

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

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

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Abstract

This study investigates the response of the components of FDI flows to macroeconomic variables within firms. The analysis uses a new firm-level database constructed from anonymised confidential data held by the Zambian Central Bank, covering the period 2008 – 2017. Applying the fixed effects estimation method, the study confirms a positive association between FDI inflows and commodity prices. The study also confirms a positive correlation between reinvested earnings and exchange rate depreciation. Furthermore, the study accepts, but with a qualification, the preference for intra-company debt financing when there is policy uncertainty in a host country. However, the proposition of a positive relationship between equity financing and currency appreciation in the host country is rejected. The study proposes instead a new hypothesis, a negative relationship between equity financing and the exchange rate appreciation.

Keywords: Foreign direct investment; retained earnings; equity; intra-company debt; firm

JEL codes: E3, F23, F24, F31, H32

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This study uses 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 respondent's confidentiality. The analysis and interpretation in this paper does not represent the position of the data owners. Due to the research methodology applied in this study, the results may not exactly be the same as the data owner's aggregates.

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.

The available data may not allow the identification of transfer pricing directly. As a result, part of the strategy in this study is to estimate the effect of macroeconomic variables on inward foreign direct investment (henceforth FDI) financing behaviour and the profits within firms, as the dataset allows this in a precise manner. 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. In addition, disaggregating the components of FDI is important as each of them might respond differently to the same set of macroeconomic variables (Brewer, 1993).

This study is motivated by the sudden shift in the FDI financing behaviour of foreign firms operating in Zambia. It investigates the response of the components of FDI flows to macroeconomic variables within firms. The key variables of interest are copper price and the exchange rate. Previous research has suggested that there is a positive association between commodity prices and FDI flows, and a negative correlation between currency appreciation and FDI flows. It has also suggested that there is a positive relationship between equity financing and currency appreciation, and a positive correlation between reinvested earnings and exchange rate depreciation, as well as the preference for debt financing relative to the other two. This paper re-examines these propositions 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.

This study confirms the positive association between FDI inflows and commodity prices [copper prices] and the positive correlation between reinvested earnings and exchange rate. Furthermore, the study accepts, but with a qualification, that intra-company debt financing is preferred when there is policy uncertainty in a host country. However, the proposition of a positive relationship between equity financing and currency appreciation in the host country is rejected. The study proposes instead a new hypothesis, a negative relationship between equity financing and the exchange rate appreciation.

To the best of my knowledge, this is the first attempt to examine these propositions using the novel database, which is a key contribution of this study. Another contribution of this study is a novel fact about the profit dynamics. The study reveals that a high proportion of firms reported zero change or reducing profits on a year-to-year basis. The study also contributes to understanding of the effects of currency

management policy on FDI financing. The evidence suggests an aggressive substitution of reinvested earnings financing with intra-company financing in 2012 and 2013. These results may also suggest that firms engaged in profit shifting, which could be detrimental to the country, through tax avoidance. It is for this reason that government policies should target the integration of foreign subsidiaries with local firms.

There are several channels through which FDI impacts the host economy. For instance, [Alfaro et al. \(2004\)](#) claim that FDI contributes to increased efficiency in the use of the world's resources by stimulating innovation, competition, economic growth, and employment. [de Mello Jr. \(1999\)](#) argues that FDI impacts growth through knowledge transfer, the introduction of alternative management practices and organisational arrangements. [Cockcroft and Riddell \(1991\)](#) claim that FDI has the potential of addressing the low levels of investment and the foreign exchange shortages faced by most countries in Sub Saharan Africa. Multinational enterprises (henceforth MNEs) are considered as the single most important vehicle for FDI.

One of Zambia's expected major benefits from FDI is the constant supply of foreign currency from exporting firms. 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 the instability in the foreign exchange rate. The mining industry accounts for about 70% of the country's total exports ([Chipili, 2016](#)). Thus, to capture more foreign currency from export earnings, the Zambian Government implemented currency management policies in 2012 and 2013.¹

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 main driver. At the same time, reinvested earnings contracted substantially, compared to the previous two years, when they were the main contributor of FDI growth. The unprecedented high level of intra-company debt was a significant departure from firms' previous financing behaviour.

Recent research on issues in this paper 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 and Lipponer, 2005](#)). This study extends the existing wider 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 paper is structured as follows: Section 2 provides a background; Section 3 presents related literature; Section 4 highlights the theory and hypotheses; Section 5 briefly outlines the data and estimation technique used in this study; Section 6 discusses the key results; and Section 7 concludes.

2 Background

Prior to 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 and Bhatia, 1998](#); [Fundanga and Mwaba, 1997](#)). The sale of the mines in the early

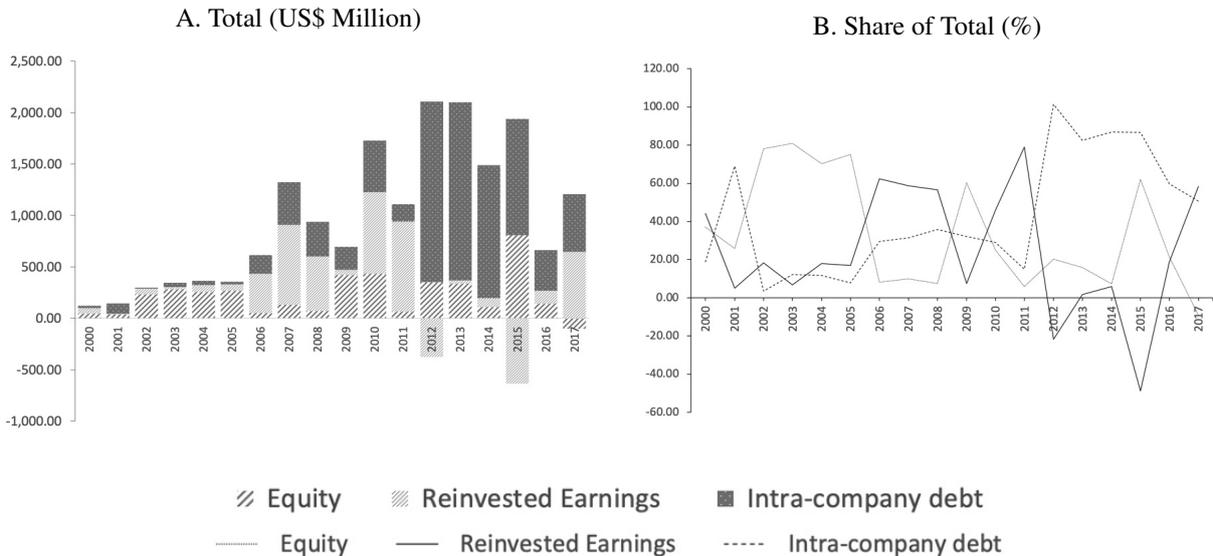
¹The currency regulations of 2012 were aimed at barring the settlement of domestic transactions in foreign currency ([Government of Zambia, 2012](#); [Bank of Zambia, 2013](#)). This was complemented with changes to the monitoring of balance of payments regulations in 2013 ([Government of Zambia, 2013](#);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

2000s, which is the dominant recipient of FDI, was a key milestone in the privatisation process (see, for example, Lungu, 2008, for a detailed account of the privatisation process of the mines).

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 1 shows 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 with 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 1: Trends in FDI financing, 2000-2017



Notes.- Author calculations using the private capital flows database. Panel A shows the gross annual levels of flows for each of the components of FDI. Panel B shows the components of FDI as a share of the total gross annual flows.

Reinvested earnings were relatively low until 2005. Between 2006 and 2008, however, they were the major contributor of 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, 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 firms were making substantial profits, to the extent that part of those earnings were being reinvested.

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 and declined 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. Intra-company debt remained as the major contributor of FDI flows in 2014 at US\$1,293 million and US\$996 million in 2015. Although it was still the major contributor of 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 there was no major global economic event during this period, the potential explanation for this firm financing behaviour might be attributed to the policy changes that were introduced in 2012 and 2013.

2.2 Foreign exchange dynamics

Export earnings are Zambia's main source of foreign currency and they help to stem the pressure on the local exchange rate. 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 and Lee, 2007), and for servicing the Government's foreign debt. However, balance of payments data show that increasingly the export earnings were deposited in foreign banks. For instance, the share of deposits banked in foreign banks as a percentage 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, which in turn was 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 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).

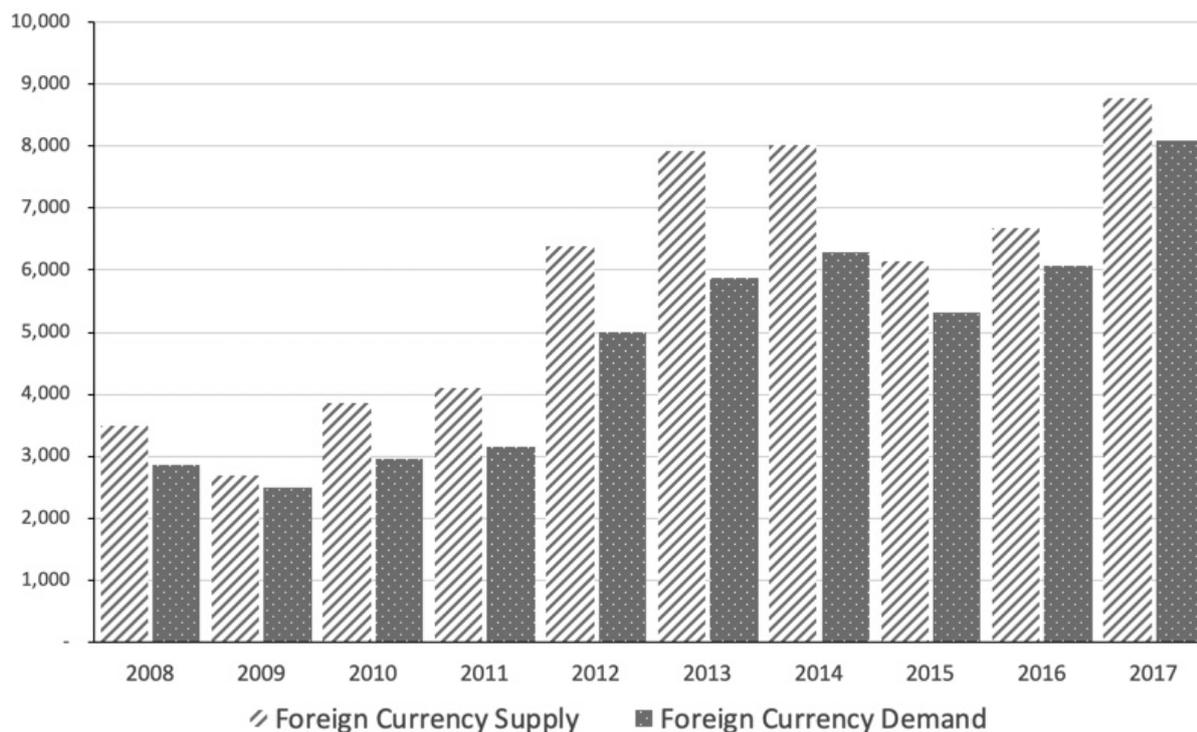
2.3 Domestic characteristics

There are several fundamental factors that 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.

A greater proportion of Zambia's FDI is in the primary sector, like most African countries (Jaiblai and Shenai, 2019), with the mining sector accounting for 60% of the total FDI stock. The sector is largely dominated by copper 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 3). 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, more especially for countries with flexible exchange rate regimes. A stable exchange rate helps to maintain macroeconomic stability which influences the location decision of investments (see, for example, Demekas et al., 2007; Alguacil et al., 2011).

²Foreign 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: 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.

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 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 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 show that a wide range of methods are 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 and Casson, 2018).

This study attempts to explain the effects of macroeconomic variables on the components of inward FDI flows within firms. The analysis focuses 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. There are several empirical studies that include commodity prices and the exchange rate movements as determinants of FDI.

3.1 FDI flows and Commodity prices

Bevan et al. (1994) suggest that a considerable rise in the relative commodity price leads to a rise in the return to capital for the commodity sector, which in turn induces, investment. By the same argument, they suggest that the opposite is true. Mash (1998) posits that investment booms in response to commodity price

FIGURE 3: Copper prices and ZMW/US Dollar exchange rates, January 1998 - December 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.

shocks may occur or may take place at the end of the commodity price shock. However, his study does not specifically focus on FDI, but investment in general. [Kariuki \(2015\)](#) investigates the factors that influence FDI flows into African countries using data from 35 nations. She finds a positive and significant association between inward FDI flows and the commodity price index performance.

The three studies do not specifically focus on copper, a study by [Comelli and Ruiz \(2016\)](#), investigates the effect of copper price uncertainty on investment decisions in Chile. The study estimates a vector autoregressive (VAR) using seasonally adjusted monthly data for the period 1999 to 2015. The results indicate that the effect of a copper price uncertainty shock on investment is strong and persistent. This is consistent with the findings of [Fornero and Kirchner \(2018\)](#), who analyse the effect of the commodity price shocks on saving-investment dynamics for the Chilean economy. The study uses a dynamic stochastic general equilibrium (DSGE) model and concludes that if there is a high and persistent commodity price shock, the potential actualisation of higher returns of capital, particularly in the commodity sector, triggers a boom in investment.

3.2 FDI flows and exchange rates

Literature assessing the effects of exchange rates on FDI is ambiguous. [Froot and Stein \(1991\)](#) demonstrate 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 and Rosengren \(1994\)](#) find that a depreciation of the real exchange rate in the dollar facilitated increased FDI inflows into the United States. A study by [Kogut and Chang \(1996\)](#) explores the effects of industry, firm and exchange rate movements on investment. They find that investment decisions are significantly influenced by real exchange rate movements. [Blonigen \(1997\)](#) finds that the depreciation of the United States dollar led to increased Japanese investments in United States firms.

[Kosteletou and Liargovas \(2000\)](#) find an ambiguous relationship relating to the direction of the association between FDI and real exchange rate volatility. They apply a simultaneous equation model and time series data for 12 European countries over the period from 1960 to 1997. [Bénassy-Quéré et al. \(2001\)](#) find that FDI is affected by exchange-rate volatility. The authors use a panel of 42 developing countries, who were recipients of FDI from 17 Organisation for Economic Co-operation and Development (OECD) source countries covering the period 1984–1996. [Lee and Min \(2011\)](#) assess the effect of both the movements and volatility of the exchange rate on FDI inflows in South Korea. The study analyses the relationship between the exchange rate volatility and foreign investors' decisions. The study finds that the exchange rate volatility had a robust impact on FDI flows.

The estimation evidence from [Pain and Welsum \(2003\)](#) shows that the effect of exchange rates on FDI is ambiguous. It is heterogeneous across different countries and modes of investment. The authors claim 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 are. [Pain and Welsum \(2003\)](#) further suggest that FDI may be less sensitive to exchange rate movements in developing countries, because they are largely dominated by greenfield investments.

3.3 FDI components

Each component has its intrinsic features and may respond differently to the same economic fundamentals. Consequently, a number of studies examine the determinants of FDI on disaggregated components separately, for instance for equity (see [Loree and Guisinger, 1995](#); [Hau and Rey, 2006](#)) and reinvested earnings (see [Auerbach et al., 1993](#); [Brewer, 1993](#); [Lundan, 2006](#); [Wolff, 2007](#); [Oseghale and Nwachukwu, 2010](#); [Chakravarty and Xiang, 2011](#)). Using pooled regression, [Hau and Rey \(2006\)](#) find a positive association between the appreciation of the exchange rate in a host country and equity flows.

[Lundan \(2006\)](#) posits that a currency depreciation of the host country is linked with discouraging repatriation. In other words, there is scope for firms to reinvest their earnings. [Oseghale and Nwachukwu \(2010\)](#) examine the effect of a set of explanatory variables of United States firms' reinvested earnings in some countries. The study applies a fixed-effect regression model covering the period between 1994 and 2006. The results show a positive relation between reinvested earnings and macroeconomic variables of a host country, such as the exchange rate and profitability of existing operations.

[Wolff \(2007\)](#) argues that the empirical predictions of the effect of macroeconomic variables on intra-company debt is 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.

3.4 Policy and Investment

Numerous studies explain the link between policy changes and the level of investment (see, [Bernanke, 1983](#); [Pindyck, 1991](#); [Aizenman and Marion, 1993](#); [Canh et al., 2020](#)). [Bernanke \(1983\)](#) and [Pindyck \(1991\)](#) present theoretical arguments that irreversible investment is sensitive to increased volatility, leading to reduced investment. Similarly, [Canh et al. \(2020\)](#) present empirical evidence that a rise in domestic policy uncertainty significantly and adversely affect inward FDI flows.

4 Theory and hypotheses

The hypotheses are constructed from the literature on neoclassical investment and on 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 and Liargovas, 2000](#), for a discussion on these models). The study also benefits from the macroeconomic analysis of [Dunning and 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 financing of subsidiaries in developing countries are driven, in part, by exchange rate controls and currency stability in the host country.

H1: FDI within firms is positively related to exchange rate depreciation and the price of copper

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 (see, for example, [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 relative value of the foreign investors' assets and consequently, increase 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 stronger 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 lower the cost of imports for the country, including mining equipment, which in turn would induce an increase in 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 prior to 2012 (see [Figure 2](#)), as well as the holding of export earnings in offshore accounts ([Bank of Zambia, 2008, 2013](#)). Holding of export earnings in the 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 the currency management policies in 2012 and 2013. Government policy has scope to directly or indirectly affect FDI. [Brewer \(1993\)](#) argues 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. Increased supply of foreign currency would provide scope for the appreciation and stability of the local currency. Since a depreciation lowers the value of foreign currency that firms require to meet their domestic obligations, the assumption is that firms devised measures to maintain a weakened local currency. They may have done this through transfer pricing and/or intra-company debt financing.

H2: Firms record stable profits

Most empirical work on neoclassical investment patterns of the firm is modelled under the assumption that firms are driven by maximisation of profit (Dunning and Lundan, 2008). Firms exploit their internal assets and capabilities to produce goods and services at levels that enable profit maximisation. Inward FDI is associated with technology transfer. New technology is linked to increased productivity, which increases production using the same amount of capacity. It reduces production costs which makes the prices of exports more competitive. Resource-seeking investment is linked to export for a large proportion of the output. Increased productivity therefore boosts scope for increased exports and profits. Profits are distributed as dividends and reinvested earnings. Dividends are paid out to shareholders for their investment in the firm, done so in accordance with the firm's dividend policy. But the earnings not distributed to firm owners count as reinvested earnings. The importance and significant contribution of reinvested earnings to total inward FDI flows in Zambia suggests that firms record stable profits (see Figure 1).

As long as there is a stable economic and policy environment, firms are incentivised to maintain their investment behaviour provided their objectives and motivations, such as profit maximisation, are met. Conversely, with any change to the policy environment that threatens to reduce profits, firms will adjust their behaviour to continue maximising profits. Whereas the implementation of the currency management measures was aimed at resolving identified balance of payments challenges, they might have been a source of uncertainty to firms, threatening to reduce their profits in foreign currency terms. Against Government assurances that the measures were not capital controls, investors may have reasonably viewed the policy measures as a precursor or an imposition of other restrictions on transfer of international funds. As a result, firms seem to have devised strategies to protect their profits by changing their financing strategies, substituting reinvested earnings for intra-company debt.

H3: Equity flows within firms are positively associated with exchange rate depreciation

This hypothesis is linked to **H1**. Parent companies can finance their foreign subsidiaries using either equity capital or reinvested earnings or intra-company debt. Equity is irreversible. It is predominantly the initial main source of financing and determines the ownership structure when there are several investors involved. There is scope for investors to use their own funds in the form of equity in the acquisition of assets in subsidiary enterprises, when the local currency is weak, since it is cheaper to do so. 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 are positively associated with exchange rate depreciation will be tested.

H4: Reinvested earnings within firms are positively associated with FDI growth and the copper price

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 to the parent firm in the home country is

governed by a number factors, including the exchange rate and firm profitability. For instance, a host country may implement an exchange rate policy aimed at addressing 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.

H5: Financing FDI within firms through intra-company debt is volatile and sensitive to exchange rate movements and copper prices

This prediction is related to H1 and H2. Since firms are driven by profit maximisation, it is reasonably fair to assume that firms are motivated to maintain their investment behaviour as long as their objective is met under any 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. In such cases, for example, firms may prefer debt to equity, owing to its tax advantage (see, for example, [Hennessy and Whited, 2005](#); [Jermann and Quadrini, 2012](#)).

[Tripathi and Thukral \(2016\)](#) suggest that parent companies use intra-company debt to finance their foreign subsidiaries, to contain risks presented by political instability and the legal environment in the host country. Similarly, [Kraus and Litzenberger \(1973\)](#), which suggests that debt financing is preferred because it reduces the company’s corporate income tax liability and raises 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 and Nanda \(1994\)](#), who suggest that parent firms use both 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.

5 Data and estimation technique

5.1 Data

This study uses a new database constructed from anonymised confidential firm-level data held by BoZ. The primary source of the database is the private capital flows dataset based on information compiled through the annual survey on private capital flows.³ 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 in accordance with 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

³The 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.

with the United Nations Conference on Trade and Development (UNCTAD) requirements for compiling of Foreign Affiliates Trade in Services (FATS).⁴

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, reinvestment earnings and intra-company debt. In addition, the surveys capture information on FATS,⁵ which is validated with the audited company accounts and official government records. Published survey results are consolidated at the country level.

For this study, I use firm-level data on inward FDI flows which 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 (e.g. 166 in 2008 and 337 in 2017). However, variables for some firms are missing or cannot be linked over time. Accordingly, I restrict my analysis 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, 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.

5.2 Other data

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, sector 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 are 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.

⁴Obtained from Bank of Zambia, accessed 22/7/2019. 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.

⁵FATS 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.

5.3 Estimation technique

This section presents the estimation technique to be used in this paper. The standard fixed effects estimator is adopted. This approach is preferred because it controls for unobserved group heterogeneity (Gormley and Matsa, 2014). All standard errors are clustered at the firm level to correct for serial correlation (Desai and 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 investment to Zambia is resource-seeking, especially in the mining sector, it could be argued that access to natural resources is the main driver of investment to Zambia. By this argument, it 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 used in this paper 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 total inward FDI flows; new gross equity capital flows; new gross reinvested earnings flows; and new gross intra-company debt flows. I start by estimating the impact of selected independent variables on the total inward FDI flows. Thereafter, 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 a disinvestment in assets, or an affiliate extends a loan to a parent company, or if the subsidiary repays a loan in full from its parent or if reinvested earnings are negative.⁶ 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, I use levels.

The fixed effects equation of the following order will be estimated:

$$y_{i,t} = \alpha_i + \mathbf{x}'_{i,t}\boldsymbol{\beta} + \varepsilon_{i,t} . \quad (1)$$

where $\mathbf{y}_{i,t}$ is a set of dependent variables (gross total inward FDI flows ($fdi\ flow$), gross equity capital flows ($e\ flow$), gross reinvested earnings flows ($re\ flow$) and gross intra-company debt flows ($d\ flow$), i represents individual firms and t is a calendar year. \mathbf{x}' is a vector of independent variables. $\boldsymbol{\beta}$ is a vector of coefficients of the independent variables. α_i is a firm fixed effect and ε_{it} is the error term. I estimate this equation for each dependant variable: total inward FDI flows; equity financing; reinvested earnings financing; and intra-company debt.

On the right-hand side, the considered independent variables are the annual average copper price ($cup\ price$) and the annual average exchange rate ($x\ rate$). 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

⁶Disinvestment occurs when a direct investor sells their interest in a direct investment enterprise back to the direct investment enterprise or to 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].

seek to gain from this trade. When the real effective exchange rate (REER) is used, the results are not significantly different.

Other control variables on the right hand side include the FDI stock (*fdistock*). This variable is chosen because of the assumption that firms adjust their investment to a preferred level depending on the current position of investment. After the desired level of investment is determined, firms decide the mode of financing. This could be either through new equity capital, reinvestment earnings, or new intra-company debt. Another control variable is a policy dummy (*dpol*) to account for a macroeconomic policy change, representing the implementation of the currency management measures in 2012 and 2013. The last two control variables are foreign currency variables, foreign currency purchases (*fxpur*) representing the amount of foreign currency that banks purchase from firms, which is a proxy for earnings; and foreign currency sales (*fxsal*) representing the amount of foreign currency that firms purchase from banks, which is a proxy for expenses.

6 Key results

The objective of this study is to estimate the effects on the components of the 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. Included in the estimates are 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-year period for different reasons.⁷

The observations for equity flows, reinvested earnings flows, intra-company debt, total inward FDI flows, FDI stock, foreign currency purchases and foreign currency sales for mining firms are 182 for each variable. The observations for all firms are 1,908 for each variable in Table 1. These observations represent country of origin affiliate-year cells. An affiliate might have more than one source country in one year, from either the parent company or other affiliated subsidiaries. Some observations drop when the multiple source country entries are collapsed into one per firm. The focus of the study is restricted to mining firms with at least two observations of interest during the survey period.

6.1 Econometric results (H1, H3, H4, H5)

In this section, results of the fixed effects estimation of Equation (1) for the restricted sample of the mining firms are presented. Table 2, columns (1)-(4) presents the estimated effects of the copper price and the exchange rate on: total inward FDI flows in column (1); equity financing in column (2); reinvested earnings financing in column (3); and intra-company debt in column (4). These estimates only include firm fixed effects. Columns (5)-(8) displays results that also control for the FDI stock and the policy dummy on the right hand side. Results in Table 3 include additional controls, foreign currency purchases and foreign currency sales by commercial banks on the right hand side of Equation (1). Estimates in these two tables are tests for H1, H3, H4 and H5.

The results in column (1) suggest that the total inward FDI flows within firms are significantly impacted by the copper price. An increase of US\$1,000 in the average copper price results in an average US\$13.9

⁷Some 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.

TABLE 1: Descriptive statistics

	Mean	Std. Dev.	Min.	Max.	Obs.
Mining firms					
New equity flows (US\$ million)	6.9	48.4	-28.5	605.2	182
New reinvested earnings flows (US\$ million)	-9.9	119.1	-817.7	613.3	182
New intra-comp. debt flows (US\$ million)	33.7	138.8	-510.2	805.7	182
New FDI flows (US\$ million)	30.7	161.3	-797.7	803.3	182
FDI stock (US\$ million)	431.5	702.7	-39.0	3,132.6	182
Foreign currency purchases (US\$ thousand)	85.4	176.8	0.0	1,060.1	182
Foreign currency sales (US\$ thousand)	4.3	12.7	0.0	118.6	182
All firms					
New equity flows (US\$ million)	1.1	16.3	-151.7	605.2	1,908
New reinvested earnings flows (US\$ million)	0.3	40.9	-817.7	661.1	1,908
New intra-comp. debt flows (US\$ million)	3.8	45.7	-510.2	805.7	1,908
New FDI flows (US\$ million)	5.2	54.8	-797.7	803.3	1,908
FDI stock (US\$ million)	59.6	253.4	-431.0	3,132.6	1,908
Foreign currency purchases (US\$ thousand)	13.7	69.2	0.0	1,060.1	1,908
Foreign currency sales (US\$ thousand)	5.8	20.1	0.0	389.8	1,908

Notes.- Author calculations using the private capital flows and the foreign currency trades datasets. The data covers the period 2008-2017.

million rise in total inward FDI flows annually, all other variables held constant. The relationship is positive and statistically significant at the 10% level. 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. Although the relationship is not statistically significant, this result supports other theoretical and empirical evidence (see, for example, [Froot and Stein, 1991](#); [Klein and Rosengren, 1994](#)).

When the results in column (1) are compared to results in column (5), the estimates suggest that the effect of the copper price is stronger within firms when I control for the FDI stock and policy dummy. The coefficient on the copper price increases and is statistically significant at the 5% level. Similarly, 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 that there is a positive association between the total inward FDI flows within firms and the policy dummy. This evidence suggests that the total inward FDI flows within firms increased following the implementation of the currency management policies in 2012 and 2013. However, the estimate is not statistically significant.

A similar pattern is observed in column (1) of Table 3. The copper price and the FDI stock have significant impacts on the total inward FDI flows within firms. The coefficient of the copper price is higher than that of columns (1) and (5) of Table 2 and is statistically significant at the 5% level. The estimates suggest that the effect of an appreciation of the exchange rate on the inward FDI flows within firms weakens when controlled for the policy dummy and the foreign currency transactions. The impact of the FDI stock in column (1) of Table 3 is higher than column (5) in Table 2. The impact is statistically significant at the 1% level. This suggests that when I control for the foreign currency transactions, the impact of the copper price and the FDI stock within firms on inward FDI flows is stronger. The impact of the policy dummy is also stronger. These results support the **H1** prediction of a positive relationship of FDI within firms to the copper price and exchange rate movements. The results also suggest that the implementation of the currency management policies impacted positively the total inward FDI flows within firms.

TABLE 2: Estimated effects of macroeconomic variables on FDI inflows within Zambian firms, 2008-2017

	FDI (1)	Equity (2)	RE (3)	Debt (4)	FDI (5)	Equity (6)	RE (7)	Debt (8)
Copper price (US\$)	13.853* (7.527)	-6.902* (3.782)	11.396 (9.540)	9.358 (8.717)	15.966** (6.115)	-6.026 (3.939)	14.867 (9.171)	7.124 (6.012)
1,000*Exchange rate	-2.432 (5.782)	-2.860* (1.610)	-1.579 (4.634)	2.006 (7.978)	-1.430 (5.319)	-2.564 (1.944)	-1.209 (4.648)	2.343 (7.909)
FDI stock					0.087*** (0.011)	0.024 (0.019)	0.010 (0.011)	0.054*** (0.019)
Policy dummy					16.160 (22.309)	0.766 (4.639)	-36.655 (32.930)	52.048 (33.985)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	178	178	178	178	178	178	178	178
R-squared	0.021	0.012	0.020	0.004	0.090	0.057	0.029	0.050

Notes.- Firm fixed effects are estimated as per regression model (1) for the period 2008-2017. 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.

The evidence in column (2) of Table 2 shows that an appreciation in the exchange rate has a negative impact on equity capital within firms. The relationship is statistically significant at the 10% level. The results also show a significant negative effect of the copper price on the equity flows within firms. The effect is statistically significant at the 10% level. The values and signs of the coefficients of the copper price and the exchange rate in column (6) are not substantially different from the coefficients in column (2), save for the statistical significance levels. The coefficients in column (6) are not statistically significant. The estimates in column (6) indicate that the FDI stock and the policy dummy have insignificant positive impacts on the equity flows within firms. All estimations in column (6) are not statistically significant.

When I control for foreign currency transactions, I observe a similar pattern in column (2) of Table 3 and in columns (2) and (6) of Table 2. 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 within firms. The FDI stock has a positive, but a weak association with equity capital within firms. The coefficient of the policy dummy is positive, but relatively small and not statistically significant. The effects of the foreign currency transactions on the new equity capital within firms is negative.

The weak relationship between the copper prices 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 one would expect that equity financing would be less sensitive to copper prices, exchange rate and policy change. This evidence confirms with a qualification the **H3** prediction that equity flows within firms are positively associated with exchange rate depreciation.

The results in column (3) of Table 2 show that reinvested earnings within firms are positively associated with the copper price. The prediction of **H4** is supported by this finding. However, the effect is not

statistically significant. Notwithstanding, this suggests that investors use their own funds to expand their operations when the annual average copper price increases. Intuitively, this is logical and expected as an increase in the copper price would be perceived as offering a good investment opportunity, which is in support of [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](#).

When I control for the FDI stock, policy dummy and foreign currency transactions, it turns out that results in column (7) show that the coefficient for the copper price is stronger. The coefficient for the exchange rate is not substantially different from the one in column (3). Both coefficients are not statistically significant. The copper price has a positive impact on reinvestment earnings financing within firms, while an appreciation in the exchange rate results in a decline in the reinvested earnings financing. Evidence in column (7) suggests a negative association between reinvested earnings financing within firms and the policy dummy. Firms reacted negatively to the currency policy implementation by reducing their reinvested earnings financing. In other words, the introduction of the currency management policies may have triggered the withdrawal of reinvested earnings within firms.

When I control for foreign currency transactions, I observe that the coefficients in column (3) of [Table 3](#) are stronger than those in columns (3) and (7) of [Table 2](#). All coefficients are not statistically significant, except for the foreign currency sales, which is statistically significant at the 10% level. Taken together with the effect of the policy dummy, these results suggest aggressive repatriation of profits within firms.

TABLE 3: Estimated effects of macroeconomic variables on FDI inflows within Zambian firms, 2008-2017

	New FDI (1)	Equity (2)	RE (3)	Debt (4)
Copper price (US\$)	16.448** (6.590)	-5.772 (3.902)	16.392 (9.803)	5.828 (5.165)
1,000*Exchange rate	-0.727 (5.222)	-2.461 (1.956)	-0.201 (4.740)	1.934 (7.546)
FDI stock	0.094*** (0.023)	0.025 (0.020)	0.021 (0.015)	0.048** (0.021)
Policy dummy	20.316 (24.153)	1.370 (4.284)	-30.725 (33.029)	49.671 (36.644)
Forex purchases	0.006 (0.248)	-0.030 (0.019)	-0.131 (0.116)	0.167 (0.150)
Forex sales	-1.233 (1.462)	-0.057 (0.132)	-1.202* (0.645)	0.026 (0.947)
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	178	178	178	178
R-squared	0.101	0.062	0.063	0.073

Notes.- See notes in [Table 2](#)

Column (4) of [Table 2](#) tests the prediction in **H5** that financing FDI within firms through intra-company debt is volatile and sensitive to exchange rate movements and copper prices. The findings fully support **H5**.

The evidence displays that intra-company debt financing within firms increases with respect to an increase in the copper price. The results also suggest that debt financing within firms increases when the exchange rate depreciates. The results in column (8) of Table 2 show that the 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 dummy. Although this result is weak, it is fundamentally important. The coefficient is stronger than those on the other two components. This suggests that intra-company debt was the preferred means of financing following the implementation of the currency management policies within firms. These estimates support other empirical literature that suggests that when exposed to a macroeconomic policy shock, such as an exchange rate crises, firms prefer debt to equity (see, for example, [Hennessy and Whited, 2005](#); [Jermann and Quadrini, 2012](#)).

The estimates in column (4) of Table 3 suggest that the impact of the copper price and the exchange rate on intra-company debt within firms is reduced when I control for the foreign currency transactions. The results, however, are not statistically significant. The evidence suggests that the FDI stock has a significantly positive effect on intra-company debt within firms at the 5% level.

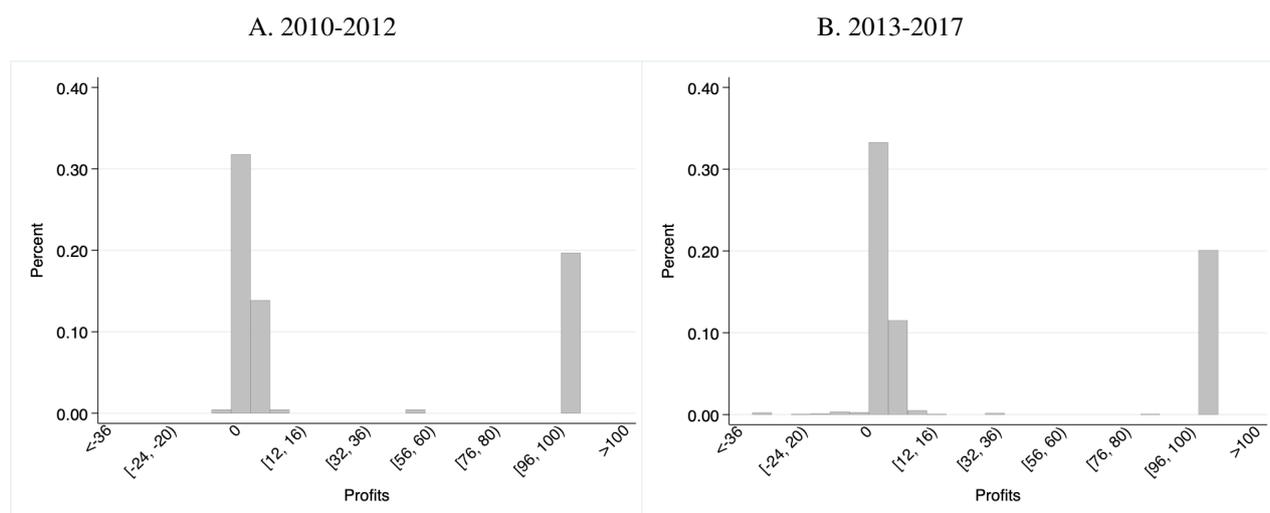
6.2 Do firms record stable profits? (H2)

In evaluating the **H2** prediction that firms record stable profits, a graphical approach is applied. A series of histograms of year-by-year and individual year changes using a combination of reported profits and reinvested earnings are constructed, although I only report two here. To take care of 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 firm's profits dynamics over time. Nonetheless, the data suggest that a nontrivial proportion of firms record zero change and reducing profits.

In Figure 4, the histogram displays the distribution of year-to-year percentage changes in profits. Sub-figure A pools percentage changes in profits for all firms for the period 2010-2012 and sub-figure B pools percentage changes in profits for all firms for the period 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. Both sub-figures display that a higher proportion of changes in firm profits are concentrated around zero. This is supported by statistics in Table 4 and Table 5.

The results in Table 4 suggest 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. What is more surprising is that despite these firms reporting zero change or reduced profits, reinvested earnings, which are a function of profits, constituted a substantial proportion 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 financing. This suggests that firms recorded substantial profits, particularly the mining sector, whose profits could have been boosted by the high copper prices which were at a record high (see Figure 3). Since mining operations are huge, it is possible that profits recorded by a few large firms could offset the losses of small firms. It is equally surprising that when the number of firms that recorded zero change or reduced profits was second lowest in 2012, reported profits were low, with huge reinvestment earnings

FIGURE 4: 2010-2017, pooled changes, all firms



Notes.- Pooled annual changes of profits for all firms before and the policy change, 2010-2012 and pooled annual changes of profits for all firms before the policy change, 2013-2017.

outflows (see Figure 1). The notable highest number of firms reporting zero change or reduced profits was in 2017, about 76.0%. During the same year, the recorded profits substantially increased, leading to increased reinvested earnings financing (see Figure 1). The potential explanation of such behaviour is that firms may have engaged in aggressive repatriation of their profits in 2012 and 2013.

TABLE 4: 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.

Statistics in Table 5 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 pair of years 2014-2015. This suggests that there was an increase in the number of firms that recorded positive or increasing profits. The elevated fraction of firms reporting zero change or reducing profits suggests that a high proportion of 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).

TABLE 5: 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 private capital flows 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.

6.3 Robustness and other discussion

Robustness is tested by estimating Equation (1) on the unrestricted full sample. Although the full 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, firms not directly involved in mining, may still be affected by the copper price developments. By this reasoning, I re-estimate Equation (1) on the full sample of firms. Estimates from the unrestricted sample are qualitatively the same with the ones obtained from the restricted mining sample. However, I do not report them in this paper, but they are available on request.

The analysis in this paper 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 the total inward FDI flows within firms in the mining sector are positively associated with the copper price. However, the relationship between the total inward FDI flows within firms and the exchange rate is negative. The result is not statistically significant. This result suggests that investment in the commodity sector is less sensitive to exchange rate movements. This result corroborates the findings of a great deal previous work (see, for example, [Pain and Welsum, 2003](#)). This current study also confirms that the existing level of FDI stock within firms plays an important 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 rather surprising, because the country recorded the highest amount of total inward FDI flows during the period when the currency management policies were implemented in 2012 and 2013 (see [Figure 1](#)).

The analysis of individual components of FDI provides important insights about the financing behaviour within firms. The evidence indicates that equity financing within firms is negatively impacted by an appreciation in the exchange rate. This is an unsurprising outcome. The surprising outcome, however, is the effect of the copper price on equity financing within firms, which is negative. This is somewhat counterintuitive. This result suggests that analysing the response of equity capital to macroeconomic variable is less useful in unravelling the financing strategy within firms in the mining sector, as it shows less signs of adjustment.

The response of reinvested earnings to macroeconomic variables within firms is interesting. The coefficients are all insignificant except when I control for foreign currency transactions, I get a significant coefficient on foreign currency sales. As expected, reinvested earnings increase with respect to an increase in the copper price. An inspection of the coefficients relating to the response of the three components of

FDI to the copper price shows that reinvested earnings have the largest effect. This suggests that reinvested earnings financing is the preferred form of financing within firms when the price of copper is favourable. A high copper price boosts the scope for increased profits, which boosts 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 breakdown of the three components of FDI in Figure 1 shows that reinvested earnings were a major source of financing of total annual inward FDI flows for some years, although there were also periods of withdrawals. This suggests that firms had positive earnings for most of the years during the review period. However, reinvested earnings outflows were reported in 2009, 2012, 2013 and 2015. The low reinvested earnings in 2009 could be attributable to the global economic crisis. However, it is difficult to find a convincing explanation for the other years. A potential explanation, however, could be that firms were reacting to 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 complete opposite of what happened. During this period, Zambia recorded phenomenal growth in inward FDI flows (see Figure 1).

What emerges in this study is that when the Government implemented the currency management policies, massive reinvested earnings outflows were recorded. At the same time, massive inflows of intra-company debt to finance the huge expansion of FDI inflows. The substitution of intra-company debt for reinvested earnings as the major 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 suggests that a non-trivial proportion of firms record zero change and reducing profits throughout the review period. There seems to be a contradiction here. On the one hand, firms report zero change and reducing profits. On the other hand, firms are using reinvested earnings to finance their growth. This inconsistency may partly be subject to measurement errors. This is an important issue for future research.

The findings of this study have a number of practical implications for Zambia and other commodity dependent countries. With the widespread international competition for investment resources, it is critical that Government policies are balanced, so that they attract investment that benefits the country. Relevant investment policies must be robust and cognisant of the fact that reinvested earnings and intra-company debt are the most sensitive forms of financing. Perhaps more importantly, 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).

In view of these facts, it would be prudent to consider policies that encourage reinvestment of profits. To the extent that profits repatriated to the parent companies are considered as 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 will facilitate the establishment of firms that will promote value addition to copper. This will enable Zambia to derive maximum value from its resources. In addition, implementing policies

that restrict potential tax evasion through the use of intra-company debt financing would be beneficial, provided they don't harm inward FDI flows.

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

7 Conclusion

This study investigates the response of the components of FDI flows to macroeconomic variables within firms in Zambia for the period 2008-2017. Using a new database constructed from anonymised confidential firm-level data, this study presents the following facts. Estimates show that FDI inflows are positively associated with copper prices. The empirical evidence supports the existence of a negative correlation between currency appreciation and a decline in the total inward FDI flows.

Equity financing within firms is negatively associated with exchange rate appreciation. There is a significant negative effect of the copper price on the equity flows within firms. Equity financing is weakly associated with the policy dummy. In other words, equity financing shows less signs of adjustment in response to the policy change.

Reinvested earnings financing is positively impacted by the copper price. Reinvested earnings financing declines in response to an appreciation in the exchange rate. The policy change has a negative effect on reinvested earnings financing. The evidence indicates that reinvested earnings financing is substituted for intra-company debt when the policy measures were implemented in 2012 and 2013.

Intra-company debt financing increases when there is a rise in the copper price. A depreciation in the exchange rate has a positive effect on intra-company debt financing. The policy change has a positive effect on inward FDI flows. When the currency management policies were introduced, the evidence suggests high substitutability between reinvested earnings and intra-company debt. 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 then may indicate that the policy change triggered the aggressive repatriation of profits and phenomenal growth in phantom intra-company debt.

The analysis of the profit dynamics show that a high proportion of firms reported zero change or reducing profits on a year-to-year basis. Whereas part of this could be attributed to measurement errors, it appears doubtful that proportions of this scale could purely be a statistical artefact. There is substantial evidence to suggest that this observed firm behaviour may be attributable to other explanations. What is surprising and seems contradictory is the fact that, in periods when firms recorded high reinvested earnings financing, the proportion of firms reporting zero change or reducing profits was also high. This contradiction might point to extensive tax sophistication of foreign firms (Dharmapala, 2014).

Overall, the study provides interesting findings on the determinants of inward FDI flows in the mining sector in Zambia and how the individual components respond to macroeconomic variables and profit dynamics within firms. The evidence of a high proportion of firms reporting zero change or reduced profits year-to-year and the general growth in reinvestment earnings financing at the same time, seems contradictory. Taken together, these results may suggest that firms engaged in aggressive profit shifting. This are issues for future research.

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