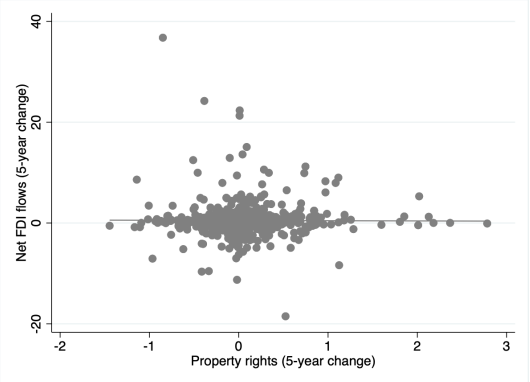
NetFDI represents net FDI inflows, measured as a percentage of GDP to account for country size (Ali et al., 2010). We will also later consider gross FDI flows (*GrossFDI*) measured in current United States dollars as an alternative to *NetFDI*. $NatRes_{i,t-1}$ denotes natural resource abundance lagged by 5 years, measured by natural resource rents as a percentage of GDP. We consider two variants of this measure. First, we consider the total sum of coal rents (*CoaRen*), forest rents (*ForRen*), mineral rents

FIGURE 4.2: Correlations of levels and 5-year changes in net FDI inflows, natural resource rents, and property rights, pooled, all years and countries in the estimation sample

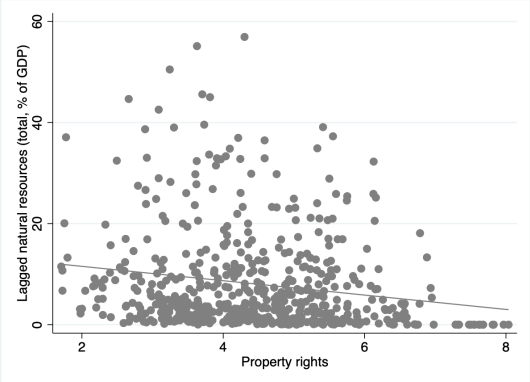
(a) Net FDI inflows (% of GDP) and prop. rights



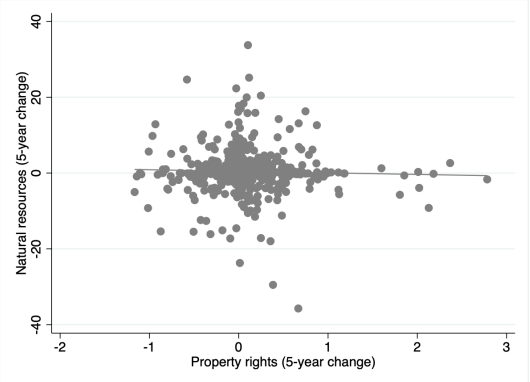
(b) 5-year change in net FDI inflows and prop. rights



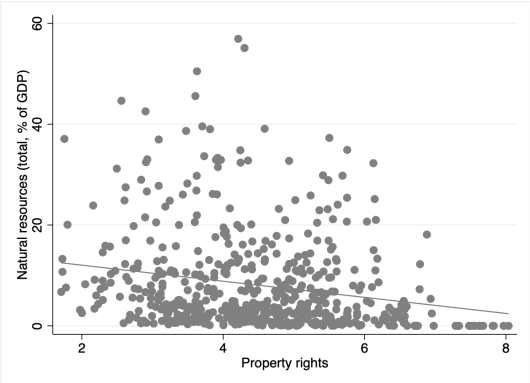
(c) Lag nat. res. (% of GDP) and prop. rights



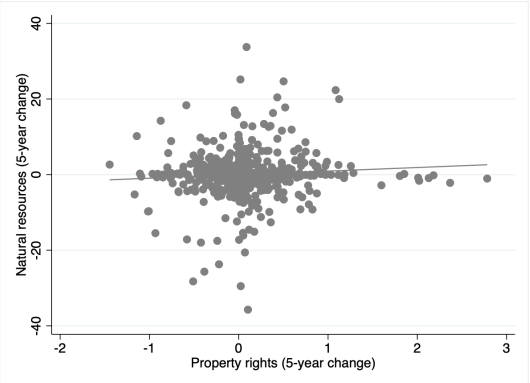
(d) Lag 5-year change in nat. res. and prop. rights



(e) Nat. res. (total % of GDP) and prop. rights



(f) 5-year change in nat. res. and prop. rights



Notes.- author calculations (see Table 4.2 for sample descriptives). Sub-Figure (a) shows the corresponding values for all country-year observations in our sample of the levels of net FDI inflows and the property rights measure. Likewise, Sub-Figure (c) shows the corresponding values of lagged natural resource rents and the property rights measure. Sub-Figure (e) shows the corresponding contemporaneous levels of natural resource rents and the property rights measure. Sub-Figures (b), (d) and (f) show corresponding values of 5-year changes in the respective variables shown in (a), (c) and (e). The estimated line of best fit is displayed in each sub-figure.

(*MinRen*), natural gas rents (*GasRen*), and oil rents (*OilRen*). Second, we consider the maximum percentage of GDP attributed to one of these sectors. In this way, we distinguish the effects of single-sector natural resource dependence on institutions, in line with the theory described above.

$NetFDI_{i,t} \times NatRes_{i,t-1}$ models the potential interaction effects between contemporaneous net FDI inflows and lagged total natural resource rents, to admit the possibility that FDI flows in resource dependent countries could impact institutions differently. ϕ_i and λ_t denote host country and period fixed effects, respectively. To address any region-specific trends in institutional development, $\psi_{R(i,t)}$ captures region-year fixed effects, where $r = R(i,t)$ is an indicator function denoting that country i and period t relate to region-year r (see Appendix Table C.1 for the six region groupings of countries in the estimation sample). The remaining unobserved heterogeneity in the quality of institutions is in the residual, $\varepsilon_{i,t}$.

We start by estimating Equation (4.1) using least squares and computing standard errors robust to country-level clusters, with different combinations of the stated levels of fixed effects. However, these estimates will surely suffer from endogeneity bias in a dynamic panel model setup such as Equation (4.1). Reverse causality is one potential source of endogeneity, whereby FDI flows, and the institutions of a host country may influence each other. To address this, we apply the two-step system GMM estimator, following Ali et al. (2011), where the instruments are all possible lags of the levels and differences of the variables treated as endogenous, $\{Inst_{i,t-1}, GDPperCap_{i,t}, Growth_{i,t}, NetFDI_{i,t}, NatRes_{i,t-1}, (NetFDI_{i,t} \times NatRes_{i,t-1})\}$, and the year fixed effects are treated as exogenous. This corrects for weaknesses that can arise when using only the lagged levels of the first-differences of variables as instruments, i.e., when instead applying difference GMM (Baum, 2006). Including the lag of the dependent variable in the model helps to capture the persistence of institutions (Acemoglu et al., 2008; Pan et al., 2020). We test for the overall appropriateness of the instruments using the Hansen test of the overidentifying restrictions.

4.4.1 Main Results - Property Rights

Focusing on the property rights index as a measure of institutional quality, the first set of estimates for Equation (4.1) are presented in Table 4.3. Ensuring the protection of private property and enforcement of contracts is one of the fundamental functions of government in an economically free society (De Haan et al., 2006). One justification for focusing on the property rights index over the WGI rule of law measure is that the former has a longer consistent time series of 1970-2015, compared to the

latter's shorter series of 1996-2016. Columns (I)-(III) of Table 4.3 report least squares estimates, adding in, from left to right, three sets of fixed effects and the lagged dependent variable. In columns (IV)-(VI), we report system GMM estimates while varying how natural resource abundance enters the model.

The estimates of the pooled cross-section variant of Equation (4.1) show a negative and statistically significant coefficient for lagged natural resource rents, suggesting that there is a general association of natural resource abundance with weak or lower quality property rights in the estimation sample and period, conditional on the level and speed of a country's economic development. Net FDI inflows and economic growth have the expected positive coefficients in the pooled cross-section model, but they are both statistically insignificant. Controlling also for year and country fixed effects in column (II), the parameter estimates for all other variables in the model are statistically insignificant at standard levels. Column (III) adds lagged property rights to account for unobservable heterogeneity through past institutional development (Kotschy & Sunde, 2017), as well as the region-year fixed effects. The effect of natural resource abundance in this model specification is negative and significant at the 5% level; an increase in the use or extraction of natural resources by 10 percentage points of GDP leads to a decline of 0.011 in the measure of property rights five years later, which is equivalent to about one-quarter of a standard deviation in the 5-year change in the property rights measure within the estimation sample (see also Table 4.2 and Figure 4.1).[9]

[9]We also considered system GMM estimates of Equation (4.1) where GDP per capita (constant 2015 US$) replaced GDP per capita (current US dollars. The results are reported in Appendix Table C.8. In Column (I), we first report estimates where only net FDI flows and lagged natural resources were the only independent variables to address the possibility that the control variables absorbed part of the influence of our main variables of interest on institutional development. The results show a positive and statistically significant coefficient for net FDI flows and a statistically significant negative coefficient for lagged natural resources. The findings in Columns (II)-(VII) show that using GDP per capita (constant US$) instead of GDP per capita (US dollars) yields similar results.

TABLE 4.3: Estimated effects of FDI and natural resource rents on property rights, 5-year periods in 1975-2015

Dep. variable: property rights	(I)	(II)	(III)	(IV)	(V)	(VI)
Lagged property rights			0.682***	0.928***	0.930***	0.927***
			(0.045)	(0.040)	(0.042)	(0.044)
GDP per capita (US$000s)	0.101***	-0.003	-0.005	0.002	0.001	0.002
	(0.018)	(0.013)	(0.007)	(0.005)	(0.006)	(0.007)
Economic growth (5-year, %)	0.141	0.078	0.211**	0.141**	0.152**	0.136**
	(0.111)	(0.067)	(0.071)	(0.066)	(0.066)	(0.065)
Net FDI inflows (% of GDP)	0.029	0.002	-0.003	0.002	0.003	0.002
	(0.023)	(0.010)	(0.004)	(0.005)	(0.005)	(0.006)
Lag nat. res. (total % of GDP)	-0.017**	-0.008	-0.011**	-0.007**		
	(0.008)	(0.007)	(0.004)	(0.003)		
Lag nat. res. (max. sector, % of GDP)					-0.009**	-0.007*
					(0.004)	(0.004)
FDI × nat. res. (×100)						-0.014
						(0.026)
Constant	4.170***	4.503***	1.521***	0.380**	0.370**	0.371*
	(0.138)	(0.065)	(0.189)	(0.165)	(0.167)	(0.189)
5-year FEs	No	Yes	Yes	Yes	Yes	Yes
Country FEs	No	Yes	Yes			
Year × region FEs	No	No	Yes	No	No	No
N of countries	69	69	69	69	69	69
N of country-5-year obs.	558	558	549	558	558	558
R^2	0.302	0.810	0.907			
Arellano-Bond AR(2) test, *p*-value				0.299	0.280	0.395
Hansen test of overid., *p*-value				0.231	0.210	0.256
Number of instruments				56	56	65

Notes.- The table reports the results for varying estimates of Equation (4.1) for the period 1970-2015, in 5-year intervals, where the dependent variable is the the property rights measure (see Table 4.2 and Figure 4.1 for sample descriptives, including for levels and 5-year changes).
Columns (I)-(III): least squares estimates, standard errors robust to country-level clusters.
Columns (IV)-(VI): system GMM estimates with lagged differences and levels of endogenous variables (all except the 5-year fixed effects) used as instruments.
***, ** and * denote statistically significant differences from zero at the 1%, 5% and 10% levels, respectively, two-sided sided tests, with (cluster) robust standard errors reported in parentheses.

To address the endogeneity of the least squares parameter estimates of Equation (4.1), columns (IV)-(VI) of Table 4.3 show results using the system GMM estimator described above. For each model estimated, we report p-values for the Hansen test of overidentifying restrictions and for the Arellano-Bond AR(2) test of the differenced residuals, in both cases not rejecting the null hypothesis for all models at standard levels of statistical significance. The results in Tables 4.1, 4.2, 4.3, 4.4, 4.5, Appendix Tables C.1, C.2, C.3, C.4, C.5, C.6, C.7 & C.8 show that the Hansen test supports the validity of the instruments for all our model specifications. In column (IV), with the total 5-year lagged natural resource rents as an explanatory variable, the estimates suggests a substantial degree of persistence in property rights quality within countries. The estimated effect of natural resource rents on institutional development is negative and significant at the 5% level; an increase in the use or extraction of natural resources by 10 percentage points of GDP leads to a decline of 0.07 in the measure of property rights five years later, which is equivalent to about one-seventh of a standard deviation in the 5-year change in the property rights measure within the estimation sample. This is a smaller effect than the least squares estimates provided in column (III), suggesting that omitted variables correlated with natural resource richness tend to bias the effects of this variable downward when using OLS to model property rights development, even after accounting for country and region-year fixed effects.

Column (V) of Table 4.3 shows estimates of a similar model to column (IV), only changing the natural resource variable to be the maximum percentage of GDP attributed to one of the natural resource sectors within a country and period, thus addressing the potential effects of single-sector economic dependence on institutional development. We find that the effect of a change in the maximum percentage of GDP focused within a single natural resource sector has a marginally greater negative effect on property rights development within countries than the overall amount of GDP derived from natural resource sectors. Column (VI) shows further results after including the term in the model for the the interaction of contemporaneous FDI and lagged total natural resources $(NetFDI_{i,t} \times NatRes_{i,t-1})$. Demir (2016) argued that there is a high likelihood that foreign investors treat resource rich countries differently in order to access resources. Although the estimates of this interaction effect are negative for property rights, they are not statistically significant. The system GMM estimates of Equation (4.1) also show that net FDI inflows on their own have no significant effects on property rights across all our model specifications. It is also notable that the coefficient of at least 0.9 for the 5-year lagged dependent variable in the GMM model estimates implies that the effects of changes in natural resource richness on property rights within a country are very persistent.

These results for property rights generally support the endowments view of institutional development of Engerman & Sokoloff (2002), among others. Moreover, the results align with a theory that the presence of natural resources generates incentives for investments that facilitate increased extraction of monopoly rents by a few state or private actors. In other words, there is motivation for actors involved in the use or extraction of natural resources to affect the weakening of institutions (e.g., through corruption, Malesky et al., 2015), to drive up monopoly rents regardless of whether those resources are increasingly exploited alongside foreign investment into the local economy.

Appendix Table C.3 reports equivalent results to Column (VI) of Table 4.3, in turn replacing the maximum sector-specific percentage contribution of natural resource rents to GDP with the contributions from only gas, forestry, coal, minerals, and oil. Although imprecisely estimated and not generally statistically significant, the magnitudes and directions of the effects of natural resource rents from each of these sectors on the development of property rights are consistent with the main results. Only oil rents have a statistically significant effect on property rights at the 10% level (column (V), Appendix Table C.3), suggesting that the use or extraction of oil especially tends to lead to the erosion of national institutions. This is consistent with some evidence from Andersen & Aslaksen (2013) and Omgba (2009) that only oil dependence, and not other extractive resources, tends to erodes political institutions in Africa.

To test the geographical stability of our estimates, Appendix Table C.4 shows further model estimates equivalent to the main results in column (VI) of Table 4.3, dropping in turn one of the six regional groupings of countries from the estimation sample. The effect of a change in the maximum contribution of a single natural resource sector to GDP on property rights is negative in each case. However, when excluding the six Middle East & North African (MENA) countries from the sample, this effect is not statistically significant at standard levels. When instead excluding the eight East Asia & Pacific countries, net FDI inflows tend to have a significant positive effect on property rights unless moderated by high natural resource richness. Taken together, these results suggest that although the effects of increased natural resource rents within a country are likely to be negative for property rights, the estimated average effects are sensitive to the sample of countries or regions studied.

To provide additional sensitivity checks of our results, Appendix Table C.5 displays further model estimates equivalent to the main results in column (VI) of Table 4.3, dropping in turn some years from the estimation period. The estimates show that the effect on property rights of a change in the maximum contribution of a single natural

resource sector to GDP is negative in each case, except in column (II) when we drop 1975. Moreover, when excluding year 2015 from the sample period, this effect is statistically significant at standard levels. When instead excluding periods before 1980 and after 2010, net FDI inflows tend to have a negative effect on property rights. These results suggest that the estimated average effects are sensitive to the sample period studied.

4.4.2 Other aspects of institutional development

In this section, we explore whether other aspects of the Fraser Institute's measures of institutional quality and the WGI dimensions of governance are affected by net FDI inflows or natural resource rents. Table 4.4 reports the system GMM estimator results of Equation (4.1) comparable to those shown in column (VI) of Table 4.3, replacing the previous dependent variable, property rights (prop. rights - repeated for comparison in column (I) of Table 4.4), with each of the other four Fraser Institute measures: size of government (gov. size), column (II); sound money (money), column (III); freedom to trade internationally (free. trade), column (IV); and business regulation (reg.), column (V). The model estimates show that these other institutional measures are substantially less persistent within countries than property rights. Net FDI inflows tend to have more positive effects on other aspects of institutional quality compared with property rights, but these effects are only statistically significant at standard levels for government size and regulation. The effect of a change in natural resource richness on institutional development five years later has the smallest magnitude effect for property rights out of the five different measures, although the effect on sound money is not statistically significant. The largest negative effects of natural resource rents are estimated for the freedom to trade internationally; an increase in the maximum single-sector use or extraction of natural resources by 10 percentage points of GDP leads to a decline of 0.33 in the freedom to trade internationally measure five years later, which is equivalent to about one-quarter of a standard deviation in the 5-year change in this measure within the estimation sample. Across all Fraser Institute measures of institutional quality, we find no significant evidence that net FDI inflows moderate or exacerbate the extent to which natural resource richness tends to erode institutional development.

Next, we broaden our analysis and present model estimates using the WGI dimensions of governance as dependent variables. Table 4.5 displays system GMM estimates of Equation (4.1), which repeat the analysis in the previous sections by replacing the dependent variable with: control of corruption (con. corr.), column (I); rule of law (rule/law), column (II); government effectiveness (gov. eff.), column (III); regulatory quality (regul.), column (IV); political stability and absence of

violence/terrorism (stab. vio.), column (V); and voice and accountability (voice), column (VI). The effect of net FDI inflows is only positive and significant at the 10% level on regulatory quality, which aligns with the findings of Pan et al. (2020). Dependence on a single natural resource sector has a significant negative effect on political stability and absence of violence/terrorism. This is consistent with the notion that the wealth derived from natural resources provides an incentive for political survival (e.g., Andersen & Aslaksen, 2013). Overall, due to the more limited sample period, our tests of whether natural resources affect the WGI dimensions of governance are underpowered.

TABLE 4.4: Estimated effects of FDI and natural resource rents on Fraser Institute's individual institutional factors, 5-year periods in 1975-2015

Dep. variables:	prop. rights (I)	gov. size (II)	money (III)	free. trad. (IV)	reg. (V)
Lagged institutional factors	0.927***	0.566***	0.671***	0.593***	0.544***
	(0.044)	(0.064)	(0.055)	(0.078)	(0.060)
GDP per capita (US$000s)	0.002	-0.009	0.015	0.024*	0.016**
	(0.007)	(0.006)	(0.011)	(0.013)	(0.007)
Economic growth (US$000s)	0.136**	0.383***	1.070***	0.400*	0.543***
	(0.065)	(0.141)	(0.229)	(0.225)	(0.101)
Net FDI inflows (% of GDP)	0.002	0.016*	0.018	0.013	0.017**
	(0.006)	(0.009)	(0.019)	(0.011)	(0.007)
Lag nat. res. (max. sector, % of GDP)	-0.007*	-0.027***	-0.013	-0.033**	-0.012**
	(0.004)	(0.010)	(0.012)	(0.013)	(0.005)
FDI $\times$ nat. res. ($\times$ 100)	-0.014	0.066	0.062	0.041	-0.016
	(0.026)	(0.087)	(0.093)	(0.079)	(0.032)
Constant	0.371*	3.108***	2.053***	2.737***	2.909***
	(0.189)	(0.477)	(0.427)	(0.475)	(0.410)
5-year FEs	Yes	Yes	Yes	Yes	Yes
N of countries	69	69	69	69	69
N of country-5-year obs.	558	558	558	537	540
Arellano-Bond AR(2) test, *p*-value	0.395	0.744	0.072	0.880	0.176
Hansen test of overid., *p*-value	0.197	0.580	0.744	0.425	0.817
Number of instruments	65	65	65	65	65

Notes.- Two-step system GMM estimates of Equation (4.1) for the period 1975-2015, in 5-year intervals, where the dependent variables are Property Rights (prop. rights), government size (gov. size); sound money (money), freedom to trade Internationally (free. trad.), and regulation (reg.) (see Table 4.2 and Figure 4.1 for sample descriptives, including for levels and 5-year changes).
Model estimates with lagged differences and levels of endogenous variables (all except 5-year fixed effects) used as instruments.
***, ** and * denote statistically significant differences from zero at the 1%, 5% and 10% levels, respectively, two-sided tests, with robust standard errors reported in parentheses.

TABLE 4.5: Estimated effects of FDI and natural resource rents on WGI's individual institutional factors, 5-year periods in 1975-2015

Dep. variables:	con. corr. (I)	rule/law (II)	gov. eff. (III)	regul. (IV)	stab. vio. (V)	voice (VI)
Lagged institutional factors	0.912***	0.951***	1.021***	0.877***	0.930***	0.842***
	(0.140)	(0.114)	(0.131)	(0.082)	(0.115)	(0.096)
GDP per capita (US$000s)	0.002	0.003	0.003	0.007*	0.009	0.004
	(0.009)	(0.006)	(0.007)	(0.004)	(0.006)	(0.005)
Economic growth (%)	0.043	0.102	0.073	0.074	0.330***	0.120**
	(0.065)	(0.077)	(0.108)	(0.063)	(0.123)	(0.053)
Net FDI inflows (% of GDP)	0.005	0.002	-0.006	0.008*	-0.013	-0.003
	(0.006)	(0.005)	(0.005)	(0.005)	(0.009)	(0.004)
Lag nat. res. (max. sector, % of GDP)	0.001	-0.004	-0.001	-0.004	-0.011**	0.004
	(0.004)	(0.005)	(0.008)	(0.004)	(0.005)	(0.005)
Constant	-0.580	-0.086	0.033	-0.062	0.001	-0.094
	(0.102)	(0.062)	(0.071)	(0.053)	(0.123)	(0.063)
4-year FEs	Yes	Yes	Yes	Yes	Yes	Yes
N of countries	67	67	67	67	67	67
N of country-4-year obs.	258	258	258	258	258	258
Arellano-Bond AR(2) test, *p*-value	0.452	0.763	0.749	0.448	0.591	0.204
Hansen test of overid., *p*-value	0.319	0.451	0.215	0.069	0.563	0.625
Number of instruments	32	32	32	32	32	32

Notes.- Two-step system GMM estimates of Equation (4.1) for the period 2000-2016, in 4-year intervals, where the dependent variables are WGI: control of corruption (con. corr.), rule of law (rule/law), government effectiveness (gov. eff.), regulatory quality (regul.), political stability and absence of violence/terrorism (stab. vio.), and voice and accountability (voice).
***, ** and * denote statistically significant differences from zero at the 1%, 5% and 10% levels, respectively, two-sided sided tests, with robust standard errors reported in parentheses.

4.4.3 Results When Using Alternative FDI Measures

In this section, we consider estimating Equation (4.1) using gross FDI inflows and FDI stocks as an alternative to net FDI inflows. Appendix Figures C.1, C.2, C.3 & C.4 show the distributions of these variables, in levels and first differences, as well as their correlations with property rights.

First, we report results of using gross FDI inflows in Appendix Table C.6 that are comparable with Table 4.3. The results are quantitatively and qualitatively similar to those in Table 4.3. Next, we consider evidence obtained using FDI stocks, in line with previous studies (e.g., Ali et al., 2011; Kwok & Tadesse, 2006). The FDI stock is obtained from the United Nations Conference on Trade and Development (UNCTAD) and is measured as a percentage of GDP. FDI inflows capture the degree of change in FDI in developing countries, which could mount pressure on host governments to improve institutions (Ali et al., 2011). However, it is plausible that support for the development of national institutions in each host developing country could largely rely on FDI stocks instead of flows. FDI flows quantify the rise in the investment of foreign investors, whereas FDI stocks measure the total of that investment. Therefore, from this argument, it is possible that FDI flows may capture new investors in a host country. In other words, FDI flows could be induced by institutional improvements, while the current FDI stock could influence institutional quality. Appendix Table C.7 presents model estimation results using FDI stocks instead of net inflows, comparable with Table 4.3. Using FDI stocks instead of flows in the models also yields quantitatively and qualitatively similar results to those shown in Table 4.3.

4.5 Conclusion

In this essay, we explored the relationships between natural resources, FDI inflows, and institutions. When focusing on legal property rights, we found negative and significant effects of natural resource use or extraction on the development of these particular national institutions. This aligns with a theory that abundant natural resources generally lead to the weakening of institutions because of the potential to secure and capitalise on monopoly rents. Further, we found that the effect of FDI inflows on institutions is not robust to controlling for natural resource abundance. This suggests that the latter tends to result in eroded institutions regardless of whether those resources are exploited through increased foreign investment into the local economy. Looking more widely, we found some evidence that not only a country's property rights but also the size of its government, the freedom it gives to trade internationally, regulation, political stability, and the absence of violence/terrorism, are all other

institutional factors that appear to respond negatively to the increased share of natural resources in a country's output.

Our results for the development of property rights were generally robust to dropping specific regions from the estimation sample, except when we excluded the EAP and MENA regions from the regression models. This suggests that the effects of natural resources are stronger in these parts of the world, which is an important issue for future exploration and case study. While our estimates appear to be quite robust to the different model specifications and estimation samples that we considered, it does not imply that the selected variables are the only important predictors of institutions. Similarly, there are several other factors that can be used to proxy institutions. In this essay, we used several composite indices, because unlike Eicher & Roehn (2007) we are not convinced that it is possible to form a single factor that could adequately explain a country's whole institutional environment.

Our findings add new evidence on the average relationships across countries between natural resources, FDI, and institutions, which could be helpful for future policy formulation in resource rich countries. For instance, our results suggest that policymakers whose objectives are to strengthen domestic institutions should be wary (and possibly renew their resolve) when their countries develop new opportunities to extract rents from natural resources. In other words, they would be advised to discourage, dismantle or robustly regulate natural monopoly industries, which have strong incentives to invest in political pressure or other measures that can secure and ensure monopoly rents. In this light, Botswana is an example of a developing country that has successfully managed to regulate its natural resource sectors to avert excessive monopoly rents. The country's remarkable story in mining and the trade of diamonds has been made possible through the creation of strong institutions and state management that stands against corruption (Acemoglu et al., 2015; Ghebremusse, 2018).

Chapter 5

Conclusion

The aim of this thesis was to contribute to the general discussions around the impact of MNEs operations and FDI on host developing countries. To achieve this, the thesis was designed to include three essays. Each essay discussed distinct issues. The first essay addressed the response of the three components of FDI flows to macroeconomic variables within firms. Using FDI information disaggregated into equity capital, reinvested earnings and intra-company debt, the essay estimated the effect of macroeconomic variables on FDI financing behaviour and the profits within firms. The results confirm that the components of FDI flows respond differently to the same set of macroeconomic variables (Brewer, 1993). Specifically, the results show positive and significant effects of copper price on FDI inflows. This supports the theory that high commodity prices tend to stimulate investment. The evidence also shows a negative relationship between FDI flows and exchange rate appreciation. The relationship is insignificant, but it aligns with the theory.

For the individual components of FDI, the evidence shows varying effects. I found that the relationship between equity capital and copper price is negative. The evidence also indicates a negative relationship between equity capital and exchange rate appreciation. In contrast, the evidence shows a positive relationship between reinvested earnings and copper price. This suggests that firms reinvest profits to finance their operations when the copper price increases. However, the estimated effect of the exchange rate appreciation on reinvested earnings is negative. Also, evidence shows a significant positive relationship between intra-firm debt and copper price, while the impact of the exchange rate depreciation on intra-firm debt is positive. Thee findings provide new empirical evidence that supports the theory that components of FDI may respond differently to the same set of macroeconomic variables.

Taken together with the stylised facts of the profit dynamics and FDI financing modalities, there seems to be a contradiction. When firms recorded high reinvested earnings financing, the proportion of firms reporting zero change or reducing profits was also high. This contradiction may be attributable to the extensive tax sophistication of foreign firms (Dharmapala, 2014). Since the analysis in this essay focused on the mining sector, it is recommended that more research should be undertaken to establish whether these findings can be applied to other industries.

This essay contributes to the existing literature in three ways. First, it illustrates how the individual components of FDI react to the macroeconomic variables and policy change using a novel dataset. Second, to the best of my knowledge, this is the first study to investigate the determinants of each component of FDI at the firm level. Third, it is believed to be the first study to examine the response of the individual components of FDI to selected macroeconomic variables in the context of a developing country.

The second essay described tax avoidance instruments deployed by large multinationals. Focusing on a single representative subsidiary of a large multinational operating in the manufacturing sector, the chapter outlined key instruments deployed to lower tax obligations. The evidence suggests that the firm used transfer pricing, mis-pricing of internal loans, and overcharging for notional services to lower its tax bill. Two plausible reasons explain this. First, to conceal its actions to avoid detection. Second, if detected on one, it can continue using the other two options as it already has experience using them.

There is no substantial evidence suggesting significant differences in applying the methods within the company. This indicates that the company could be using a formulaic approach, which fits the idea that it was not applying a super refined strategy but rather a package that processes things routinely. This evidence illustrates how a firm, regarded as a good corporate citizen, can systematically deploy tax avoidance mechanisms to reduce its tax bill. Likely, the potential loss of tax may almost never be fully compensated with personal income tax paid by the subsidiary. Against this background, further research is recommended to contextualise the savings generated by the firm for deploying tax avoidance mechanisms compared to its philanthropic activities. The conclusions of this study are crucial not only for Zambia but also for other developing countries. In this regard, countries that desire to curb the deployment of tax avoidance instruments should be advised to implement effective legislation that will discourage or deter the use of such arrangements.

Moreover, tax avoidance is a complex global problem for individual countries. OECD has established a comprehensive agenda to curb the problem. For instance, in

2021, the OECD adopted a two-pillar package[1] to prevent the erosion of tax bases in countries promoted by MNEs. Pillar One seeks to guarantee that profits and taxing rights are distributed fairly among countries concerning the largest multinationals. Pillar Two aims to place a threshold on tax competition on corporate income tax by introducing a global minimum corporate tax rate which countries can apply to safeguard their tax bases. The expected benefits from the agreement include the reallocation of expected profits of more than US$100 billion to countries annually under Pillar One, about US$150 billion in new tax revenues are estimated to be generated globally yearly through the global minimum tax rate of at least 15%, and increased tax certainty for tax administrations and taxpayers due to the stabilisation of the international tax system.

These measures may help to combat tax avoidance and generate tax revenue, with developing countries, like Zambia, likely to benefit more since they are more vulnerable to tax avoidance due to ineffective law enforcement (Fuest et al., 2011; Johannesen et al., 2020; OECD, 2015). For instance, Dyrda et al. (2022) found that these policies would lower profit shifting by over two-thirds. However, fundamental reasons diminish the optimism about the agreement's effectiveness in the tax avoidance problems. For instance, Cantos (2022) suggests that the forecasts on the estimated tax bases under Pillar One are unrealistic. The minimum tax rate of 15% in corporate tax may not be implemented effectively (Cantos, 2022). Dyrda et al. (2022) suggest that the policies would reduce output in high tax countries and intangible investment, thereby causing tension for policymakers. Profit shifting boosts high tax countries' economic activity but also erodes their tax bases; hence policies that lower profit shifting harm macroeconomic fundamentals (Dyrda et al., 2022). Against this background, individual countries must be proactive in finding solutions to their tax avoidance problems.

This essay makes three contributions. First, it contributes to the literature on MNE corporate tax planning. This literature identifies the main instruments deployed in MNE corporate tax planning (Cooper & Nguyen, 2020). This essay complements and extends this literature and the existing broader empirical research by documenting the deployment of these instruments using a case study. Second, this study provides new empirical evidence on how large multinationals and their subsidiaries avoid paying taxes. This is done by presenting the key findings from a case study of a subsidiary operating in a developing country. Third, it proposes a methodology for estimating the extent of tax avoidance by MNEs through each of the three mechanisms (i.e., transfer

[1]OECD: Tax Challenges Arising from the Digitalisation of the Economy: Global Anti-Base Erosion Model Rules (Pillar Two) Inclusive [External link].

pricing, mis-pricing internal loans, and overcharging for notional services). Moreover, this study helps bridge the gap in the absence of comparative studies and diversity in geographic representation (Cooper & Nguyen, 2020), especially for developing countries.

The third essay focused on the relationships between natural resources, FDI inflows, and the quality of national institutions. The study finds negative and significant effects of natural resource use or extraction on the development of national institutions. We focus on legal and property rights, but these findings also apply to some other measures of institutions, namely government size, freedom to trade internationally, regulation, political stability, and the absence of violence or terrorism. The results align with a theory that abundant natural resources lead to weakened institutions because of the potential for firms to secure monopoly rents. Further, the study finds that the effects of FDI inflows on institutional development are not robust to controlling for natural resource rents. This suggests that the latter tend to erode institutions regardless of whether those resources are exploited alongside increased foreign investment into the local economy. Our results are important for policymakers whose objectives are to strengthen domestic institutions. They should be wary (and possibly renew their resolve) when their countries develop new opportunities to extract rents from natural resources. In other words, governments would be advised to discourage, dismantle, or robustly regulate natural monopoly industries, which have strong incentives to invest in political pressure or other measures that can secure their powerful positions in the market. It is recommended that future research is undertaken to examine the relationships between natural resources, FDI inflows, and the quality of national institutions for individual countries.

This essay contributes to the existing literature in two main ways. First, it provides new evidence on the average relationships across countries between natural resources, FDI, and institutions, which could be helpful for future policy formulation in resource-rich developing countries. For instance, the results suggest that policymakers whose objectives include strengthening domestic institutions should be wary (and possibly renew their resolve) when their countries develop new opportunities to extract natural resources rent. It also provides empirical evidence of the effects of the dominant natural resource sector on institutions across countries. Furthermore, it provides empirical evidence of the effect of the dominant natural resource sector on institutions across countries. Second, it provides new evidence on the impact of FDI inflows on institutional development controlling for natural resource rents. This suggests that the latter tend to erode institutions regardless of whether those resources are exploited alongside increased foreign investment into the local economy.

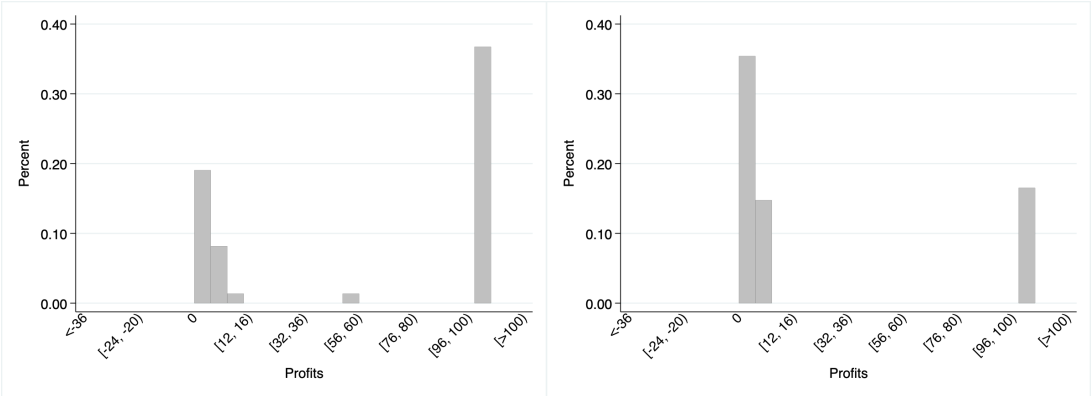
Appendix A

The components and determinants of FDI within firms: A case study of Zambia

Appendix A.1 Additional figures & table

FIGURE A.1: 2010-2017, pooled changes, mining firms

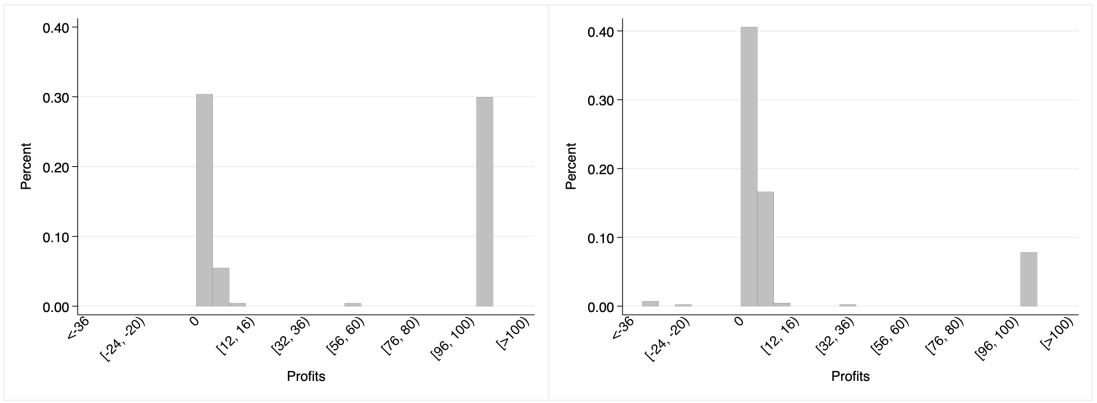
(a) 2010-2012 (b) 2013-2017



Notes.- Pooled annual changes of profits for mining firms before the policy change, 2010-2012 and pooled annual changes of profits for mining firms after the policy change, 2013-2017.
The bin sizes are 2 for both Sub-Figures (a) & (b), with the bin to the right of zero containing values which are positive but not greater than 2.

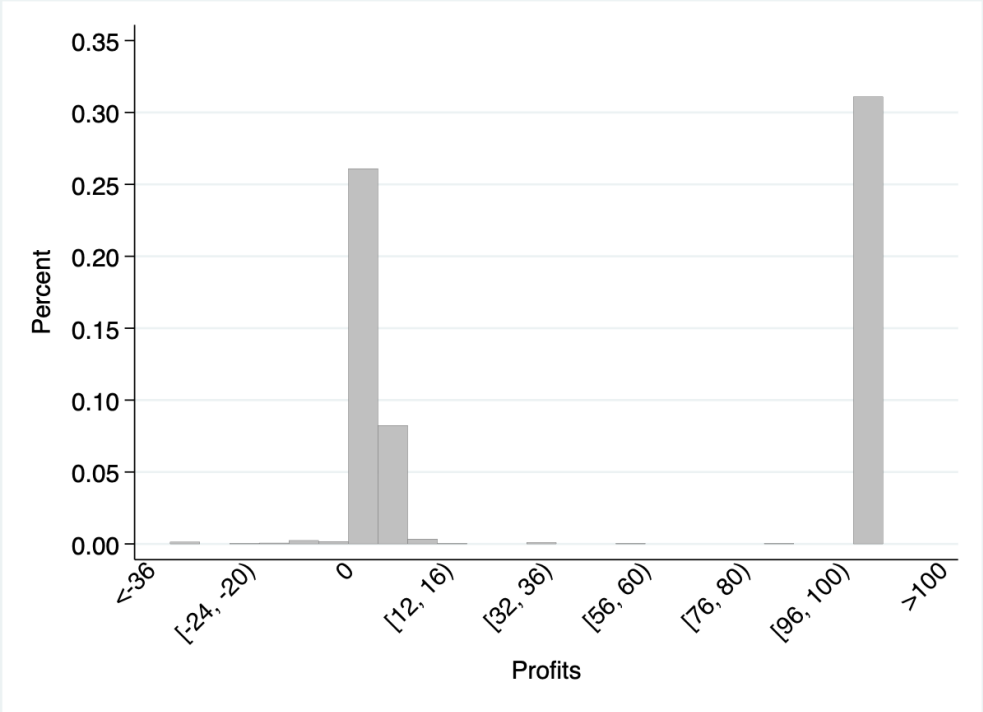
FIGURE A.2: 2010-2017, pooled changes, large firms

(a) 2010-2012 (b) 2013-2017



Notes.- Pooled annual changes of profits for large firms before the policy change, 2010-2012 and pooled annual changes of profits for large firms after the policy change, 2013-2017.
The bin sizes are 2 for both Sub-Figures (a) & (b), with the bin to the right of zero containing values which are positive but not greater than 2.

FIGURE A.3: 2010-2017, pooled changes, all firms



Notes.- Pooled annual changes of profits for all firms before and after the policy change, 2010-2017.
The bin sizes are 2 for both Sub-Figures (a) & (b), with the bin to the right of zero containing values which are positive but not greater than 2.

TABLE A.1: Estimated effects of macroeconomic variables on FDI inflows within Zambian firms, 2008-2017

Dep. variables	FDI (I)	Equity (II)	RE (III)	Debt (IV)
Copper price (US$)	2.600**	-0.599	1.581	1.618
	(0.955)	(0.642)	(1.384)	(1.013)
Exchange rate ($\times$1000)	0.701	-0.024	0.242	0.483
	(0.892)	(0.327)	(0.584)	(1.348)
FDI stock	0.127***	0.042	0.015	0.071***
	(0.036)	(0.031)	(0.050)	(0.020)
Policy dummy	3.477	0.911**	2.236	0.330
	(5.213)	(0.379)	(3.996)	(3.146)
Forex purchases	-0.007	-0.009	-0.020	0.022
	(0.036)	(0.006)	(0.017)	(0.025)
Forex sales	-0.171	-0.026	-0.114	-0.031
	(0.195)	(0.019)	(0.113)	(0.096)
Growth	4.941	2.034	3.274	-0.367
	(6.286)	(2.045)	(3.228)	(6.101)
Firm FEs	Yes	Yes	Yes	Yes
N of firm observations	178	178	178	178
R^2	0.128	0.119	0.033	0.110

Notes.- Firm fixed effects are estimated as per regression model (2.1) for the period 2008-2017 where dependent variables are FDI, equity, returned earnings and intra-firm debt (see Table 2.3 for sample descriptives).
Standard errors in parentheses robust to serial correlation at the firm-level.
*** Statistically significant at the 1% level; ** at the 5% level; * at the 10% level.

Appendix B

Tax avoidance by multinationals: A case study of the Zambian manufacturing sector

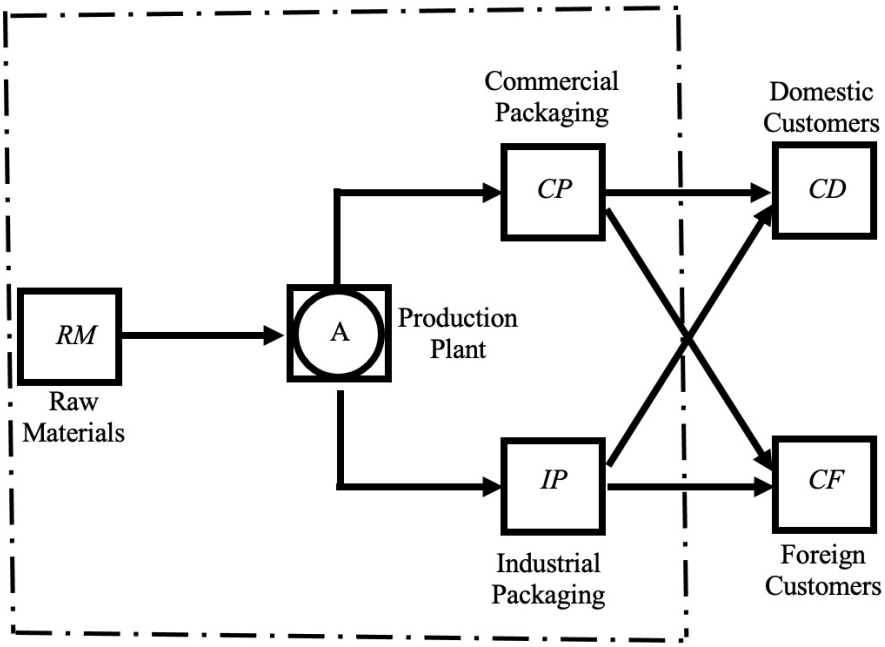
Appendix B.1 Additional table

TABLE B.1: Country characteristics and corporate tax rates

Country	Characteristics	Tax rate (%) 2020
1	African country, host to the intermediate holding firm	28.0
2	European country, headquarters of the ultimate parent company	19.0
3	European country, host to a subsidiary of firm C	25.0
4	Africa country, Low tax, small island	15.0
5	African country, export market	30.0
6	European country, host to a subsidiary of firm D	25.0
7	European country; tax heaven, host to a subsidiary C, ranked among the 20 lowest statutory corporate income tax rates in the world (Asen, 2020)	12.5
8	African country, host to subsidiary firm	30.0
9	African country, host to subsidiary firm	30.0
10	African country, host to subsidiary firm	27.5
11	African country, host to subsidiary firm	32.0
Host	Ranked among the 20 highest statutory corporate income tax rates in the world, 2020 (Asen, 2020)	35.0

Notes.- The information on tax rates was accessed from the Tax Foundation website on 9 November 2021; [External link].

FIGURE B.1: Schematic representation of the supply chain



Notes.- The plot shows the flow of materials, through the value adding processes and distribution facilities, to customers. Key: *Square box*: production or distribution facility; *Circle*: represents individual decision-maker. *Thick black lines*: flow of product that is eventually sold to customers (this includes intra-firm exports); *Long Dash Dot line*: boundary of production plant location (firm A). *Notation*: *RM*: represents raw materials; *A*: firm A: production plant; *CP*: commercial packaging; *IP*: industrial packaging; *CD*: domestic customers; and *CF*: foreign customers.

Appendix C

Do natural resources and FDI tend to erode or support the development of national institutions?

Appendix C.1 Additional tables & figures

TABLE C.1: List of countries included in the analysis

East Asia & Pacific	Europe & Central Asia	Latin America & Caribbean	Middle East & North Africa	South Asia	Sub-Saharan Africa
Hong Kong	Turkey	Argentina	Egypt	Bangladesh	Angola
Indonesia		Bolivia	Iran	India	Benin
Korea, Rep.		Brazil	Jordan	Pakistan	Botswana
Malaysia		Chile	Morocco	Sri Lanka	Burkina Faso
Papua New Guinea		Colombia	Syria		Cameroon
Philippines		Costa Rica	Tunisia		Congo, DR
Singapore		Dominican Rep.			Congo, Rep.
Thailand		Ecuador			Cote d'Ivoire
		El Salvador			Ethiopia
		Guatemala			Gabon
		Guyana			Ghana
		Haiti			Kenya
		Honduras			Lesotho
		Jamaica			Madagascar
		Mexico			Malawi
		Nicaragua			Mali
		Panama			Mauritius
		Paraguay			Mozambique
		Peru			Namibia
		Trinidad and Tobago			Niger
		Uruguay			Nigeria
		Venezuela, RB			Senegal
					Sierra Leone
					South Africa
					Tanzania
					Uganda
					Zambia
					Zimbabwe

TABLE C.2: Definitions of variables

Variable (s)	Definition	Source
Net FDI flows (% of GDP)	Net FDI inflows as percentage of GDP	World Bank, World Development Indicators
Gross FDI flows (US$ million)	Gross FDI flows in US dollars	United Nations, UNCTADStat
Economic growth (5-year %)	Percentage change in GDP	Calculated from World Bank data, World Development Indicators
Forest rents (% of GDP)	Forest rents as percentage of GDP	World Bank, World Development Indicators
Gas rents (% of GDP)	Mineral rents as percentage of GDP	World Bank, World Development Indicators
GDP per capita (US$000s)	GDP per capita expressed in current United States dollars	World Bank, World Development Indicators
GDP per capita (US$000s)	GDP per capita expressed in constant 2015 United States dollars	World Bank, World Development Indicators
Government size	Measure of size of government, scale 0 - 10	Fraser Institute
Legal system and property rights	Measure of legal system and property rights, scale 0 - 10	Fraser Institute
Coal rents (% of GDP)	Coal rents as percentage of GDP	World Bank, World Development Indicators
Minerals rents (% of GDP)	Oil rents as percentage of GDP	World Bank, World Development Indicators
Oil rents (% of GDP)	Mineral rents as percentage of GDP	World Bank, World Development Indicators
Natural resources rents (total, % of GDP)	Total natural resources rents as percentage of GDP	World Bank, World Development Indicators
Sound money	Measure of sound money, scale 0 - 10	Fraser Institute
Freedom to trade internationally	Measure of freedom to trade internationally, scale 0 - 10	Fraser Institute
Regulation	Measure of economic freedom present in regulation, scale 0 - 10	Fraser Institute
Voice and Accountability	Measures perceptions of the extent to which a country's citizens are able to participate in selecting their government.	World Bank, Worldwide Governance Indicators
Political Stability and Absence of Violence/Terrorism	Measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism.	World Bank, Worldwide Governance Indicators
Government Effectiveness	Captures perceptions of the quality of public services and civil service and the degree of its independence from political pressures.	World Bank, Worldwide Governance Indicators
Regulatory Quality	Captures perceptions of the ability of the government to formulate and implement sound policies.	World Bank, Worldwide Governance Indicators
Rule of Law	Captures perceptions of the extent to which agents have confidence in and abide by the rules of society.	World Bank, Worldwide Governance Indicators
Control of Corruption	Captures perceptions of the extent to which public power is used for private gain.	World Bank, Worldwide Governance Indicators

TABLE C.3: Estimated effects of sector-specific natural resource rents on property rights, 5-year periods in 1975-2015

Dep. variable: Property Rights	(I)	(II)	(III)	(IV)	(V)
Lag Property rights	0.931***	0.943***	0.956***	0.934***	0.938***
	(0.042)	(0.051)	(0.039)	(0.043)	(0.037)
GDP per capita (US$000s)	0.002	-0.001	0.000	0.001	0.002
	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)
Economic growth (%)	0.107	0.154*	0.099	0.123	0.109*
	(0.070)	(0.079)	(0.077)	(0.074)	(0.061)
Net FDI flows (% of GDP)	0.003	0.003	0.000	0.002	0.003
	(0.007)	(0.008)	(0.006)	(0.007)	(0.006)
Lag gas rents (% of GDP)	-0.011				
	(0.018)				
Lag forest rents (% of GDP)		-0.005			
		(0.009)			
Lag coal rents (% of GDP)			-0.070		
			(0.127)		
Lag mineral rents (% of GDP)				-0.016	
				(0.016)	
Lag oil rents (% of GDP)					-0.005*
					(0.003)
FDI × nat. res. (×100)	-0.037*	-0.045*	-0.029	-0.043*	-0.017
	(0.022)	(0.026)	(0.020)	(0.025)	(0.023)
Constant	0.315*	0.292	0.228	0.370**	0.300
	(0.173)	(0.242)	(0.180)	(0.181)	(0.153)
5-year FEs	Yes	Yes	Yes	Yes	Yes
N of countries	69	69	69	69	69
N of country-5-year obs.	520	558	493	558	522
Arellano-Bond AR(2) test, *p*-value	0.847	0.404	0.596	0.408	0.852
Hansen test of overid., *p*-value	0.164	0.119	0.329	0.331	0.244
Number of instruments	65	65	63	65	65

Notes.- Two-step system GMM estimates of Equation (4.1) for the period 1975-2015, in 5-year intervals, where the dependent variable is the Property Rights (see Table 4.2 and Figure 4.1 for sample descriptives, including for levels and 5-year changes).
Model estimates with lagged differences and levels of endogenous variables (all except 5-year fixed effects) used as instruments.
***, ** and * denote statistically significant differences from zero at the 1%, 5% and 10% levels, respectively, two-sided tests, with robust standard errors reported in parentheses.

TABLE C.4: Estimated regional effects of natural resource rents on property rights, 5-year periods in 1975-2015

Excluding:	EAP (I)	ECA (II)	LAC (III)	MENA (IV)	SA (V)	SSA (VI)
Lag Property rights	0.874***	0.936***	0.902***	0.937***	0.927***	0.957***
	(0.053)	(0.045)	(0.040)	(0.047)	(0.047)	(0.045)
GDP per capita (US$000s)	0.007	0.002	0.006	0.002	0.002	0.008
	(0.013)	(0.007)	(0.006)	(0.007)	(0.007)	(0.007)
Economic growth (%)	0.080	0.125*	0.266***	0.154**	0.144**	0.179
	(0.063)	(0.066)	(0.091)	(0.073)	(0.068)	(0.106)
Net FDI (% of GDP)	0.020**	0.001	0.000	0.001	0.001	-0.016
	(0.009)	(0.005)	(0.006)	(0.006)	(0.005)	(0.011)
Lag nat. res. (max. sector, % of GDP)	-0.007	-0.006*	-0.011**	-0.005	-0.008*	-0.011*
	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.006)
FDI × nat. res. (× 100)	-0.062*	-0.016	0.005	-0.024	-0.010	-0.158
	(0.035)	(0.026)	(0.039)	(0.027)	(0.025)	(0.199)
Constant	0.550***	0.356*	0.451**	0.310	0.370*	0.175
	(0.205)	(0.197)	(0.192)	(0.198)	(0.199)	(0.207)
5-year FEs	Yes	Yes	Yes	Yes	Yes	Yes
N of countries	61	68	47	63	65	41
N of country-5-year obs.	487	549	366	507	523	358
Arellano-Bond AR(2) test, *p*-value	0.808	0.471	0.174	0.339	0.537	0.359
Hansen test of overid., *p*-value	0.450	0.278	0.976	0.358	0.368	0.998
Number of instruments	65	65	65	65	65	65

Notes.- Two-step system GMM estimates of Equation (4.1) for the period 1975-2015, in 5-year intervals, where the dependent variable is Property Rights (see Table 4.2 and Figure 4.1 for sample descriptives, including for levels and 5-year changes).
Model estimates with lagged differences and levels of endogenous variables (all except 5-year fixed effects) used as instruments.
Variable definitions: EAP = East Asia and Pacific, ECA = Europe and Central Asia, LAC = Latin America and Caribbean, MENA = Middle East and North Africa, SA = South Asia, and SSA = Sub-Saharan Africa.
***, ** and * denote statistically significant differences from zero at the 1%, 5% and 10% levels, respectively, two-sided tests, with robust standard errors reported in parentheses.

TABLE C.5: Estimated effects of FDI and natural resources on property rights, 5-year periods in 1975-2015, excluding some years in turn from the estimation sample

Excluding:	Non (I)	1975 (II)	<1980 (III)	<1980 & >2010 (IV)	>2010 (V)	2015 (VI)
Lag Property rights	0.927***	0.958***	0.952***	1.015***	0.981***	0.955***
	(0.044)	(0.042)	(0.048)	(0.093)	(0.044)	(0.050)
Net FDI inflows (% of GDP)	0.002	0.002	0.004	-0.007	-0.006	0.011
	(0.006)	(0.005)	(0.006)	(0.010)	(0.006)	(0.010)
GDP per capita (US$000s)	0.002	-0.003	-0.003	-0.000	0.011	-0.004
	(0.007)	(0.007)	(0.008)	(0.018)	(0.009)	(0.011)
Economic growth (5-year, %)	0.136**	0.061	0.092	0.035	0.102*	0.159**
	(0.065)	(0.071)	(0.076)	(0.074)	(0.056)	(0.070)
Lag nat. res. (max. sector, % of GDP)	-0.007*	0.000	-0.003	-0.010	-0.005	-0.008**
	(0.004)	(0.005)	(0.006)	(0.006)	(0.003)	(0.003)
FDI × nat. res. (×100)	-0.014	-0.044	-0.038	0.100	0.052	0.019
	(0.026)	(0.032)	(0.029)	(0.072)	(0.059)	(0.072)
Constant	0.497**	0.385*	0.000	0.000	0.228	0.329
	(0.216)	(0.202)	(0.000)	(0.000)	(0.207)	(0.239)
5-year FEs	Yes	Yes	Yes	Yes	Yes	Yes
N of countries	69	69	69	64	64	69
N of country-5-year obs.	558	511	451	316	423	491
Arellano-Bond AR(2) test, *p*-value	0.395	0.714.	0.951	0.509	0.790	0.423
Hansen test of overid., *p*-value	0.197	0.282	0.302	0.181	0.503	0.188
Number of instruments	65	60	53	39	51	58

Notes.- Two-step system GMM estimates of Equation (4.1) for the period 1975-2015, in 5-year intervals, where the dependent variable is Property Rights (see Table 4.2 and Figure 4.1 for sample descriptives, including for levels and 5-year changes).
Model estimates with lagged differences and levels of endogenous variables (all except 5-year fixed effects) used as instruments.
Columns exclude year (s): (II): 1975, (III): 1975 & 1980, (IV): 1975, 1980, 2010 & 2015, (V): 2010 & 2015, and (VI): 2015.
***, ** and * denote statistically significant differences from zero at the 1%, 5% and 10% levels, respectively, two-sided tests, with robust standard errors reported in parentheses.

TABLE C.6: Estimated effects of gross FDI and natural resources on property rights, 5-year periods in 1975-2015

Dep. variable: Property rights	(I)	(II)	(III)	(IV)	(V)	(VI)
Lagged Property rights			0.682***	0.930***	0.936***	0.941***
			(0.045)	(0.040)	(0.041)	(0.040)
GDP per capita (US$000s)	0.129***	0.001	-0.004	0.004	0.002	0.003
	(0.018)	(0.015)	(0.007)	(0.006)	(0.006)	(0.007)
Economic growth (%)	0.129	0.076	0.210***	0.144*	0.160**	0.142*
	(0.105)	(0.067)	(0.070)	(0.074)	(0.074)	(0.073)
Gross FDI flows (US$ million)	-0.009	-0.002	-0.001	-0.001	-0.001	-0.006
	(0.006)	(0.004)	(0.001)	(0.001)	(0.001)	(0.004)
Lag nat. res. (total % of GDP)	-0.016**	-0.008	-0.011**	-0.006**		
	(0.008)	(0.007)	(0.004)	(0.003)		
Lag nat. res. (max. sector, % of GDP)					-0.009***	-0.007*
					(0.003)	(0.003)
Gross FDI × nat. res. (×100)						-0.085
						(0.062)
Constant	4.185***	4.501***	1.514***	0.443**	0.421*	0.000
	(0.137)	(0.067)	(0.189)	(0.208)	(0.217)	(0.000)
5-year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Country FEs	No	Yes	Yes			
Year × region FEs	No	No	Yes	No	No	No
N of countries				69	69	69
N of country-5-year obs.	558	558	549	558	558	558
R^2	0.297	0.810	0.907			
Arellano-Bond AR(2) test, *p*-value				0.270	0.251	0.384
Hansen test of overid., *p*-value				0.119	0.118	0.189
Number of instruments				56	56	65

Notes.- Two-step system GMM estimates of Equation (4.1) for the period 1975-2015, in 5-year intervals, where the dependent variable is Property Rights (see Table 4.2, Appendix Figure C.1 and Appendix Figure C.2 for sample descriptives, including for levels and 5-year changes).
Model estimates with lagged differences and levels of endogenous variables (all except 5-year fixed effects) used as instruments.
Columns (I)-(III): least squares estimates, standard errors robust to country-level clusters.
Columns (IV)-(VI): system GMM estimates with lagged differences and levels of endogenous variables (all except the 5-year fixed effects) used as instruments.
***, ** and * denote statistically significant differences from zero at the 1%, 5% and 10% levels, respectively, two-sided sided tests, with (cluster) robust standard errors reported in parentheses.

TABLE C.7: Estimated effects of FDI stock and natural resources on property rights, 5-year periods in 1975-2015

Dep. variable: Property rights	(I)	(II)	(III)	(IV)	(V)	(VI)
Lagged Property rights			0.678***	0.936***	0.941***	0.956***
			(0.041)	(0.050)	(0.050)	(0.049)
GDP per capita (US$000s)	0.138***	0.004	-0.003	-0.001	-0.002	-0.001
	(0.018)	(0.022)	(0.008)	(0.009)	(0.009)	(0.008)
Economic growth (%)	0.260**	0.024	0.125*	0.105	0.109	0.109
	(0.108)	(.082)	(0.070)	(0.079)	(0.084)	(0.074)
FDI Stock (% of GDP)	-0.012	-0.002	0.000	0.001	0.001	-0.003
	(0.007)	(0.004).	(0.001)	(0.001)	(0.001)	(0.011)
Lag nat. res. (total % of GDP)	-0.019**	-0.004	-0.009*	-0.008**		
	(0.008)	(0.009)	(0.004)	(0.003)		
Lag nat. res. (max. sector, % of GDP)					-0.010**	-0.007*
					(0.004)	(0.003)
FDI stock × nat. res. (×100)						-0.052
						(0.151)
Constant	4.211***	4.558***	1.570***	0.000	0.000	0.343
	(0.139)	(0.089)	(0.176)	(0.000)	(0.000)	(0.229)
5-year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Country FEs	No	Yes	Yes			
Year × region FEs	No	No	Yes	No	No	No
N of countries				68	68	68
N of country-5-year obs.	494	494	486	494	494	494
R^2	0.331	0.808	0.911			
Arellano-Bond AR(2) test, *p*-value				0.898	0.865	0.882
Hansen test of overid., *p*-value				0.157	0.118	0.201
Number of instruments				53	53	61

Notes.- Two-step system GMM estimates of Equation (4.1) for the period 1975-2015, in 5-year intervals, where the dependent variable is Property Rights (see Table 4.2, for sample descriptives, including for levels and 5-year changes).
Model estimates with lagged differences and levels of endogenous variables (all except 5-year fixed effects) used as instruments.
Columns (I)-(III): least squares estimates, standard errors robust to country-level clusters.
Columns (IV)-(VI): system GMM estimates with lagged differences and levels of endogenous variables (all except the 5-year fixed effects) used as instruments.
***, ** and * denote statistically significant differences from zero at the 1%, 5% and 10% levels, respectively, two-sided sided tests, with (cluster) robust standard errors reported in parentheses.

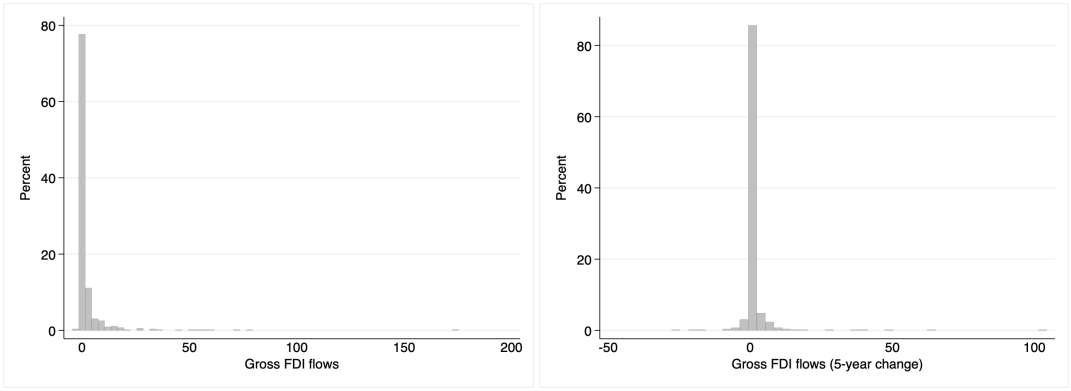
TABLE C.8: Estimated effects of FDI and natural resource rents on property rights, 5-year periods in 1975-2015

Dep. variable: property rights	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
Lagged property rights				0.656***	0.929***	0.929***	0.928***
				(0.042)	(0.051)	(0.051)	(0.046)
GDP per capita (Constant US$000s)		0.104***	0.005	-0.002	0.004	0.004	0.004
		(0.016)	(0.016)	(0.008)	(0.007)	(0.007)	(0.007)
Economic growth (5-year, %)		0.110	0.070	0.202***	0.142*	0.152*	0.163**
		(0.104)	(0.066)	(0.076)	(0.082)	(0.082)	(0.073)
Net FDI inflows (% of GDP)	0.096***	0.022	-0.002	-0.005	0.001	0.002	-0.000
	(0.023)	(0.022)	(0.009)	(0.004)	(0.005)	(0.005)	(0.005)
Lag nat. res. (total % of GDP)	-0.024**	-0.015*	-0.008	-0.010**	-0.007*		
	(0.009)	(0.008)	(0.007)	(0.005)	(0.004)		
Lag nat. res. (max. sector, % of GDP)						-0.008**	-0.008*
						(0.004)	(0.004)
FDI × nat. res. (×100)							-0.004
							(0.024)
Constant	4.391***	4.029***	4.476***	1.632***	0.464*	0.478*	0.152
	(0.155)	(0.141)	(0.089)	(0.184)	(0.246)	(0.253)	(0.191)
5-year FEs	No	No	Yes	Yes	Yes	Yes	Yes
Country FEs	No	No	Yes	Yes			
Year × region FEs	No	No	No	Yes	No	No	No
N of countries	69	67	67	67	67	67	67
N of country-5-year obs.	558	538	538	538	538	538	538
R^2	0.170	0.355	0.822	0.909			
Arellano-Bond AR(2) test, *p*-value					0.433	0.414	0.553
Hansen test of overid., *p*-value					0.069	0.066	0.175
Number of instruments					55	55	64

Notes.- The table reports the results for varying estimates of Equation (4.1) for the period 1970-2015, in 5-year intervals, where the dependent variable is the the property rights measure (see Table 4.2 and Figure 4.1 for sample descriptives, including for levels and 5-year changes).
Columns (I)-(IV): least squares estimates, standard errors robust to country-level clusters.
Columns (V)-(VII): system GMM estimates with lagged differences and levels of endogenous variables (all except the 5-year fixed effects) used as instruments.
***, ** and * denote statistically significant differences from zero at the 1%, 5% and 10% levels, respectively, two-sided sided tests, with (cluster) robust standard errors reported in parentheses.

FIGURE C.1: Distributions of levels and 5-year changes in gross FDI inflows, pooled, all years and countries in the estimation sample

(a) Gross FDI flows (% of GDP), 1975-2015 (b) 5-year change in gross FDI flows, 1975-2015

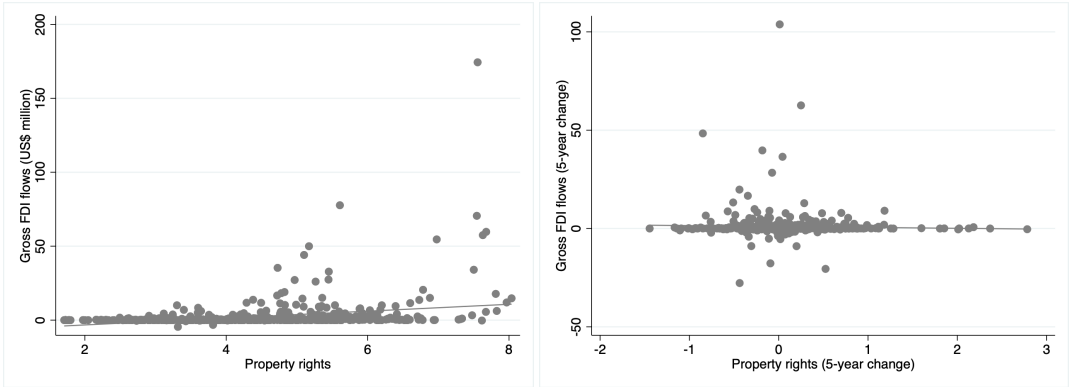


Notes.- author calculations using data from the United Nations, UNCTADstat. Sub-Figure (a) shows the pooled distribution for all sample countries at 5-year intervals of: gross FDI inflows measured in current United States dollars. The Sub-Figure (b) shows pooled distributions over the sample countries and period for 5-year changes in the aforementioned variables.
The bin sizes are 3 for both Sub-Figures (a) & (b), with the bin to the right of zero containing values which are positive but not greater than 3.

FIGURE C.2: Correlations of gross FDI inflows with a measure of property rights, levels and 5-year changes, all years and countries in the estimation sample, 1975-2015

(a) Gross FDI flows (US$ million) and prop. rights

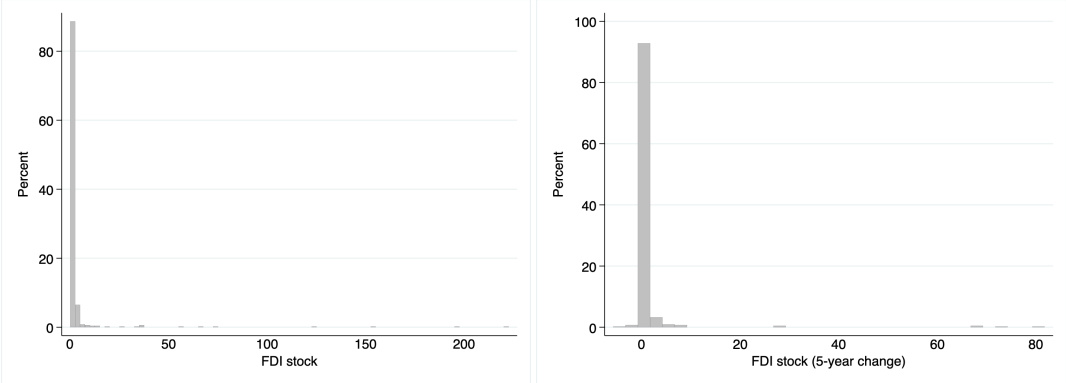
(b) 5-year change in gross FDI flows and prop. rights



Notes.- author calculations. Sub-Figure (a) shows the corresponding values for all country-year observations in our sample of the levels of gross FDI inflows and the property rights measure. Likewise, Sub-Figures (b) shows corresponding values of 5-year changes in the respective variables shown in (a). The estimated line of best fit is displayed in each sub-figure.

FIGURE C.3: Distributions of levels and 5-year changes in FDI stock, pooled, all years and countries in the estimation sample

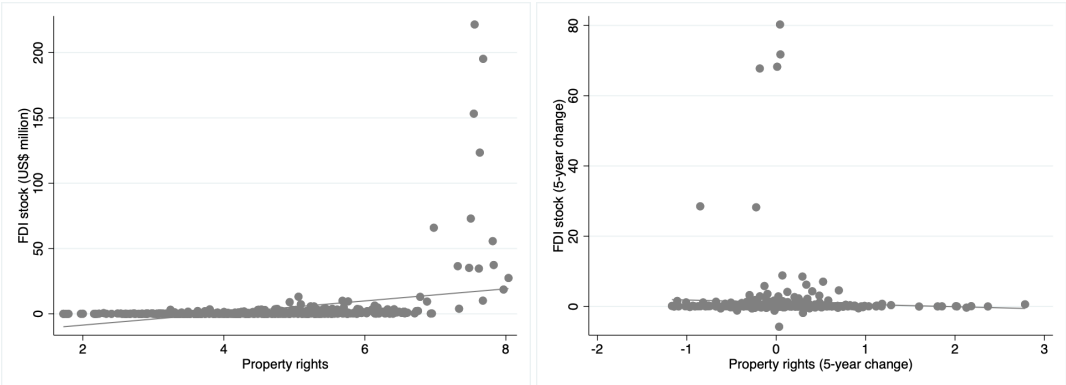
(a) FDI stock (% of GDP), 1975-2015 (b) 5-year change in FDI stock, 1975-2015



Notes.- author calculations using data from the United Nations, UNCTADstat. Sub-Figure (a) shows the pooled distribution for all sample countries at 5-year intervals of: FDI stock measured in current United States dollars. The Sub-Figure (b) shows pooled distributions over the sample countries and period for 5-year changes in the aforementioned variables.
The bin sizes are 2.5 for both Sub-Figures (a) & (b), with the bin to the right of zero containing values which are positive but not greater than 2.5.

FIGURE C.4: Correlations of FDI stock with a measure of property rights, levels and 5-year changes, all years and countries in the estimation sample, 1975-2015

(a) FDI stock (US$ million) and prop. rights (b) 5-year change in FDI stock and prop. rights



Notes.- author calculations. Sub-Figure (a) shows the corresponding values for all country-year observations in our sample of the levels of FDI stock and the property rights measure. Likewise, Sub-Figures (b) shows corresponding values of 5-year changes in the respective variables shown in (a). The estimated line of best fit is displayed in each sub-figure.

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