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| RESEARCH ARTICLE

Mineral Resource Management and Economic Growth: What Zambia Should Learn from Chile

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| ABSTRACT
Natural resource dependent economies are totted of being in a cycle of economic boom and slump, the natural resource curse. This paper looks at natural resource management and compares the relations between prices of copper and macroeconomic performance in Chile and Zambia, two copper-rich countries with contrasting fortunes. It explores the fiscal policies and mining taxes regimes, and non-fiscal benefits of mining. Eleven indicators are used to compare the macroeconomic performance of the two countries and domestic and external macroeconomic volatility and its possible source in the countries. Using the indicators, it was found that the Zambian economy is relatively more affected by fluctuations in copper prices than the Chilean economy. That both domestic and external macroeconomic uncertainty is more rampant in Zambia than in Chile shows evidence of the detrimental effect of Zambia's indiscreet populism-driven policy inconsistencies on the economy.

| KEYWORDS

Macroeconomic performance; Macroeconomic uncertainty; Macroeconomic volatility; Chile; Zambia

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1. Introduction

Most developing countries have failed to break free from the scourge of natural resource exportation dependence. They are in a recurring cycle called the paradox of plenty or the natural resource curse, struggling to sustain growth long enough to achieve economic development (Badeeb et al., 2006; Frankel, 2012; Aunty, 1990). These countries, in periods of plenty, transfer resources from tradable sectors to non-tradable sectors (Barder, 2006). They fail to prudently manage gains from a commodity boom by allowing local currencies to appreciate, affecting others export-industries that have the potential to sustain growth after the bubble bursts, an economic condition known as the Dutch Disease (Gondwe & Pamu, 2014; Rivero et al., 2017). A condition that has given resurgence to claims by Sachs and Warner (1995) is that there is an inverse relationship between the share of natural resource exports to GDP and the economic growth rate (Ducoing, et al., 2018).

These countries often fail to tax the dominant sector, resulting in low revenue contribution by the sectors. Generally, the state is plagued by corruption, lacks the capacity to effectively and efficiently collect taxes, and mining firms tend to use their influence to sway authorities into giving them favourable rents for the resources (Bebbington, et al., 2018). The volatility of the budget is worsened by external factors (i.e., exchange rate and the commodity prices) that affect the tax revenue, create adjustments in the tax revenue that make the tax base of the sector really smaller and inhibit the nation from fully benefiting from its exhaustible-resource (Crivelli & Gupta, 2014). Moreover, the Dutch disease affects economic diversification (Bature, 2013). As the international price of the dominant commodity export rises, the supply of foreign currency increases due to increased revenues causing the local currency to appreciate. The appreciation of the local currency makes other export commodities become expensive, causing exporters to look for alternative markets. In addition, economic indicators (i.e., inflation rate, fiscal deficit, budget deficit, per capita income, GDP growth rate, and others) are also pinned to a single industry whose performance is affected by the economic performance of more industrialised economics that require the commodity (Gondwe & Pamu, 2014).

Few countries embody natural resource dependence like Zambia and Chile. Both are highly dependent on copper. Since 1964, when Zambia became independent, both have experimented with the two extremes of economic ideologies, socialism and capitalism, experienced some periods of recessions and booms, commodity booms and slumps, as well as banking crises. Even though they faced similar challenges, Chile happened to come out stronger and revered as a model for other natural resource rich-economies (Meller & Simpasa, 2011). The liberal reforms that preceded the 1982-83 banking crises, led by the Chicago Boys, and the post crises policies managed to reduce the effects of copper prices volatility on the economy, ushering in the Chilean 'Golden Period' of unprecedented annual growth of 7.2% (1985-1997), and post-Golden Period annual growth of 5.3% (1998-2005), regardless of booms and slumps in copper prices (Buc, 2006; De Gregorio, 2004). The adoption of progressive policies not influenced by populism has been key to policy stability, which is lacking in the case of Zambia, which has been pivotal to Chile's success. In Zambia, imprudent and inconsistent policies have been detrimental economy (Bebbington, et al., 2018). Relatively, the Zambian economy is both domestically and externally more volatile and dependent on copper than Chilean economy. Its macroeconomic performance is affected more by copper prices and shows evidence of severe cases of both the natural resource curse and Dutch disease (Weeks, 2008).

The reason for this paper is to compare the effectiveness of copper prices on the macroeconomic performance of Chile and Zambia. The study uses a historical perspective of the economic patterns since Zambia's independence in 1964. To understand the effects of policy stability on the relationship, economic uncertainty in the two countries is compared.

The rest of the paper is organised as follows: Sections 2 and 3 examine the economic backgrounds of Chile and Zambia, respectively. Then the macroeconomic performance, and sources of domestic and external volatility, of Zambia and Chile are compared in Section 4. Finally, a conclusion is offered in section 5.

2. Chile's Economy since 1964

In order to have a broader understanding of Chile's economic history will backtrack to the period before 1964 and start in the late 1950s, when Chile faced chronic inflation and turbulent economic growth. In 1955, the Chilean government engaged renowned Chicago consultancy firm, Klein Saks, to come up with an anti-inflationary programme for them to implement. Klein Saks recommended major reforms and identified Chile's huge fiscal deficit, monetary expansion, exchange rate policy, trade policy, and wage indexation policy to be the cause of its inflation problems (Edwards, 2007).

After implementing the reforms proposed by the firm, inflation drastically fell as the fiscal deficit turned into a fiscal surplus of 1.6% of GDP; it also adjusted its wage indexation below inflation the rate to anchor expected inflation. However, low inflation did not last as copper prices declined, and the government abandoned the reforms due to political pressure in 1957, causing the fiscal surplus to revert to a deficit of 3% in 1962, as well as a Balance of Payment (B.o.P) crisis and exchange rate depreciation. The inflation rate rose and remained relatively high at 27.7% in 1962, 45.3% in 1963 and 38.5% in 1964. The financing of the fiscal deficit was mostly by seigniorage (Caputo & Saravia, 2019).

Eduardo Frei Montalva became president in 1964 and adopted socialistic inclined policies aiming to give the public an active role in income distribution and investment. To achieve this government increased foreign financing and income tax at a rate higher than expected. This led to the doubling of both domestic and foreign debt, acquired mostly from international and private banks, while seigniorage remained constant (United States Senate, 1975). Frei's government also adopted an exchange policy of minimum devaluation to prevent real exchange appreciation, that failed to alleviate the inflation problem. The inflation rate declined to 25% and 17% in 1965 and 1966, respectively, from 38.5%. The main reason for the drop in inflation was the fall in the fiscal deficit, from 3% to 1.5% of GDP, during the same period (Caputo & Saravia, 2019). However, the gradual fall in inflation could not be contained, as it rose from 21.9% to 34.9% from 1967 to 1970, correspondingly. While from 1964 to 1966, the economic growth rate was 4.31%, with the highest growth rate being 11.24% recorded in 1966 (The World Bank, 2020).

Even though socialist elements can be traced back to Eduardo Frei's administration, Allendes fully embraced them by nationalising the banking sector and most industries in a socialism campaign dubbed 'The Chilean Way to Socialism' (Schmidt-Hebbel, 2006). During Allende's tenure, the government had a heavy-hand on the economy. State control increased from 14.2% in 1965 to 39% in 1973, with what remained of the private sector subject to price, interest rates, and exchange rate controls; high tariff and non-tariff barriers to trade; very high inflation rate; shortages and rations (Brown, 2018).

The socialism reforms that came with Allendes started out well, with a growth rate of 9.42% in 1971. This growth came at the expense of fiscal prudence, as the government increased its expenditure, raising aggregate demand and public deficit levels, and increased fiscal deficit from 0.5% in 1970 to 7.3% in 1971 and 11.4% of GDP in 1972 (Caputo & Saravia, 2019). As a result, the bubble busted in 1972, and the economy went into recession, declining by 1.02% and 5.03% in 1972 and 1973, respectively. The economic condition worsened as the copper price fell, the fiscal deficit doubled in 1973 to 23%, the inflation rate was 77.8% in 1972 and became hyperinflation in 1973 at a rate of 352.8%, the trade deficit increased, and labour strikes became prominent

(World Bank, 2020; Larrain & Meller, 1991). These events became the hallmark of Allendes' last day as president before a military coup in 1974.

The new regime, of military junta Pinochet, carried out reforms similar to those proposed by Klein Saks but being led by the 'Chicago Boys'[1]. Although the reforms were not popular, the junta was able to implement them without regard for popular or legislative support. Like Klein Sak's policy recommendations, the policy aimed at reducing the fiscal deficit (Silva, 2010). During the period 1974-79, the inflation rate drastically declined from 504.74% in 1975 to 33.39% in 1979 (World Bank, 2020). This was because of the adopted contractionary monetary policy driven by the exchange rate, fiscal policy, and accumulation of reserves. In 1975, there was a crisis, as the economy declined by 12.91% (World Bank, 2020). The reason for this was that the price of copper fell, causing a fall in terms of Trade (T.o.T). The other contributing factor was the fiscal adjustment that reduced the fiscal deficit by 0.4%, adversely affecting Aggregate Demand, which declined to 21% of GDP. Afterwards, the economy boomed, with double-digit growth recorded in 1977. The momentum continued as the government eliminated subsidies, freed interest rates, replaced the sales tax with the value-added tax, reprivatized the public sector, and successfully integrated the mines under CODELCO (Edwards, 1985).

In 1979, the government adopted a fixed exchange rate regime. The adoption of the regime led to a subsequent appreciation of the (effective) real exchange rate, which, together with the wage indexation, depressed interest rates, and large domestic and foreign debt, led to the Chilean-banking crisis of 1982. The fixing of the Peso and mismatch between private debt – which was mostly foreign debt- 41.8% of GDP, and public debt - 27% of GDP, caused a sharp depreciation of the Peso, and most banks became insolvent because they were unable to recover most of their debts that were in foreign currency (Caputo & Saravia, 2019). In 1982, the exchange rate was reverted to a crawling peg, which devaluated the exchange rate and exacerbated the burden of foreign debt, and deepened the crisis. During the crisis, they were 800 private sector bankruptcies and 8 financial institution bailouts. By 1985, the government had bought many of the banks' debts and bailout them to the point that the Chilean financial sector almost became nationalised. The government also agreed on three debt-rescheduling programmes with its international lenders in 1983, 1985 and 1989. To achieve fiscal consolidation, in 1987, the Copper Stabilisation Fund (CSF) was introduced. The CSF accumulated when copper prices were higher than a reference price and decreased when the market price was below (Solimano & Guajardo, 2017). Economic recovery after the crisis was slow, with full output achieved in 1989 when foreign investment rose due to increased copper prices (Brown, 2018).

The period after the crisis to that before the Banking Crisis was known as the Chilean 'Golden Period,' in which Chile achieved sustained economic growth, averaged at 6.58% (World Bank, 2020). Inflation gradually fell during the period, with single-digit being recorded starting in 1995, putting an end to the years of double-digit and hyperinflation. The inflows of foreign investment that started in the 1980s continued. In the 1990s, almost half of the growth came from capital investment sustained by record investment rates. The private sector accounted for 25% of copper production in 1990, and the Total Factor Productivity in the 1990s was 30% (De Gregorio, 2004). The mining sector received huge investments, such that by 1997 copper accounted for 42% of Chile's exports, mining 50% of exports, and 8% of GDP (Spilimbergo, 1999). The crawling was in place until 1999, when the appreciation of the Peso ceased (Gammage, et al., 2014).

The Asian Financial Crisis (AFC) was the dent in the 1990s; the crisis began because of currency devaluation and economic recession in Thailand, Indonesia, Malaysia, and the Philippines before it spread, affecting eight Asian countries. The AFC affected Chile because of its trade with the eight Asian economies that made up one-third of the world's copper demand and accounted for 14% of Chile's total exports. The AFC affected export prices as the copper price fell and export demand reduced, reducing the T.o.T. It also affected stock and financial markets (Stalling, 1998). Moreover, it did affect not only external and fiscal accounts but also output and income. The economy went into recession in 1999, declining by 0.41%. The crawling peg exchange rate regime lasted only until 1999, when the Central Bank liberalised the Peso to alleviate the problem, changing the Central Bank's policy from exchange rate to inflation rate targeting (Morande & Schmidt-Hebbel, 2000).

The economy recovered in the 2000s, with a solid economic growth average of 4.84% sustained until 2009, when the economy went into recession because of the Global Financial Crisis in 2008 (Cortes, 2016; World Bank, 2020). The growth was promoted by continuous foreign investment propelled by the high demand for resources in China. In the mining sector, private firms accounted for 25% of production in 1990, whereas in 2016, it had grown to 68% (International Copper Association, 2017). In 2001, the government introduced a policy based on the Cyclical Adjusted Balance to determine the budget by isolating copper prices and avoiding cost pressure. A prolongation of the cyclically adjusted balance, the Social Economic Stabilisation Fund (FEES), financed by the Central Bank and fiscal surplus to finance fiscal deficit as created in 2006, the FEES and Pension Reserve Fund (PRF) replaced the CSF. This created fiscal stability and managed to offset the economic shocks of the 2008 crisis (Rodriguez, et al., 2007).

[1]The Chicago Boys was a group of Chilean economists trained at the renowned Department of Economics of the University of Chicago then headed by Milton Friedman.

Furthermore, in the 2000s, in spite of being volatile, single-digit inflation averaging 3.37% was sustained, with the lowest being 0.35% in 2009 and the highest at 8.72% in 2008. In 2009, as the global economy slowed, Chile went into recession.

The economy quickly recovered after 2009 and registered a growth average of 3.60%, 2010-18. The highest growth was 6.11% in 2011, and the lowest growth was 1.77% in 2014 (World Bank, 2020). The major challenge in the 2010s was the fall in copper prices due to reduced growth in China, which caused a slump in the growth rate in 2014 and again in 2016-17. Inflation was maintained around the inflationary target rate of 3% (ECLAC, 2014; ECLAC, 2016). While mining has continued to be the largest industry, accounting for 50% of total exports while contributing to 10% of GDP (World Bank, 2020).

3. Zambia's Economy since 1964

The modern economic history of Zambia starts with the British South African Company (BSAC) undertaking an exploration of the land north of the Zambezi. The BSAC acquired concessional rights and assumed administrative control over two territories, North-Western and North-Eastern Rhodesia, which merged to form Northern Rhodesia and later become Zambia (Bebbington, et al., 2018). The BSAC constructed a railway from the south to the copper deposits near the Congo/Zaire border, introduced and collected taxes and mineral royalties before it handed over administrative control to the British government. A hut tax was introduced as an incentive to move Africans from the rural areas to seek work in the developing monetary economy of the towns along the line of rail. The towns grew as large-scale fast-growing mining attracted both African and Skilled-European migration, developing the still existent dualist economy comprising a technically advanced monetary urban economy and a subsistent agrarian rural economy in the country (Baldwin, 1966). By the 1950s and 1960s, mining acted for over 90% of export earnings and more than half of GDP. Nevertheless, the country did not benefit much from the revenue generated.

In the last 40 years before independence, only £5million generated from the country was spent on developmental projects in Zambia. Southern Rhodesia and developed countries received £400million, the BSAC took a gross of £160million and net of £82million, and the British government collected £40million in taxes (Simson, 1985).

At independence in 1964, the first Zambian government of Kenneth Kaunda inherited one of the most industrialised economies in Sub-Saharan Africa with a GDP and per capita income of $839million and $242.3, respectively (World Bank, 2020). During the first 10 years of independence, a period known as Zambia's Golden age, it registered an impressive annual growth rate of 7%, driven by high copper prices, external surpluses, and low average inflation (Andersson, et al., 2000). There was an investment in power, transport, agriculture, roads and social services –mostly in urban areas, through parastatals. An agricultural market system was established by creating a sole buyer of maize and cotton, the National Agricultural Marketing Board (NAMBOARD), to eliminate price differences inherited from the colonial regime and introduced an industrialisation programme based on 'import substitution' to diversify the economy from copper, which made up 94% of exports and 50% of revenue during the period. In 1968, the government adopted the Mulungushi reforms, which replaced Zambianisation, aimed to empower indigenous Zambians economically with nationalism because most Zambians lacked the entrepreneurial and managerial capacity required, paving the way for sweeping economic reforms that saw 80% of industries being nationalised and increased government participation in the economy (Fundanga & Mwaba, 1997; Kaela et al., 2001).

In 1965, Ian Smith's Southern Rhodesia government unilateral declared independence from Britain. The Unilateral Declaration of Independence (UDI) resulted in British sanctions on Southern Rhodesia; the sanctions obliged Zambia, a frontline state in the fight against the minority in the region, not to trade through with or through its main route that passed through Rhodesia. Economic losses were incurred during the period. Nonetheless, an alternative route running from Kapiri Mposhi to the Dar-es-Salaam port, the Tanzania Zambia Railway (TAZARA), was constructed with the help of the Chinese government was completed in 1975, as well as an alternative pipeline, the Tanzania Zambia Mafuta (TAZAMA), financed by an Italian inter-government loan (Fundanga, 2005). The effects of the disruption in trade routes exacerbated the effects of the fall in copper prices and the rise in fuel prices that caused global inflation. The fall in copper prices deteriorated Zambia's external position, increased inflation, caused the GDP per capita to fall, and affected the performance of the mining sector. The other sectors could not cushion the effects of the fall because the copper boom had reduced industrial activities, the government transferred resources from the sector to non-tradable sectors (Andersson, et al., 2000). Financial capacity was hampered as fiscal surplus became a deficit, and the government accrued both domestic and foreign debt (Cheelo & Banda, 2017). To prevent this situation from worsening, the government introduced price controls and started drawing IMF Balance of Payment assistance in 1973, and in 1978 Zambia became eligible for World Bank's IDA funding (Rakner, 2003).

For the remainder of the 1970s, 1975-79, the GDP per capita and the economy declined on average by 3.91% and 0.62% a year, respectively (World Bank, 2020). Foreign reserves were completely exhausted by 1977, making Zambia dependent on the Bretton Wood institutions and donor community for foreign exchange requirements through a series of stand-by agreements (Rakner, 2003). In 1978, the lenders started pushing for reduced internal borrowing, a 10% devaluation of the kwacha, reduced government supplies, and more realistic policies (Mungule, 2004). The government refused to bend, hoping copper prices would rebound, and

continued to borrow heavily to compensate for the reduced income from the mines and facilitate consumption and investment. Inflation increased as debt increased, foreign financing dried up, output was restricted by price controls and high tariffs. The unstable political environment that developed in the 1980s aggravated the situation by discouraging private investment (Fundanga, 2005).

In the 1980s, as it failed to meet external arrears targets, the Bretton wood institutes and the donor community started pressing for greater reforms. In 1985, the government and IMF agreed on a Structural Adjustment Programme (SAP), which proposed the dismantling of central control, liberalization of the exchange rate by introducing a foreign exchange auction system; the promotion of the role of the private sector; elimination of subsidies; restructuring of State-owned Enterprises; and reduction of civil service by 25% (Rakner, 2003). The reforms seemed to be politically unpopular, and in 1987 after riots broke-out, when maize meal prices skyrocketed due to the removal of maize subsidies, the SAP was replaced with the New Economic Recovery Programme (NERP). The NERP was not welcome by the international community because of unrealistic targets. It suggested servicing debt which was 187% of GDP with only 10% of export earnings after deducting foreign exchange requirements for various sectors. However, the government could not sustain this because by 1986 government deficit had grown to 26% of GDP (Andersson, et al., 2000). Consequently, due to lacking foreign support, in 1989, the government returned to an IMF programme, again dismantling price controls and trying to contain the effect of this reform by introducing a coupons system for the poor urban household (Rakner, 2003). However, as prices drastically increased, costly riots that led the way for the reintroduction of multi-party politics and eventual change of government erupted in 1990.

The new government, by Fredrick Chiluba's Movement for Multiparty Democracy (MMD) Party, found an economy that had only grown by 0.63% per annum since 1975 and per capita income reduced by 2.55% per annum, with soaring levels of the hyperinflation of 97.64% (World Bank, 2020). Debt had accumulated from $627million in 1975 to $7.2billion in 1991, representing 278% of GDP (Hendriks & Soko, 2011). Immediately after forming a government, the MMD embarked on reforms to transform the country from a centrally planned economy to a market economy, requiring the privatization of public economic activities and liberalization of prices. The government adopted an IMF-designed SAP aimed at restoring macroeconomic stability, facilitating private sector growth, and privatizing and deregulating agricultural and industries (Fundanga, 2005). Implementation of the reforms started with the removal of price controls, enacted amendment of the Privatization Act of 1992, the reforming of the monetary sector, including the use of market-based monetary instruments, and the liberalization of the money market, allowing for the entry of commercial banks. Trade restrictions were minimized from 11 tariff bands of 0-100% in 1991 to 4 tariff bands of 0-25% by 1996 (Ndulo & Mudenda, 2010). A cash budget system was introduced to instil budget discipline; a semi-autonomous Zambia Revenue Authority was established in 1994 and replaced Sales tax with VAT tax efficiency.

However, despite the privatization act being amended in 1992, privatization of the mines only commenced in 1995. The process was further delayed as the government switched from its initial plan of privatizing Zambia Consolidated Copper Mines Investment Holdings (ZCCM-IH) in unbundled units by open tender to privatizing it in bundled forms, delaying its completion to 2000 (Craig, 2001) . According to Lundstol & Isaksen (2018), because of the delay, ZCCM-IH continued making hefty losses of up to $l million per day. The total estimated loss from 1993 to1998 was $606 million. The poor performance of the mining sector resulted in unsubstantial annual growth of 1.31% in the 1990s and two recessions in 1994 and 1998 -as a result of the AFC, which affected the commodity market, while per capita income declined by 1.29% as the population continued to grow faster than the economy. The contractionary monetary policies implemented during the period managed to drastically reduce inflation from 183.31% in 1993 to 24.41% in 1997 (World Bank, 2020).

In the 2000s, the economic fortunate again changed as the copper prices rose, demand in China increased, and Zambia received debt relief after attainment of the HIPC and MDRI completion point (African Development Bank, 2003). The economy and per capita income grew at an average of 6.82% and 4.03% per annum, in that order, as copper prices surged from $1779 in 2003 to $8822 in 2011. The windfalls from the rising prices increased copper exports earning from $518million to $6.5billion, reversing the Current Account balance from a deficit of 13.5% to 4.7% (UNCTAD, 2017). This was after rectifying the mineral royalty from the world's lowest of 0.6% to 3% and later 6%, and raising corporate income tax for mines from 25% to 30% (Simpasa, et al., 2013). Foreign reserves soared further as the country received a $4billion debt relief package and consolidated its fiscal space by reducing public investment from 3.6% of GDP (2006) to 2.6% of GDP (2006). The kwacha appreciated the detrimental effect of the Non-Traditional Export (NTEs) sector because of the debt relief package and boom in copper prices (Cali & te Velde, 2007; Gondwe & Pamu, 2014).

Double-digit inflation, which was prevalent for most of the 2000s (except in 2006) and had become a past scourge since the adoption of an inflationary target system in 2009, was resurrected in 2014 after the country experienced a drought that led to an electric-power deficit and low agricultural output, and depreciation of the kwacha due to the underlined factors and negative global conditions (Cheelo & Banda, 2017). This caused the lowest growth rate since the 1998 recession of 2.92% and a surge in inflation. Contractionary monetary policy halted the depreciation of the kwacha. The strengthening of the kwacha plummeted

interbank foreign exchange by 86.3%, from $789m in 2015 to $108m in 2016. Fiscal pressure increased because of unbudgeted spending on electricity and higher than expected interest payment. The fiscal pressure exacerbated the reducing fiscal space, which had already deteriorated because of the lack of fiscal prudence, 45% wage increase for civil servants, and borrowing had increased from $5.3billion (2014) to $7.2billion (2015) and the $7.9billion (2016), in addition to a total of $3billion worth of Eurobonds issued by the government, by way of using debt to finance its fiscal deficit. The debt situation put the economy under stress. Since most of Zambia's debt is non-concessional and its Eurobond bond has a bullet repayment structure (World Bank, 2017).

4. Mineral Resource Management and Economic Growth

A good mineral resources fiscal regime should attract investors and benefit the nation. There is a need for prudent and stable policy, supportive legislation, and political stability to obtain maximum benefits from the resources (Peiris & Clement, 2008). In addition to fiscal regimes, ownership, institutional capacity, transparency, and accountability are important factors in the proper management of mineral resources (Chene, 2018).

4.1 Prudent and Stable Fiscal Policy

Fiscal policy is government policy on taxation and expenditure (Peiris & Clement, 2008). It includes government policies on mining taxes. Taxation of mines and mineral resources is unique because of price volatilities and the riskiness of the sector. The agreements are concessional and discretionary and usually contain discriminatory clauses or incentives dependent on government objectives. The government usually considers the opportunity costs and the total investment required to operate the mine before awarding incentives based on projections (Manley, 2013).

The most common tax regime in mining is a rent tax, a tax on the profit of the mining firms (Conrad, 2012). It is preferred because it is an operational expense and does not distort input and output allocations. Inadequate transparency in the several mineral resource sectors has caused governments to use several other tax regimes that allow them to capture a sizable rent (e.g., royalties and windfall taxes).

The taxes are divided into direct and indirect taxes. Direct taxes are taxes on income or revenue. Profit-based taxes include corporate taxes and excess profit taxes. Revenue-based taxes include windfall taxes and mineral taxes. While indirect taxes are taxes on output or expenditure. The income value-added tax and customs duty (export and import taxes). Mining firms usually have an exemption on export and import taxes (Meller & Simpasa, 2011).

The corporate tax for mines in Zambia is 30% compared to 35% for other firms with a 0-15% variable profit tax on copper producers. The royalties are at 6% of the gross value. The royalty taxes in Chile range from 0 to 5% depending on the total sales, varying by output. The corporate tax rate is 20% for first category tax, global complementary, and additional tax on non-residents. Firm mining firms have no withholding tax in Zambia, whilst they are charged 35% on their dividend. There are investment incentives for mining firms in Chile and a 100% deduction on certain capital expenditures in Zambia (Conrad, 2012).

Thus, the revenue generated by the Chilean government includes a surplus from the sale of copper by CODELCO, kept in the Economic and Social Stabilization Fund, and taxes paid by the companies. In addition, private firms contribute to the treasury through various taxes they pay. While in Zambia, the government collects money from the mines through dividends paid to the mines in which ZCCM is a minority shareholder and primarily from mineral royalties and corporate taxes paid by the mines (Rodriguez et al., 2007; Korinek, 2013; AfDB, 2016).

4.2 State Equity Participation

This arises from the state equity participation approach (Peiris & Clement, 2008). Most governments are joint shareholders in most of the mines. Investors tend to have a negative perception of this because it can lead to nationalization. Thus, a principle and agent problem can arise with the private partner who usually manages the firm unlikely to declare dividends. This has led the government to focus more on tax revenue than equity. However, insecurities about investors' activities and a desire to increase national rents from the mineral resources can cause the government to opt for ownership (Manley, 2013).

The nationalization of the copper mines in Zambia and Chile had similar yet different motives (Meller & Simpasa, 2011). In Chile, the mines were nationalized because the government believed that foreign ownership restricted financial inflows. The government pressured the mines to increase production, but the mines were sceptical about increasing their investment, bearing the risk of expropriation. The perceived insufficient production did not help fed-off nationalization intention. In 1971 the Chilean government conducted widespread nationalization of key economic sectors, including copper mining. Although popular, the reforms had an adverse impact on the economy.

High copper prices are credited to have driven the rapid economic growth Zambia experienced in the first 10 years after independence (Andersson, et al., 2000). During the period, the mines were mostly privately owned. The government was apprehensive about mines being foreign-owned because their decisions were not likely to favour national interests. This led to the

nationalization of the copper mines, with the government acquiring 51% equity stake in the two main mining companies, the Anglo-American Trust (AAT) and Roan Selection Trust (RST). AAT became Nchanga Copper Mines (NCM), and RST became Roan Copper Mines (RCM). The two were merged into one company, Zambia Consolidated Copper Mines (ZCCM), in 1982 with an increased shareholding of 60% (Meller & Simpasa, 2011).

Unfortunately, the nationalization of the mines in Zambia was mistimed, copper prices collapsed after the takeover. The government could not avert the economic impact because it was the majority owner of the mines and accrued financial losses. The country had no sovereign account. The consistent low prices led to it depleting its foreign reserves and accruing huge foreign debt. In Chile, the nationalization proved to be an imprudent economic decision as the economy went into recession before the fall of the copper prices. Civil unrest led to the removal of the government.

The loosening of the hand in the mining sector by the central government differed in Chile and Zambia. The Chilean government maintained its hold on the mines it had nationalized. It opened new exploration sites for foreign firms to exploit. This allowed for a mixed mining sector with state-owned and private firms. However, in Zambia, the ZCCM was unbundled, with mines also disintegrated and sold separately through a process that lacked transparency and accountability. The process in Chile was better managed than in Zambia, where it had faced major setbacks of government procrastination and political interference. The privatisation process started in 1992, yet the privatization of the mines was completed in the early 2000s, with most mines sold as individual units as opposed to the original (Craig, 2001; Meller & Simpasa, 2011).

4.3 Non-Tax Benefits of Mining

The full benefits of mining to an economy are not restricted to taxation and equity. They also include economic links between the mining industry and sectors and other economic sectors and industries. These backward and forward links stimulate industrial activity and growth. Backward linkages are connections with industries that supply capital and inputs to mines. While forward links are connections with industries that use the mining output as an input. These links nurture value-addition in the economy. Legislation is usually used to enhance the linkages (Manley, 2013; Bocoum, 2000).

Increased Copper prices stimulate economic growth in both Zambia and Chile. An increase in copper prices boosts production in industries that are linked to the industry. Economic growth in these nations is tied to the performance of the copper industry. Thus, instability in mining policy in a mineral-dependent country will have a negative impact on the overall economy (; Simpasa et al., 2013; Meller & Simpasa, 2011).

4.4 Institutional Capacity and Transparency

Mining firms usually employ staff with adequate capacity and experience for negative takeovers. Developing countries barely have the necessary human resource with the necessary training to negotiate mining projects, non-fiscal benefits, formulate the right tax, statutory and legislation frameworks (AfDB, 2017; (The Third World Network-Africa, 2017)). Even when the human resource is there, rent-seeking, political interference, and the undermining of institutions affect their performance. For a system to effectively operate and increase investor and stakeholders' confidence, it needs to be transparent and promote internal and external accountability (Maher & Andersson, 1999; de Asis et al., 2009).

The privatization of mines in Zambia is a classic example of the political economy of mineral resource management. In addition, the nationalization of the mines was also influenced by political events in both Chile and Zambia (Bebbington, et al., 2018). The mining sector reforms of the 1970s that were influenced by Klein Sak's abandoned reforms in the 1960s laid the foundation of the Copper sector in Chile. The authoritarian regime allowed the Chicago Boys to experiment with various policies that would later stimulate production. While Zambia had the misfortunate of an untransparent privatization process marred with political interference and rent-seeking, which has weakened institutions. The later nationalistic tendencies have weakened investor interest in the sector (Gondwe & Pamu, 2014; Clark, 2013).

5. Macroeconomic performance of Chile and Zambia

This paper compares the relation between macroeconomic performance and copper prices in the two copper-producing nations since 1964 when Zambia became independent, and Chile elected President Eduardo Frei Montalva into office. Since most resource-economies are really volatile, it further compares possible sources of domestic and external volatility.

5.1 Effects of Copper on Macroeconomic Performance

Macroeconomic performance is represented by four indicators: GDP growth, exchange rate growth, export, and import growth.

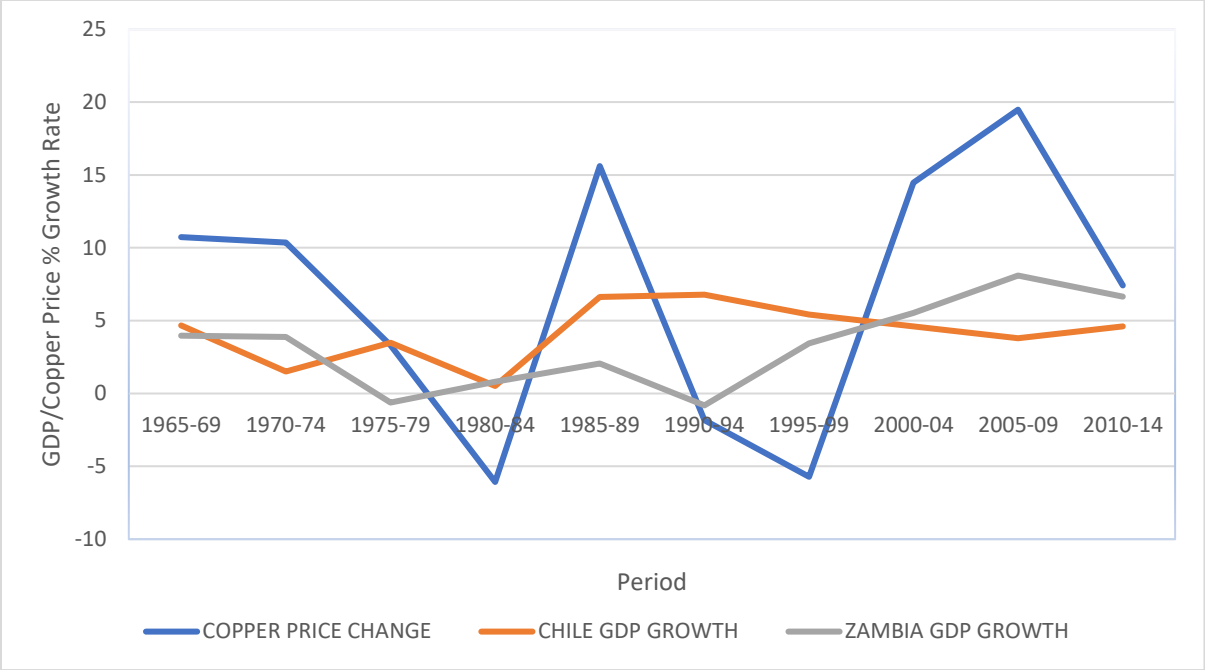

Figure 1: Average GDP Growth and Change in Copper Prices

Source: World Bank WDI and Copper Prices Computed using COMEX

It is evident, from figure 1, that when the copper prices fall, the growth rate of the Zambia GDP reduces, and that Zambia's GDP growth increases when the growth in copper prices increases.

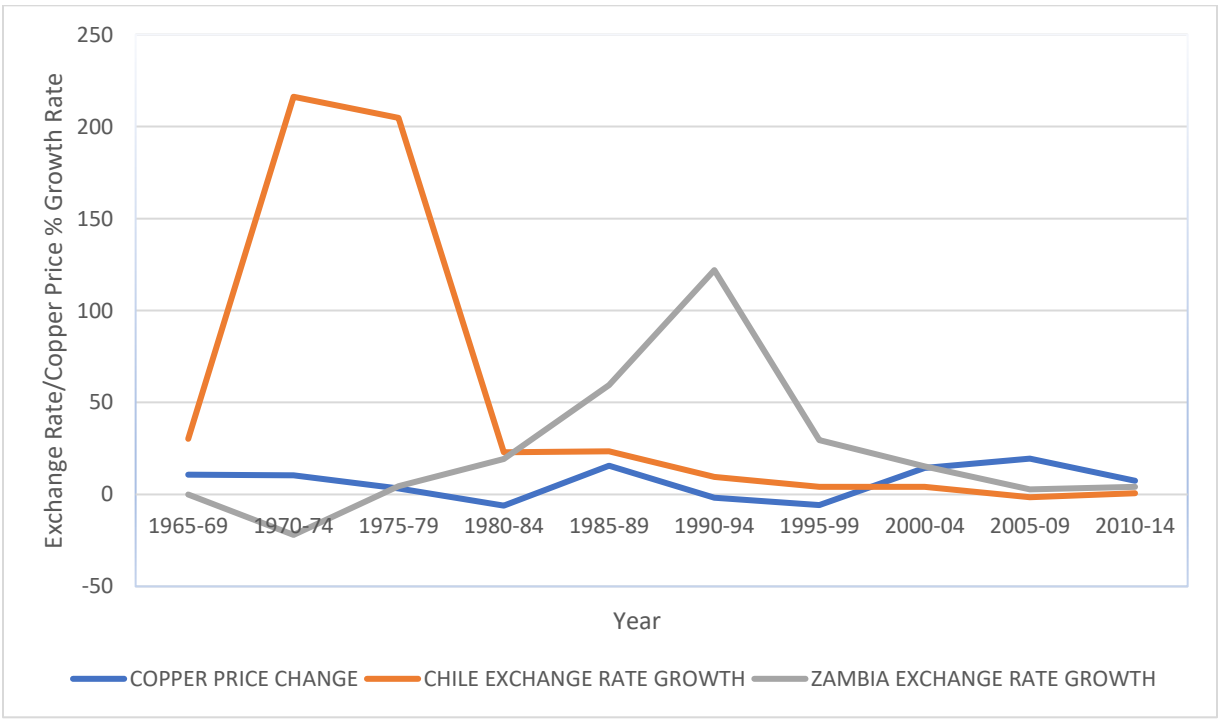

Figure 2: Average Exchange Rate Growth and Change in Copper Prices

Source: World Bank WDI and Copper Prices Computed using COMEX

Figure 2 shows that the volatility of the Zambian Kwacha is linked to the fluctuations of Copper prices than the Chilean Peso. In the early 1970s, the Kwacha was appreciating; however, after copper price growth dropped, in the mid-1970s, the Kwacha started

to depreciate against the US Dollar. After the liberalisation of the economy and kwacha, again, kwacha improved following periods of depreciation. The surge continued as copper prices boomed in the 2000s, only to be halted by mining tax regimes reforms that led to the abandonment of the windfall tax system in 2008. Nonetheless, in the early 2010s, the Kwacha continued to depreciate at a relatively more gradual rate than in the 1980s and early 1990s.

The growth of Chilean exports, in figure 3, before 1990, corresponds to the direction of growth of copper prices, except for the period before 1975. The drastic fall in copper prices in the second half of the 1970s correlated with a decline in the growth of Chilean exports, while Zambia exports earnings continuously reduced until the liberalisation of its economy in the early 1990s.

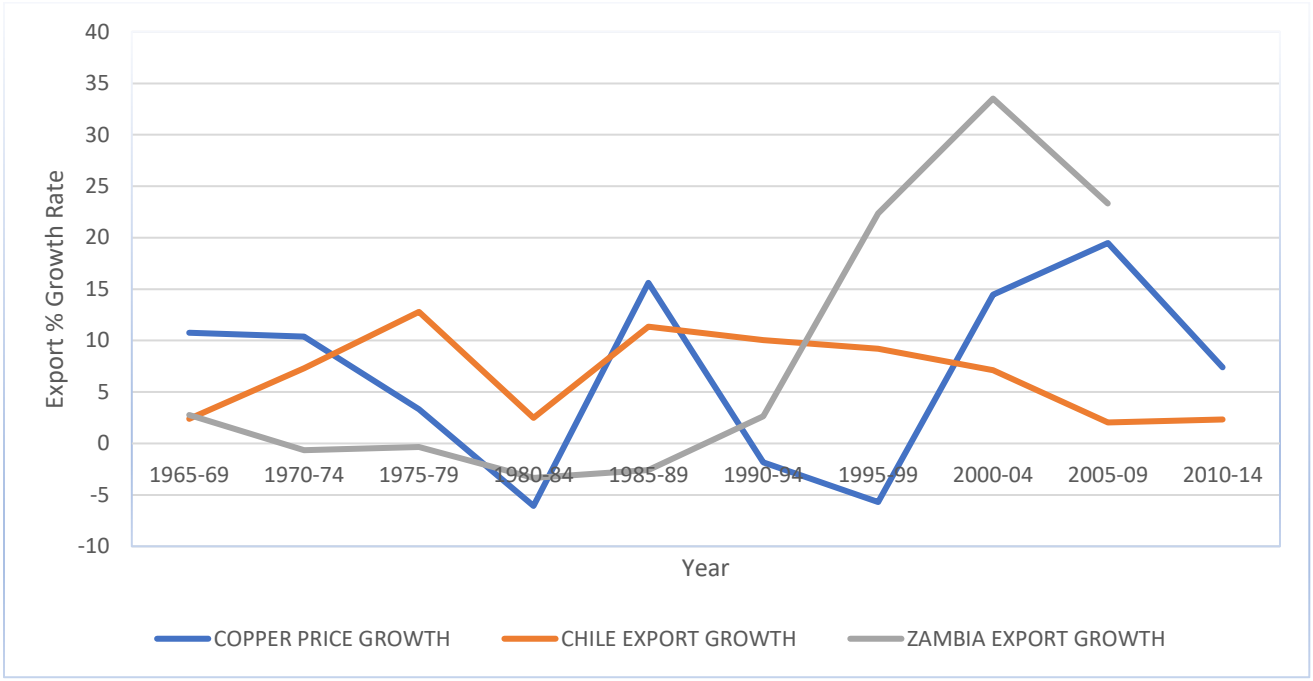

Figure 3: Average Export Growth and Change in Copper Prices

Source: World Bank WDI and Copper Prices Computed using COMEX.

In figure 3, both Zambian and Chilean export earnings appear to be influenced by copper prices. Zambian export earnings started reducing in the 1970s and continued reducing until the liberalisation of the economy in the early 1990s. Then drastically improved from the early 1990s onwards. The period in which the earnings had started reducing coincides with a period in which copper prices had started reducing. The fall in copper prices also had an effect on Chilean export earnings; the export growth rate declined during the period copper prices inflation fell in the 1980s as well as in the 1990s.

From figure 4, it is evident that Zambian imports drastically reduced after independence and the nationalisation of industries until copper prices sharply reduced in the 1970s and 1980s. In the 1980s, Chilean and Zambia imports increased together with imports growth. Zambia's imports surged in the second half of the 1990s after the 1992 reforms reduced imports tariffs. Chilean imports growth sloped downwards from the 1990s until the 2010s, while Zambian imports growth reduced in the late 2000s.

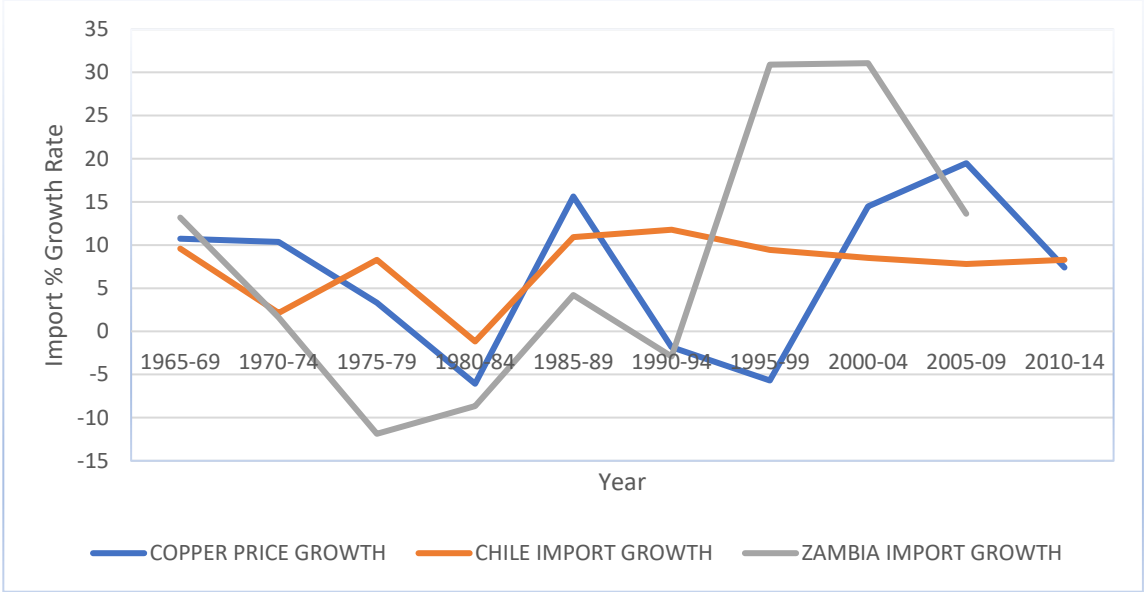

Figure 4: Average Import Growth and Change in Copper Prices

Source: World Bank WDI and Copper Prices Computed using COMEX.

5.2 Domestic Sources of Macroeconomic Volatility

In this section, the sources of macroeconomic volatility were analysed using money supply growth, growth in nominal deposits, growth in nominal lending rates, and trade openness growth.

In figure 5, money supply (broader money or M2) growth in Zambia appears to be more widely and frequently dispersed than money supply growth in Chile.

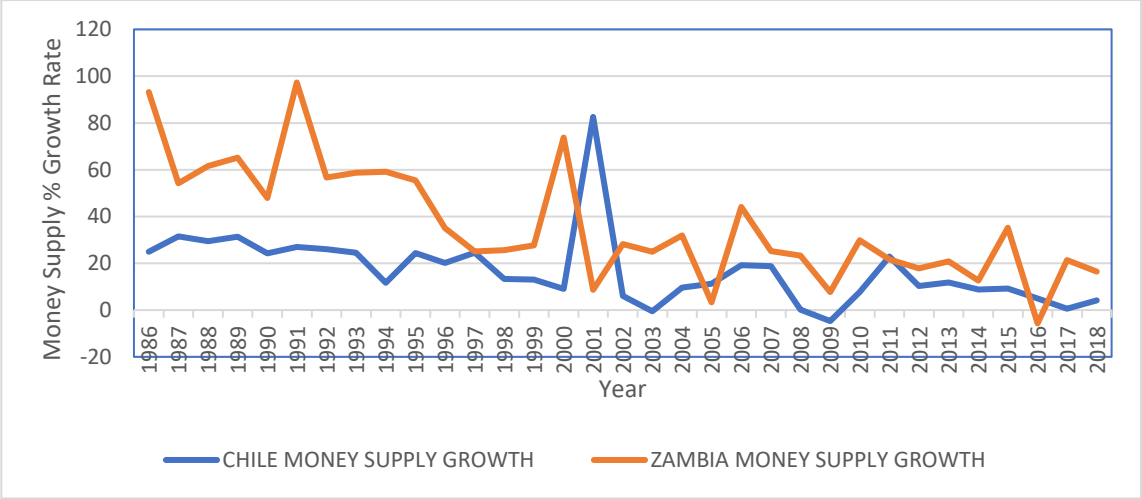

Figure 5: Money Supply Growth

Source: World Bank WDI

The growth of deposit interest rate in Chile widely fluctuates than in Zambia, in figure 6. The Chilean deposit interest rate growth appears to have deviated widest in 2011. While in figure 7, the lending interest rate growth in both Zambia and Chile looks to be similarly dispersed. The lending interest rate in Chile is mostly widely dispersed in the 1980s and 1990s, relatively more stable after 1995, whereas the dispersion is wider in the 2000s for Zambia.

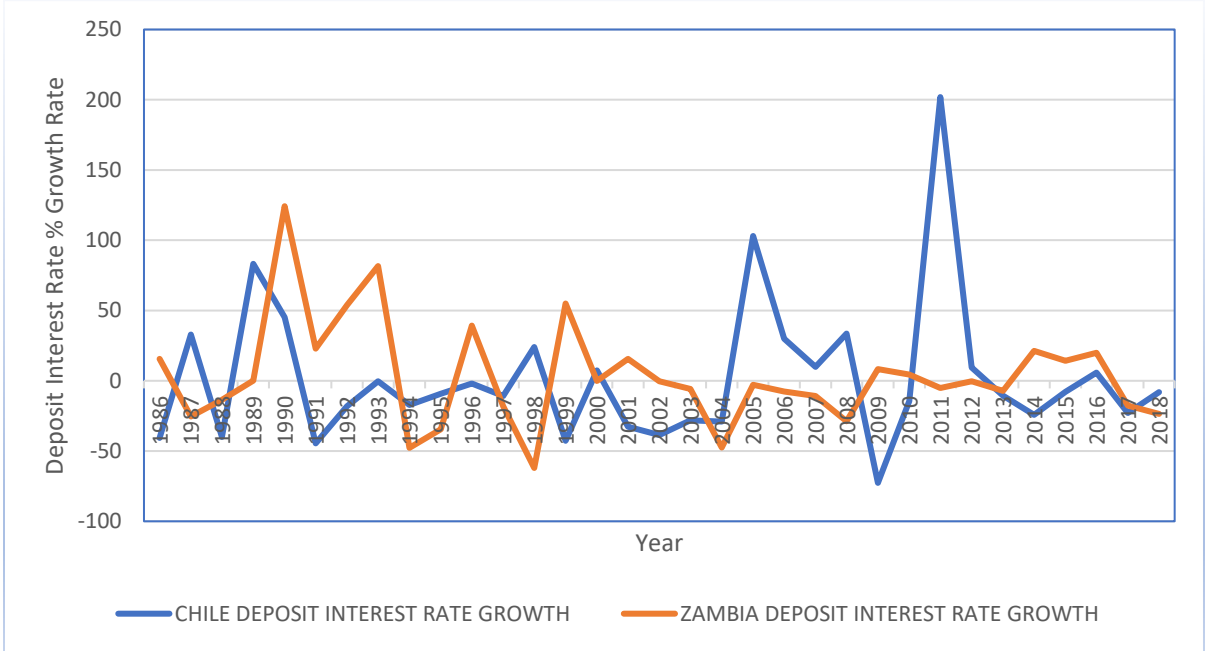

Figure 6: Deposit interest Rate Growth

Source: Computed from World Bank WDI Data.

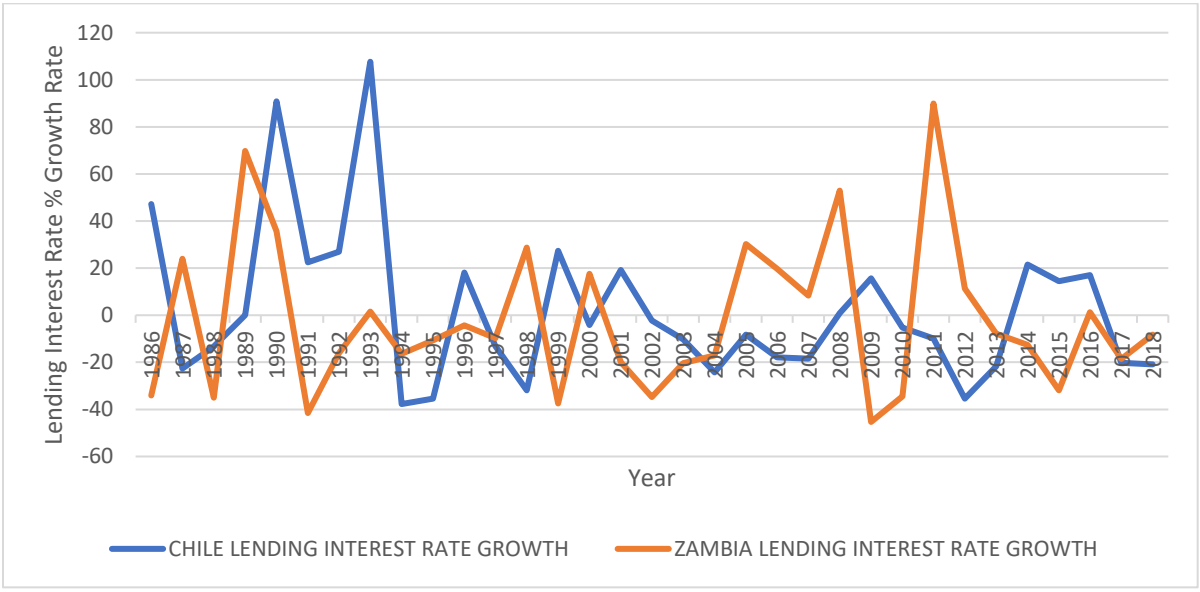

Figure 7: LENDING INTEREST RATE GROWTH

Source: Computed from World Bank WDI Data.

In figure 8, the analysis ends in 2017, the year in which the data used in the computation ends. The Zambian trade openness growth rate recorded greater fluctuations than that of Chile over the study period.

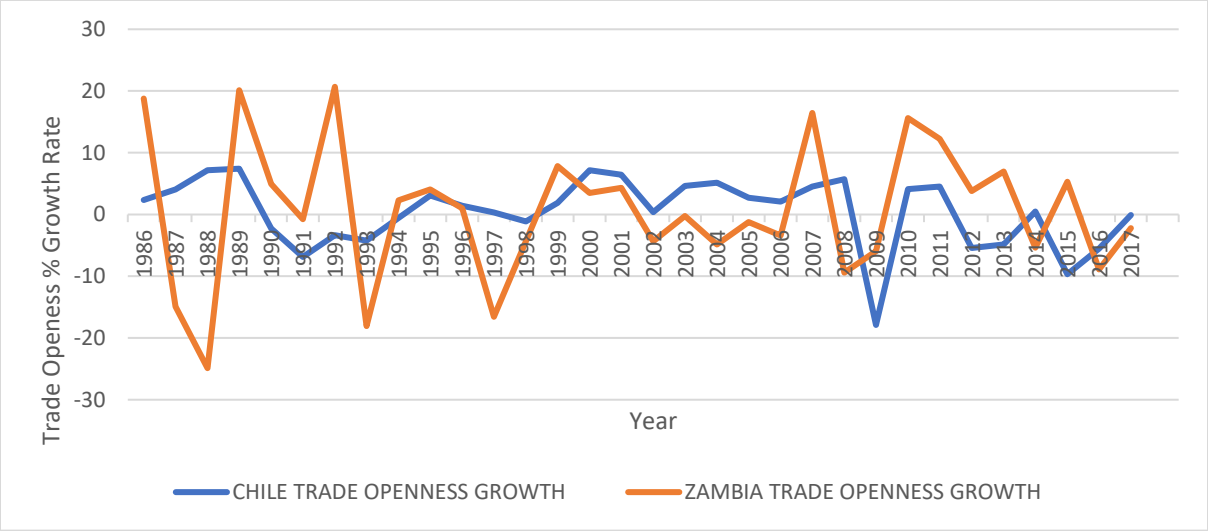

Figure 8: Trade (% GDP) Growth

Source: Computed using IMF IFS Data.

5.3 External Sources of Macroeconomic Volatility

The external sources of volatility are compared using Net FDI inflows as a proportion of GDP and the net portfolio equity inflows as a proportion of GDP.

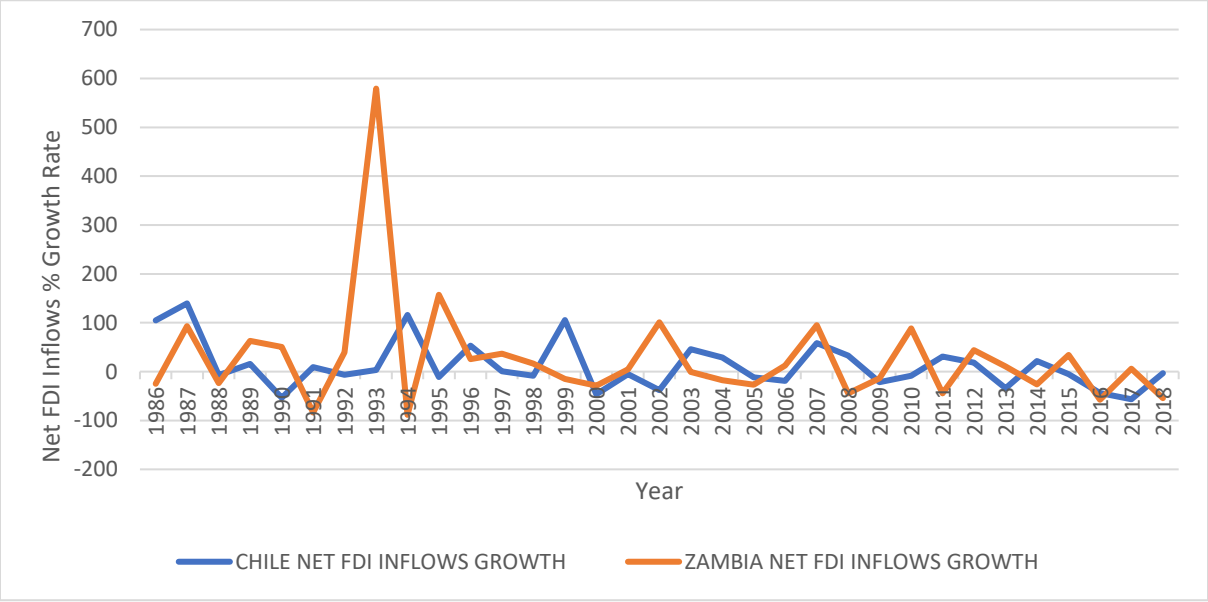

Figure 9: Net FDI as a percent of GDP Growth

Source: Computed from World Bank WDI Data.

In figure 9, Zambia's net foreign direct investment inflows (FDI) growth looks to be more volatile than Chile's net FDI inflows growth. The dispersion of the net FDI inflows is farthest during the period in which the economy was liberalised.

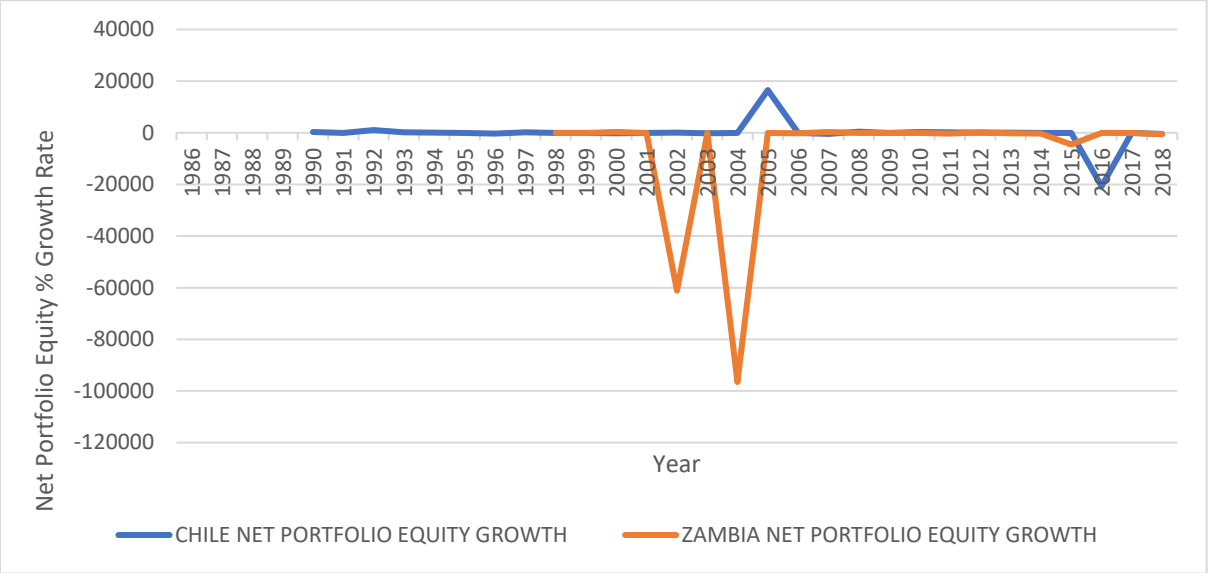

Figure 10: Net Portfolio Equity Growth

Source: Computed from World Bank WDI Data.

Data of inflows from net portfolio equity for Zambia and Chile show zero inflows from 1975 to 1978 and 78 to 1996, respectively. From the available data, it is evident that net portfolio inflows as a percentage of GDP for Zambia had a wider deviation than that for Chile.

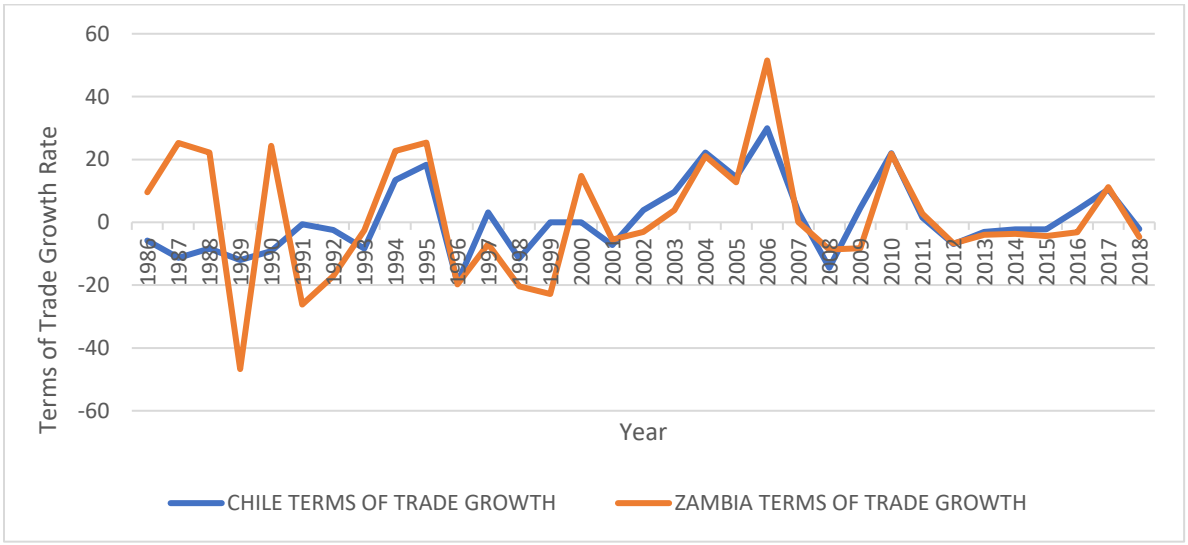

Figure 11: Terms of Trade Growth

Source: Computed from World Bank WDI Data.

Figure 11 shows that the Net Barter Terms of Trade (T.o.T) index (2000 = 100) growth rate for Zambia is relatively more volatile than that of Chile.

6. Conclusion

The study aimed to compare the relationship between macroeconomic performance and copper prices in Chile and Zambia. The macroeconomic performance of Zambia was found to be more tied to the price of copper than that of Chile. Zambia, whose economy is relatively more dependent on copper than Chile, usually experiences reduced economic growth when the rate of growth of the price of copper falls, only to rise again and fall again when the copper price growth rate decline. The relationship between the Zambian economy and the price of copper offers evidence that the severity of the natural resource curse and Dutch disease is largely influenced by a country's level of dependence on the commodity.

The economic policies of the countries also affect the impact of copper price volatility on the economies. The influence of copper prices on the Chilean economy was more severe before the policy reforms of the 1980s and 1990s that paved the way for huge mining investment in the 1990s and the adoption of the CSF and policy stability experienced later on. Zambia's economy also appears to have benefited from the 1992 reforms and harmonisation of mining taxes because, since the early 1990s, the country has experienced increased export earnings, with the growth rate only declining in 2008 after the repeal of the windfall tax mining regime.

The sources of the volatility of these economies were found to be both domestic and external. The investigation using four and three indicators for domestic and external volatility, respectively, showed that Zambia is domestically and externally more volatile than Chile. Macroeconomic uncertainty is more of a challenge in Zambia, which has suffered more from policy inconsistencies, than Chile.

6.1 Recommendation

In essence, for Zambia to break the natural resource curse, it requires robust and progressive economic policies that transcend political regimes, like the Chilean policies of the 1980s and 1990s have. Macroeconomic uncertainty, which has been largely influenced by policy inconsistency and imprudence as a result of political populism and weak institutional framework, has not helped Zambia to achieve sustained growth and macroeconomics stability as its economy is highly dependent on volatile copper prices.

In addition, there is a need for prudent management of mineral resources. The country should strengthen its institutional capacity and promote transparency in mining negotiations and agreements to allow for greater accountability. Strengthened institutions could be achieved by improving the quality of human resources through training aimed to reduce tax leakages and slippages. This could also limit political interference and avert the negative effects of a political economy rent-seeking culture. There is also a need to set-up a sovereign fund for a windfall from the copper industry. The purpose of this fund would be to reduce the adverse effect of the mining industries on non-traditional exports during the price boom period. Also, the money realised through the fund could be used when copper prices plummet. Besides, copper prices volatility is evident in the economic performance. Thus, the surplus should also be invested in non-traditional exports to export the economy.

Since the Zambian government, through ZCCM, sold the majority of its stake in the copper mines, it should not regain them using nationalization, which has an adverse effect on investor confidence and productivity of the sector, as seen in the 1960s in Chile. ZCCM should not only focus on increasing market share by exploiting newly discovered mineral deposits. This will create mineral streams for the government, as opposed to only depending on taxes and dividends from equities. The mining conglomerate could achieve this by beside; nationalization is too costly for a highly indebted nation like Zambia.

The mining sector is the main generator of foreign exchange in Zambia. Copper export accounts for over 75% of total national export. To increase the inflow of foreign exchange into the country, there is a need for value-addition to the mineral resources. There is a deliberate set-up processing and a manufacturing industry that uses mineral resources as an input. These industries would increase the value of copper and the inflow of foreign currency into the country. Besides, primary and secondary industries that provide to the mines should be promoted with various incentives to reduce financial outflows and create employment. This can be done using statutory instruments and legislation.

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