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Determinants of the Zambian Kwacha

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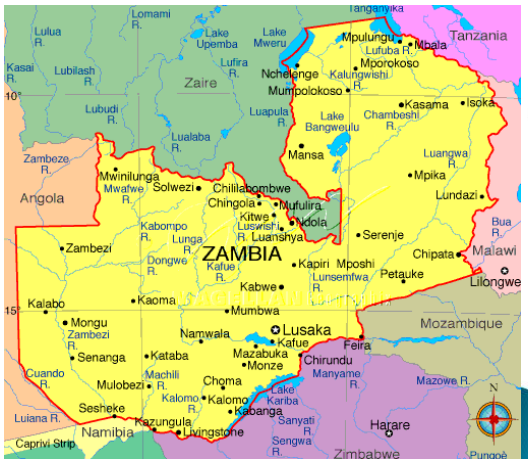

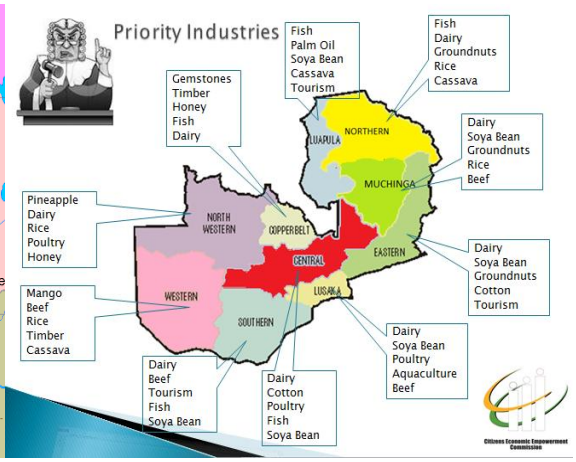

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Introduction

This study is made up of two essays on the "Determinants of the Zambian Kwacha". The first essay gives a critical analysis of the short term determinants of the Kwacha and draws implications for the exchange rate policy. The second essay specifically interrogates whether either the copper price or industrial diversification is a key long-run determinant of the Kwacha and also draws implications for the exchange rate policy. Chapter 1 is therefore essay 1 whereas Chapter 2 is essay 2.

Chapter 1-Short Run Determinants of the Nominal Kwacha: Implications for exchange policy

By

John Weeks

Executive Summary 1

1. The variability of the nominal Kwacha against the major trading currencies declined over the last several years. The variability or "instability" is quite low by comparison to other countries, both in Africa and elsewhere.
2. Exchange rate instability seems closely associated with capital account fluctuations, and moderated by the level of foreign exchange holdings of the Bank of Zambia. Reserve accumulation has an opportunity cost, though currently the level of holdings is substantially below the Bank of Zambia target level. The government might consider enhancing its reserve policy by use of market base capital account regulations.
3. Relative stability has also characterized the purchasing power parity ("real") exchange rate, which has displayed slightly *more* variation than the nominal Kwacha. We observe no consistent tendency towards PPP exchange rate appreciation for recent years.
4. Statistical modelling indicates that nominal exchange rate stability has been substantially enhanced by Bank of Zambia (BoZ) participation in foreign exchange markets.
5. The "real exchange rate" measured as the ratio of tradables excluding mining to non-tradables has moved against the former since the late 1990s; i.e., a tendency for non-mining tradables to decline in profitability. Between non-mining tradables relative price movements have favoured manufacturing, not agriculture. These conclusions could require reversion after publication of the re-based national accounts by the Central Statistics Office.
6. During 2012 and into 2013 all major external indicators show movement consistent with nominal depreciation.
7. Statistical estimations indicate that the most important variables determining the nominal Kwacha in the short run are the trade balance, the ratio of BoZ bond rates to world interest rates, and Bank of Zambia foreign exchange interventions.
8. Evidence strongly indicates that policy intervention to reduce nominal or real exchange rate instability is in general effective, but not necessary at the time this report was written.
9. Shifting incentives toward non-mining tradables requires an integrated policy that would include exchange rate management over the medium term combined with a focused sectoral policy.

1.1 Introduction

Since the mid-2000s short term movements in the Kwacha have received considerable attention as a result of variations that most analysts attribute to fluctuations in the price of copper, the country's most important export (Weeks, *et al*. 2007, IMF 2009, and Moono 2010b). A dramatic increase in copper export earnings followed the near collapse of the sector in the late 1990s. The rejuvenation of copper and other mineral production and exports provoked concern in the government and the Bank of Zambia over the implications for short and medium management of the three major areas of macroeconomic management, fiscal policy, monetary policy and exchange rate policy.

The focus of this study is the identification and empirical analysis of the process that determines the movement and level of the Kwacha with respect the currencies of Zambia's major trading partners. The objective is to provide insights to aid the Bank of Zambia in the management of the exchange rate and other aspects of monetary policy (see Annex 1 for the Terms of Reference).

The study does not treat fiscal policy. Issues arising from the transparency of mining companies about their tax base, transfer prices and estimating ore context require a separate study. The findings in this report demonstrate the importance of carrying out such a study.

1.2 Analytical Framework

1.2.1 Analytics of Exchange Rate Adjustment

It is unfortunately the case that analytical and empirical discussion of exchange rates suffers from frequent use of terms that carry implicit or explicit subjective judgements. It is common to read that the exchange rate "strengthens" or "weakens", meaning appreciation and depreciation, respectively. In the same vein the phrase "improvement in the exchange rate" invariably refers to an appreciation and "deterioration" to a depreciation.

The terminology in which a "strong" exchange rate is one whose value is high or increasing with respect to other currencies is a serious obstacle to useful analysis, especially for policy. If an exchange rate "strengthens" when it appreciates, one could rarely expect a policy maker to favour depreciation. Using the words "strong" and "strengthen" in reference to exchange rate appreciation is both a value judgement and misleading, because it implicitly treats only the import side of trade.

While an appreciation of a currency reduces the foreign exchange cost of imports, it also reduces the rate of return to tradable goods, in part through the foreign exchange cost of exports and import substitutes. Nominal exchange rate movements should be assessed in the context of *three* types of commodities, exportables, importables and non-tradables. Diagram 1 demonstrates the implications of the three commodity context (taken from Liang 1992). The vertical axis measures the price ratio of exportables to non-traded commodities and the horizontal axis the ratio of importable prices to non-tradable prices.

Non-tradables include most services, transport and commerce. The distinction between exportables and importables is country specific and changes over time. For example, in Zambia at present manufactured commodities are almost all importables, but over time productivity increases could make them internationally competitive and exportables.

Somewhere in the two dimensional space in Diagram 1 the production of exportables and importables equals their level in the absence of any policy intervention (X, the "free trade" point). Through this point pass two lines, AA which is the locus of all points for which exportable production is constant at the non-intervention level, and BB which is the same locus for importables. The locus AA shows that as the relative price of importables rises relatively to non-tradable prices, the production of exportables can remain constant only if exportable prices also rise. The same interpretation applies to line BB.[1]

A so-called strong currency tends to take relative prices into region indicated IV, "pro-nontradables". Nominal and real currency appreciation drive the ratio of exportables to non-tradables below the non-intervention ratio, and do the same for importables. The affect of pursuing a "strong" currency policy is to reduce the production of all tradable commodities. The decline of tradable production implies a persistent balance of trade deficit which will make the "strong" currency policy impossible to maintain. To put it succinctly, a "strong" currency policy discourages both exports and import substitutes.

The diagram provides three alternatives to the dysfunctional policy of discouraging exports and import substitutes. Region I represents export promotion in the strict sense, shifting resources from both import substitutes and non-tradables into exportables. Because this policy generates a trade surplus if successful, it can persistent indefinitely. Region III is the mirror opposite, stereotypical import substitution, in which relative prices shift resources out of exportables and non-tradables. Historical experience, especially in Latin America but also in sub-Saharan Africa, indicates that this policy approach is unsustainable because it tends to generate trade deficits, though not as extreme as in region I.

Finally, region III results in relative prices that promote both exports and import substitutes. This corresponds to policies followed by several of the industrializing Asian countries, most obviously South Korea. Achieving this combination requires at

[1] The lines AA and BB would pass through the origin if and only if the economy produced no non-traded commodities.

the minimum currency depreciation in line with domestic inflation compared to inflation in competitor countries.

Diagram 1 demonstrates how a "strong currency" policy undermines growth in the short run and diversification in the medium term. This conclusion does not imply its opposite. A "weak currency" does not result in a "strong economy". In order to assess in more detail appropriate exchange rate policy it is necessary to be country specific.

Exchange rate management should avoid ideology, either of the non-intervention "free market" variety or the dysfunctional "strong currency" approach. The two most important guides to effective exchange rate policy are 1) the economic objectives of the government, and 2) country specific exchange rate dynamics. Objectives are treated here and exchange rate dynamics in the next section.

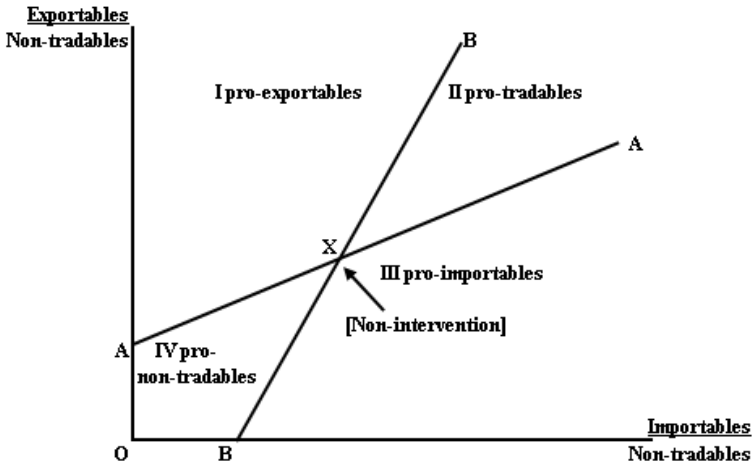
During interviews for this study several people sued the term "Dutch Disease" in the context of copper's large part in Zambia exports. The term was used specifically as part of an argument for or against Bank of Zambia active participation in foreign exchange markets. Like use of "strong currency", the term "Dutch Disease" functions a great source of analytical confusion. The term arose from the experience of the Netherlands after the discovery and exploitation of petroleum and natural gas in the North Sea.

The essence of the "disease" was the decline of non-petroleum tradables and their replacement by non-traded sector, most notably construction. At the hands of economists the "disease" emerged as a formal theory (Corden & Neary 1982). Whether the theory accurately captured the experience of the Netherlands is open to debate. It is obvious that the theory is not relevant for Zambia because of its restrictive assumptions. Most important is the assumption of full employment, which necessarily implies that an increase in non-traded goods and services must accompany a decrease in tradable sectors. It should be obvious that the Zambian economy is not and has not been characterised by full employment of its resources. Second, the theory is formulated for a flexible economy in which labour and capital move smoothly across sectors. The financial and labour market institutions of Zambia

contradict this assumption. While region IV in the Liang diagram could be interpreted as a Dutch Disease zone, the term is avoided in this study because of its analytical restrictions.

Setting the "Disease" aside, it is useful to consider the exchange rate's distinct impacts as depending on the time period in question. In the short term, such as a year or less, the major impact of exchange rate changes is on the macro economy. This is because the time period is too short to have a substantial impact on domestic resource allocation or relative prices between imports and domestic substitutes. The most important short term macroeconomic issue is typically exchange rate volatility. Volatility can intensify inflationary pressures if domestic prices are downwardly "sticky", in which tradable prices rise with depreciation but do not fall when the exchange rate appreciates. It can also make fiscal programming more difficult if development assistance represents a substantial source of revenue.

Diagram 1: Relative prices in a 3 commodity economy: Exportables, Importables and Non-tradables (the Liang diagram)



Short term volatility is potentially quite important in Zambia, which is an importer of food and intermediate inputs to production. Also, in the absence of effective hedging mechanisms, short term volatility can unsettle private sector balance sheets both for cash flow and asset values. As explained later in this report, the Bank of Zambia has acted effectively to reduce exchange volatility over the last ten years.

The Bank of Zambia reduces volatility through the purchase and sale of foreign exchange. In an initial situation of fictitious general equilibrium, private traders are by definition content with their holdings of Kwacha and foreign currencies. In order to sell Kwacha successfully, the Bank of Zambia must offer more Kwacha for foreign currencies than at prevailing equilibrium exchange rates; i.e., it must make the Kwacha cheaper by depreciation or devaluation. To do the opposite, induce private traders to sell Kwacha, the Bank of Zambia must offer more foreign currency per Kwacha; i.e., lower the price of foreign currencies through appreciation or revaluation. It follows that BoZ trading to reduce exchange rate volatility does not in itself imply either appreciation or deprecation pressure. Which occurs depends on the conjunctural context and the trend underlying the short term instability.

As will be shown, during 2003-2007 BoZ foreign exchange operations tended toward reducing appreciation pressures (inducing depreciation), and after 2007 to reduce tendencies toward depreciation (inducing appreciation). To repeat, in the short run the objective of exchange rate stability does not imply "strengthening" the currency. More basic that this pre- and post-2007 division is the exchange rate behaviour before and after the Zambian government reached the "completion point" for the Highly Indebted Poor Countries Initiative (HIPC) in April 2005.[2]

Over a time frame of several years, the "medium term", exchange rate policy in a developing country might pursue the objectives of export promotion and efficient import substitution. These objective imply the re-allocation of resources from non-tradables to tradables. The extent to which the exchange rate can contribute to this reallocation varies among countries. In Zambia depreciation should make exported commodities more profitable by increasing Kwacha revenue from a given amount of foreign exchange, and raise the return to import substitutes by reducing their price relatively to competitive foreign commodities.

There are at least two complications that could weaken or cancel the incentive to produce tradables potentially created by depreciation. In the domestic market, if the

[2] Experts at the Bank of Zambia for provided me with this empirical insight, which is applied in the modeling exercise. The completion point and associated debt relief is reported at http://www.imf.org/external/np/sec/pr/2005/pr0580.htm.

local producer is also the importer, the competition required to change relative prices in favour of domestic substitutes may not manifested itself. A more general undermining of the positive incentives from devaluation occurs through imported inputs and company debt. When the currency depreciates, a company will gain through the share of output that it exports, and lose through its imported inputs and the share of its debt held in foreign currency.

In general, the larger [smaller] the share of output exported, the smaller [larger] the share of imported inputs in total inputs, and the smaller [larger] the share of debt in foreign currency, the greater [less] will be benefits accruing to the domestic producer. In Zambia outside the minerals sector, exported output is low, imported inputs high, and foreign currency debt low. These combine to create a strong probably that a depreciation of the currency would generate net disincentives to agricultural and manufacturing producers in Zambia.

It is for this reason that many in the government and the private sector argue in favour of a "strong" (appreciating) currency, as a necessary support for diversification into agriculture and manufacturing. However, currency appreciation is an extremely clumsy instrument to stimulate diversification, all the more because other instruments not involving the exchange rate can better target the desired outcome of domestic output and export diversification. Exchange rate appreciation is a clumsy instrument for several reasons. The companies likely to benefit most are probably those that would be the least competitive in external trade, because these will be the companies with the greatest share of imports in total cost. While there will be exceptions, in general such companies will have the fewest linkages in the domestic economy, reducing their contribution to diversification through the national input-output table.

Whatever might be the positive impact of an appreciation at the level of producers, the aggregate effects are almost certain to cancel them out. If an economy is at less than full utilization of resources an appreciation will tend to reduce aggregate demand. The demand reducing effect comes through the cheapening of imports which would in the medium term lower domestic production of importables. Appreciation might also create disincentives to foreign direct investment by increasing the foreign exchange cost of domestic labour and assets. The *ceterius paribus* increase in the real money

supply that results from appreciation is unlikely to have substantial expansionary effect in an economy constrained by insufficient aggregate demand.

It would be incorrect to infer from the above that a government should pursue a non-interventionist exchange rate regime. In the Zambian context a non-intervention regime, which characterized the immediately post-Kaunda years, proved singularly dysfunctional. The overwhelming share of copper in total exports meant that international metal prices and domestic metal production combined to be the major influence on the exchange rate, as considered in more detail in the next section. This export dominance combined with large variations in the international copper price both produced an exchange rate that discouraged diversification and an instability that unsettled private sector expectations outside the metals sector. Therefore, the Zambian government and the Bank of Zambia faced a choice between active exchange rate management or abandoning an effective development strategy.

The theoretical analysis in this section does not imply that a government should always prefer currency depreciation to currency appreciation. Consistent pursuit of nominal depreciation would be the international trade equivalent of domestic price cutting to expand market shares, a thinly disguised form of mercantilism. For a non-diversified developing country, Zambia being an obvious case, nominal appreciation should result from long run increases in the productivity of exportables combined with declining structural inflation. This combination allows for continued export competitiveness and a "stronger" currency. Obvious examples of countries experiencing this benign combination are Japan and Korea. For Zambia this combination lies in the distant future.

In summary, rational exchange rate policy is likely to involve interventions to reduce exchange volatility, which will on occasion involve moderating depreciation tendencies. However, a policy of raising or maintaining a nominal rate that is low relatively to foreign currencies is not in itself rational. Nor does it make a currency strong. On the contrary, it would create an unsustainable level of the currency, as well as undermining policy objectives at the macro and micro levels.

1.2.2 The Exchange Rate in Zambia

In countries with developed financial sectors stock-flow balances determine nominal exchange rates. The stock of foreign currencies assets and the adjustment of those stocks overwhelm trade flows in the short run (see James, Marsh & Sarno, Chapter 2). Though Zambia has a financial sector relatively developed by regional comparison and substantial short term capital flow for the size of the economy, rarely are asset transactions so large as to overwhelm the impact of trade flows.

At the outset it is necessary to clarify the function of the exchange rate that this study addresses. I do not consider the impact of the exchange rate, however measured, on the "competitiveness of the economy". This concept has no clear meaning in the Zambian context. Copper dominates the external trade of Zambia, and the nominal exchange rate has little short term impact on metal production or export. The importance of the level of the Kwacha and its changes come from the impacts on macroeconomic management and diversification of the country's production structure.

This importance manifests itself through several channels, most notably through the relative price of non-copper tradables to non-tradables. Zambia does not export copper because of comparative advantage in the Heckscher-Ohlin sense, in which relative factor scarcities determine comparative costs. That approach to the structure and direction of trade presumes that all trading partners have the potential to produce all traded commodities. In the case of Zambia, copper exports result from a specific natural endowment. In the absence of policy intervention by the Zambian government or Bank of Zambia, the level of the Kwacha responds to domestic copper production and the international price, on the one hand, and the international prices and domestic demand for major imports (petroleum holding the largest single share).

Exchange rate movements are strongly affected by the policies of the mining companies as to where they deposit and hold their export earnings. Were the mining sector in public ownership or if the private companies operated with full transparency, reported domestic production exports would accurately indicate foreign exchange earnings from the sector. It would be unwise to assume full transparency, and the

absence of it implies that observed and actual export revenue differ. Available information does not allow adjustment for this probable data problem.

Official foreign exchange flows report that Switzerland is the largest importer of Zambian copper (see Central Statistics Office, *Monthly Bulletins*). Inspection of Swiss statistics shows that the country neither imports nor exports copper. The answer to this apparent mystery is that Switzerland serves as the site for the buying and selling of copper contracts without any physical trade in copper ore or copper in any stage of processing. Not even the Bank of Zambia has the information to determine the full implications of this contract trading on copper prices and export revenues as reported to the government of Zambia. Cross country experience shows that the problem of misrepresentation of production, exports and foreign exchange flows characterizes metal production in many countries, developed and underdeveloped. Though country characteristics affect the degree of misrepresentation, the problem is systemic in the global metals sector (Ndikumana and Abderahim 2010).

Before developing an analytical framework to explain movements in the Kwacha a further caveat is necessary. About a fifth of Zambian export value results from sales to China, a country whose government manages its international trade through a number of administrative mechanisms. Therefore, the exchange rate analysis of this study does not apply to trade with China. For current purposes this caveat does not represent a serious limitation, because the nominal exchange rate has little impact on copper exports, the principal commodity sold to China. The focus of this study is the role of exchange rates with regard to macroeconomic management and export diversification. Because much of the trade with Congo DR uses US dollars or some other "hard" currency, the analysis does not apply to that trade either.

Having made the necessary qualifications, the discussion shifts to Diagram 2, which summarizes the hypothesis for the determination of the Kwacha, with respect to the currencies of Zambia's major trading partners other than China and Congo DR. Moving from left to right in the diagram, the world copper price (which is exogenous) is the major short term influence on the level of domestic production, and this is the

most important determinant of exports.[3] This production requires imported inputs, and the copper sector trade balance represents by far the largest component of the overall trade balance. The foreign exchange market policies of the mining companies directly impact on flow of export revenue into the national economy.

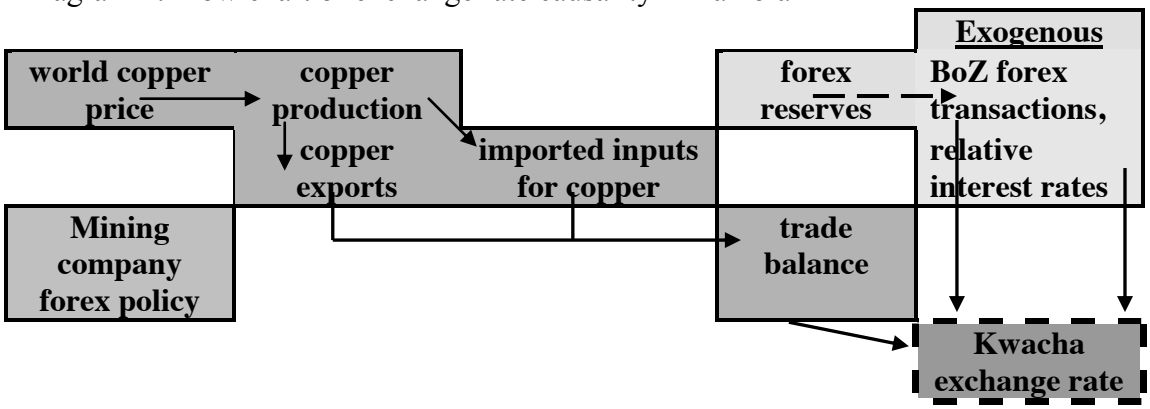
The Bank of Zambia has two major policy instruments to influence the exchange rate, to reinforce or counter the effect of the trade balance. Drawing on foreign reserves, the BoZ can buy or sell foreign exchange. The BoZ can also change the interest rate on public bonds, which increases or decreases its ratio or spread with international bond rates in global money markets. The specific mechanism by which Zambian bond rates affect foreign exchange flows is through the domestic branches of international banks. When the domestic bond rates decline relatively to external rates, these banks tend to shift from the Kwacha assets to foreign assets.

BoZ participation in foreign exchange markets can be demonstrated through an example. Assume the trade balance increases substantially as a result of a rising international price of copper, as during 2006-2007. To moderate the appreciation that would result, the BoZ increases the supply of Kwacha in domestic forex markets by selling Kwacha for dollars or other "hard" currencies (that is, attempts to raise the Kwacha price of foreign exchange). While the resulting increase in reserve holdings in theory could have an effect contradictory on private expectations, this is unlikely in practice to cancel the increase in relative supply of Kwacha.

[3] The role of the copper price in Diagram 2 is verified by Chipili (2013, 18):

> The results confirm the existence of a long-run equilibrium relationship between real copper price and the real k/us$ exchange rate; however, copper price has weak short-run impact on the exchange rate.

Diagram 2: Flow chart of exchange rate causality in Zambia



1.2.3 Further Policy Issues of Exchange Rate Analysis

The forgoing discussion of exchange rate measurement and dynamics raises several additional policy issues. The first relates to the impact of exchange rate adjustment on macroeconomic stability. As the Bank of Zambia recognises, the economy has a marginal propensity to import of over forty per cent. This implies that potentially a depreciation of ten percent could provoke economy-wide price increases of over four percent (the "pass through" rate).

Such a high pass through rate in itself a justifies interventions to moderate exchange rat movements. The interventions in the foreign exchange market serve to extend the time that pressures for depreciation manifest themselves. This give the private sector more time to adjust to increased current foreign exchange costs and the impact on asset values. While depreciation and appreciation pressures are not symmetrical in their policy impact, the latter can create its own difficulties. The experience of several countries, Japan being the most important, demonstrates that rapid appreciation can result in strong deflationary effects on domestic production.

In practice BoZ foreign exchange operations serve as a partial substitute for private hedging in forex markets. The combination of the underdevelopment of financial services and the domination of forex markets by a few private participants makes

effective hedging impossible in the foreseeable future.[4] In effect, BoZ participation in forex markets partially socializes hedging risks.

Hedging leads the discussion to the capital account and the foreign exchange practices of the copper companies, which were mentioned above. Inspection of the capital account balance shows a substantial increase in its instability since 2009. Some have suggested that this instability results from foreign exchange decisions by the mining companies. Because of the overwhelming importance of copper in the Zambian economy, it is obviously the case that the metals sector would be a primary determinant of capital account movements. Identifying the relevant practices by the companies, how these impact on the balance of payments, and whether government policy intervention is necessary requires expert study. Much of the expertise required lies outside the competence of economists. If this issue preoccupies the government, it should seek advice from experts on the industry whose independence is assured.

More directly relevant to this paper is the nature of the non-tradable sector. One frequently encounters the statement that in each country the most important non-tradable is labour. While providing an important insight, this statement is only partially correct. The first qualification is that some types of labour are internationally traded, especially skilled labour. Even unskilled labour migration in the region has some impact on wage levels in the formal sector.

A second qualification is that when analyzing the relationship between tradables and non-tradables, labour is an input used in both types of commodities, not an output. For example, calculating of the trend in the ratio of taxi fares (non-tradable) to maize (tradable) involves comparing two commodities that both use labour. The frequent assertion that increases in wages reduce the competitiveness of exports and import substitutes may be true, but is not directly affected by whether labour is a non-tradable. Therefore, more useful is to consider the tradable and non-tradable relationship in terms of outputs and sectors of the economy.

[4] The barriers to hedging were discussed with the manager of Cummins Automotive Services & Parts, Lusaka among others.

The major source of non-tradables is the public sector. Almost all public sector production is services, education, health, administration, transport and national defence and police. Because of the non-traded nature of public production, this sector will tend to decline relatively to GDP if government successfully implements a combination of export promotion and important substitution (region II in Diagram 1). This necessary result helps explain why the public sector tended to be small in the rapidly industrializing countries of southeast and east Asia. It was the consequent, not a contributing cause of successful growth.

The implication of this discussion is that while labour is largely a "home" good, changes in remuneration do not in themselves alter the relative price of traded and non-traded commodities. The relative importance of labour cost to total cost in each commodity determines what happens to this relative price when wages change in each sector. To relate the discussion directly to policy, under current conditions of aggregate labour underutilization in Zambia, it is unlikely that substantial increases in public sector wages and salaries would have a substantial impact on the private sector price ratio of tradables and non-tradables. The existence of considerable idle and unemployed labour makes the transmission of wages increases from the public sector to the private quite weak, except for highly skilled labour. The government should decide the wisdom of public sector wage increases on the basis of public finances and level of provision, by its probable impact on trade.

The "boom-and-bust" tendency of copper prices provides a strong incentive to create a "copper fund", similar to the "petroleum fund" so affective used in Norway and under consideration in other countries.[5] The fund would operate on some rule that assigned copper revenue over a specified annual or quarterly amount into a reserve fund. The purpose of such a fund would not be to accumulate foreign exchange in anticipation of diminishing copper reserves. Rather, this fund could be used as a counter-cyclical mechanism to stabilize the public sector fiscal balance, accumulated reserves to fund public investment, or a direct re-distribution fund as in the US state of Alaska. In the Zambian context a combination of the first two would seem the

[5] A description of the fund is found in a Norwegian Ministry of Finance document, http://www.regjeringen.no/upload/FIN/Statens%20pensjonsfond/SWF-memo-oct07-off.pdf

most rational approach. The government might consider a quickly seeking expert advice on how to establish and manage such a fund.

Finally, the recent introduction of Statutory Instruments for closer foreign exchange monitoring has important implications for the financial sector. The vast majority of the private buying and selling of foreign exchange occurs through domestic commercial banks. The quantitatively less important foreign exchange "bureaus" serve individuals and small and medium enterprises. The new regulations on reporting do not cover transactions in these bureaus.

Discussions with people operating businesses in the private sector indicate that the regulations are prompting a growth of bureau forex trading with the aim of avoiding Bank of Zambia monitoring. In the not-distant future a substantial portion of forex trading could escape BoZ monitoring by passing through the bureaus rather than commercial banks. The potential for growth of bureau trade results because the bureaus borrow from the commercial banks. The government may consider this shift an undesired diversion of forex trading. If so, it could be limited through regulatory measures restricting commercial bank lending to bureaus. The bureaus would then find it necessary to obtain foreign exchange by purchasing it from individuals and enterprises. As a result, the bureaus would service as an excess demand market for foreign exchange by recycling forex held outside of commercial banks. This might better reflect their appropriate role, since bureaus would be considerably more difficult to regulate effectively compared to commercial banks.

1.3 Empirical analysis

1.3.1 The Nominal Exchange Rate

Using the hypothesis in Diagram 2, in the next section inspects the major indicators in the flow chart for their variation over time. This inspection allows for a qualitative assessment of the pressures on the Kwacha for appreciation and depreciation. An initial step requires reviewing movements in the Kwacha with regard to the currencies of major trade partners (with exceptions of China and Congo DR, as explained in the previous section).

Measurement of the "nominal exchange rate" is not simple in practice because even for a specific currency, for example the US dollar, several useful measures present themselves. The most appropriate measure for a specified time period, quarter, month or year, would be the ratio of value of the dollar denominated trade to the same trade bundle in Kwacha.[6] However, the statistics necessary for this calculation are not easily available. The practice between the Central Statistics Office and the Bank of Zambia is to convert dollar values into Kwacha, or vice-versa, by use of the average spot price over the period in question. This practice leaves no practical alternative to the averaging of spot rates to calculate the nominal exchange rate.

Figure 1 shows the nominal Kwacha exchange rate for four countries, the US dollar, UK pound, the Euro and the South African Rand. Monthly values are calculated as percentage point deviations from the period average. The bracketed number is the coefficient of variation for each exchange rate. Positive values in the chart indicate depreciation compared to the period average. Inspection of the monthly values for the eight year period suggests a cyclical pattern rather than a trend. In terms of direction of movement the exchange rate adjustments can be divided between 2005-2008 and 2009-2013. The Kwacha tended to appreciate during the first period with extreme values in mid-2006 and mid-2008. Depreciation characterized the second period.

[6] Consider the calculation of a quarterly exchange rate. If both trade flows and the spot rate vary over the quarter, the average spot rate may differ substantially from the ratio of total trade in Kwacha and in dollars.

The monthly statistics show a clear tendency for depreciation in the cases of the US dollar, UK pound and euro, but not for the South African Rand. Some in Zambia have expressed surprise over the depreciating tendency, and suggested that it was inconsistent with underlying economic "fundamentals". This alleged inconsistency has provoked the conclusion that a decline of private sector confidence in government policies explains the depreciation.

Whatever the cause of the recent depreciation, the variation in the Kwacha seems low for all partner currencies, with coefficients of variation in all cases less that 0.2. In the case of the US dollar, the average monthly variation was about 640 Kwacha, compared to the mean exchange rate of 4480. As should be clear from Figure 1, the variation declined substantially after 2009. From the first quarter of 2010 through the second quarter of 2013, the coefficient of variation for the dollar was slightly less than .05, one-forth of its value for 2005-2009. The large decline in exchange rate variability after 2009 also applied to the UK pound, euro and Rand.

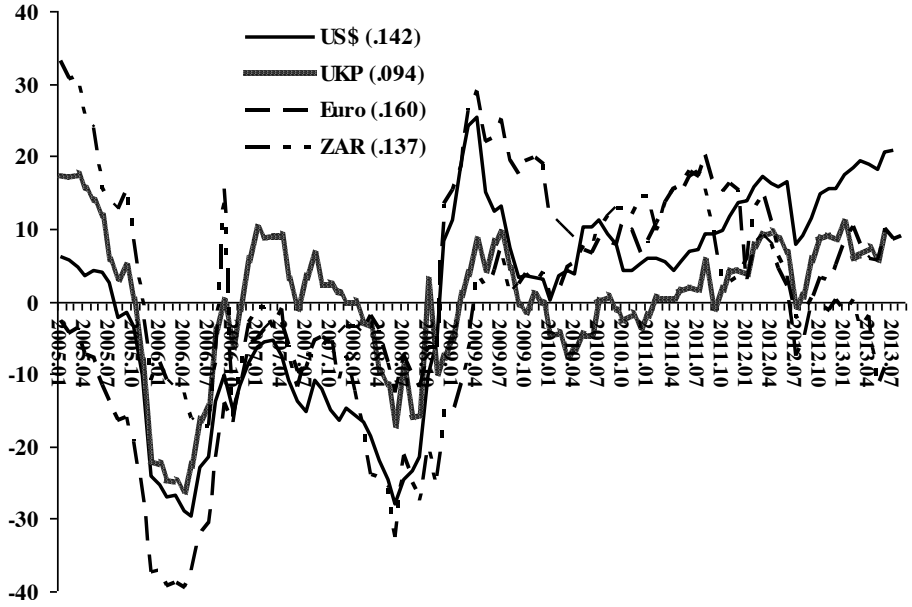
In summary, since the beginning of the present decade, the Kwacha initially depreciated then stabilized, with relatively and absolutely low variation. Whether the recent fluctuations represented a matter requiring policy intervention is an issue of policy for the BoZ and the government to decide. The statistics strongly suggest that stronger intervention for the specific goal of reducing exchange rate variation would be effective but not necessary. A case can be made for intervention with the purpose of fostering an exchange rate favourable for non-mining tradables.

Despite the declining variability of Kwacha exchange rates, interviews revealed considerable private sector concern about instability. It appears that this concern has three sources. First, the extreme depreciation in the 1990s, combined with the sharp appreciation during 2005-2006 has left the non-mining private sector with a low tolerance for exchange rate variability, for which one should have considerable sympathy. Second, this aversion to variability is an expected response to the absence of hedging mechanisms.

Third, this quite reasonable preference of stability combines with an unrealistic view of the degree of variability that the Bank of Zambia could achieve. One private sector

informant stated that the Bank of Zambia should set a one percent annual average variation in the Kwacha-US dollar rate as its goal. Such a target is beyond the ability of any central bank, and especially the Bank of Zambia which faces the change of an exchange rate heavily influence by a few private operators. This study strongly recommends that the Bank of Zambia embark on a public campaign to acquaint the public with the limits to its powers in forex markets.

Figure 1: Monthly nominal Kwacha rates against 4 currencies (US$, UK£, euro & SA Rand), percentage deviations from period average (set to 0), 2005.01 – 2013.08



Sources & notes:
Bank of Zambia, *Statistics Fortnightly* (www.boz.zm). USD – United States dollar, UKP – United Kingdom pound, ZAR – South African rand.

1.3.2 The "Real" Exchange Rate

The modifier "real" on "exchange rate" warrants inverted commas because of the considerable ambiguities association with the concept. The most commonly presented measure multiplies the nominal exchange rate by a ratio of internal to external prices. Because of data limitations, calculations frequently employ national cost of living indices or national income deflators for relative prices.

Specifically for Zambia, Moono has shown the inadequacy of the cost of living measure (Moono 2010a). The problem arises from the inclusion of non-traded

commodities in CPI indices. This also applies to national income deflators. Even when appropriately calculated, this measure at best indicates movements in relative prices, or purchasing power parity (PPP). As such it should not be interpreted as indicating relative "competitiveness" of two economies. The obvious fallacy in this interpretation is that it presumes the two countries actually or potentially import and export the same products in their bilateral trade, absurd in the case of Zambia and any developed country.

More relevant for "competitiveness" would be trading partner exchange rates calculated separately for exports and imports. To be accurate, this calculation would use the prices of the export and import baskets. The practical problems of calculation make such calculations rare. They are frequently unnecessary because economic theory provides a simpler calculation for the real exchange that indicates trade incentives, based on the distinction used in the Liang diagram between traded and non-traded commodities and services.

From any initial position an increase in the composite price of tradables compared to non-tradables indicates rising returns to exportables and importables, and vice-versa.[7] Zambian mining produces tradables, but including the sector in the tradable price index would make no economic sense. Prices of mining products, especially copper, are determined externally, as well as the prices of most mining inputs. For this sector a ratio of international metals prices and international input prices would come closer to a relative profitability measure. For policy the exclusion of mining from the tradables measure reflects the government's interest in promoting export diversification and efficient import substitution.

The domestic price ratio approach can also indicate the relative incentives to different categories of tradables. The drawback of this measure in Zambia is that it can only be calculated annually because of the absence of quarterly GDP statistics. The annual PPP, tradable/nontradable and agriculture/manufacturing indices appear in Figure 2.

[7] A thorough discussion appears in Liang (1992).

In a less rigorous way, the chart reinforces Moono's demonstration of the measurement bias that results from use of indices including non-tradables. The thick solid line provides the standard real exchange rate calculation, with the Zambian and US national income deflators for relative prices (PPP). The patterned line uses the ratio of Zambian non-mining tradables to Zambian non-tradables. A glance at the chart shows that the PPP measure bears little relationship to the tradable/non-tradable measure.

During 1997-2005 when the Kwacha suffered uncontrolled depreciation, the PPP measure suggests a general cheapening of Zambian goods and services. During the same years, the returns to tradables *declined* compared to the returns of non-tradables. The decline in relative returns persisted after 2005, and by 2012 was more than thirty percentage points below its level of 1994. This measure of the real exchange rate helps to explain the relative lack of success in diversification since the end of the Kaunda years. Between agriculture and manufacturing, the sectoral price indices indicate that the relative return to the latter rose. This finding does not contradict proposals that diversification might focus on manufacturing.

A warning is required about Figure 2 and its implications for economic policy. At the time this study was completed, the Central Statistics Office was in the process of a major review of national accounts statistics including recalculation on a more recent base year than the current one in use, which is from the early 1990s. This recalculation could have substantial effect on sector deflators used in figure 2.

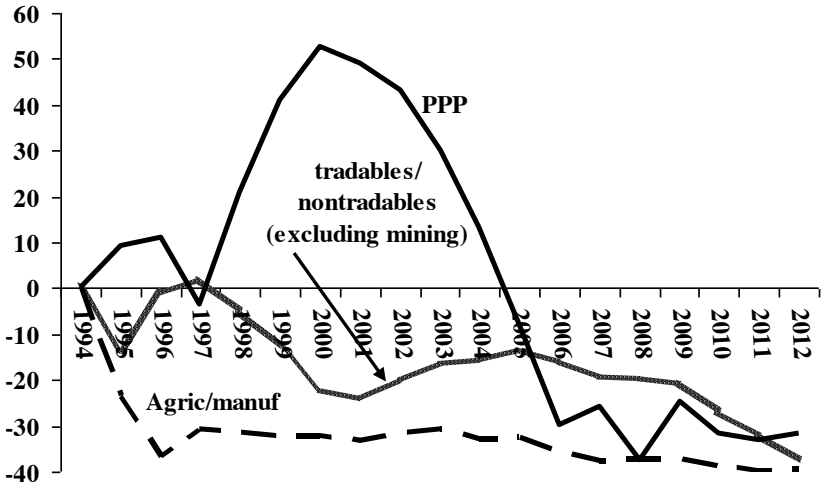
For all of its limitations, the PPP measure critiqued above and reported in Figure 3 has a simplicity that allows for monthly and quarterly calculation. Perhaps the most notable aspect of the PPP real exchange rates in the chart is that their variation in three of the four cases is higher than for the nominal rates in Figure 1, which is contrary to accepted wisdom. The usual argument maintains that the equilibrium process for the external sector brings about real exchange rate stability whatever might be the movements in the nominal rate.[8] In the case of Zambia, the coefficients

[8] If international markets are "perfectly competitive" and adjust rapidly across countries, the so-called Law of One Price would eliminate real exchange rate variability as measured by the PPP index.

of variation are very close for both nominal and real rates, though slightly larger for the latter except for the euro.

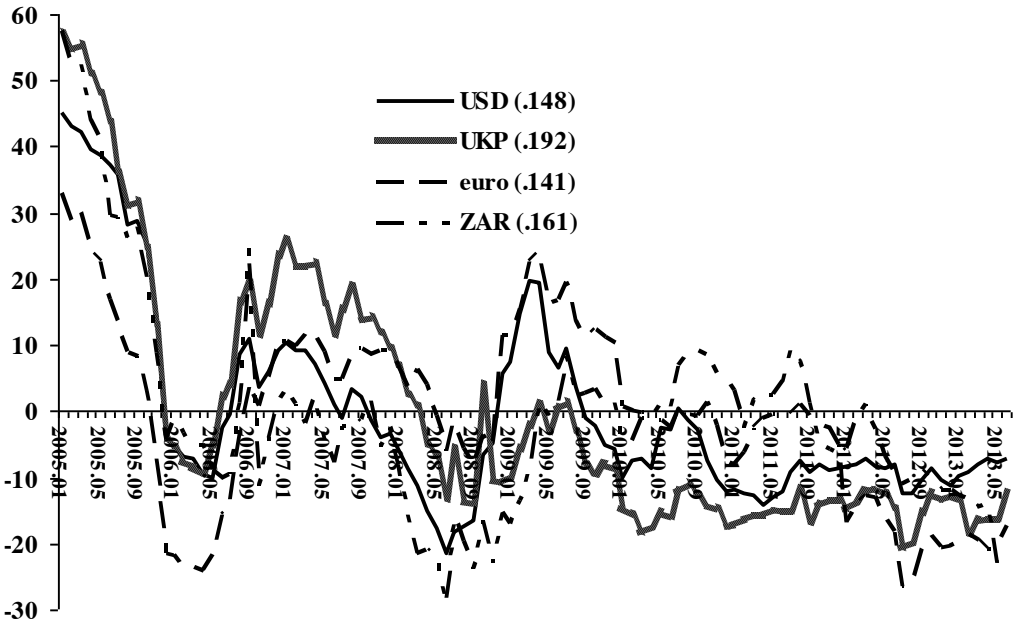
The measures of the real exchange rate produce four conclusions. First, the PPP measure indicates neither competitiveness nor the incentives for producing tradable commodities. Second, national income sectoral price indices suggest that the relative return to non-mining tradables at the beginning of the 2010s was considerably below the level of the second half of the 1990s. It appears that market liberalization policies did not generate incentives for private sector production of non-mining tradables. This negative result could be explained by the influence of the copper sector which in effect determines the nominal exchange rate, albeit through a complex process. Third, between agriculture and manufacturing relative returns moved in favour of the latter. Fourth, measured on a monthly basis, the PPP exchange rates appear quite stable during 2005-2013 with slightly more variation than for the nominal rates.

Figure 2: Zambian Kwacha: Annual values for two measures of the real exchange, purchasing power parity and ratio of non-mining tradables to all non-tradables, 1994-2012



PPP – The nominal Kwacha-US dollar rate multiplied by the ratio of the Zambian and US GDP deflators. Tradables/nontradables (excluding mining) – The denominator is the Zambian price index for agriculture and manufacturing, divided by the price index of non-tradables. Non-tradables include construction and tertiary sectors, less air transport, insurance and business services. Agric/manuf – Ratio of the national income deflators for agriculture and manufacturing.

Figure 3: Zambian Kwacha: Monthly PPP exchange rates against 4 currencies, percentage deviations from period average (set to 0), 2005.01-2013.06



Sources & notes:
Bank of Zambia, *Statistics Fortnightly* (www.boz.zm)
USD – United States dollar, UKP – United Kingdom pound, ZAR – South African rand.

1.3.3 Trends in External Variables

This section provides statistics for the external variables that have a major impact on the Kwacha. These include exports, imports, the trade balance, the copper price, international reserves, development assistance, debt service, other capital flows, and the spread between the Zambian Treasury Bill rate and the US federal funds rate. Inspection of these allows for initial inferences about the balance between appreciating and depreciating pressures.

These variables indicate substantial pressures for depreciation during the last months of 2012 and into 2013. Subsequent statistical tests support this conclusion. The so-called underlying economic fundamentals seem sufficient to explain movements in the Kwacha. Effects of other factors, such as expectations and private sector confidence are not rejected because they are not directly tested. However, expectations and private sector confidence seem unnecessary to account for exchange rate movements.

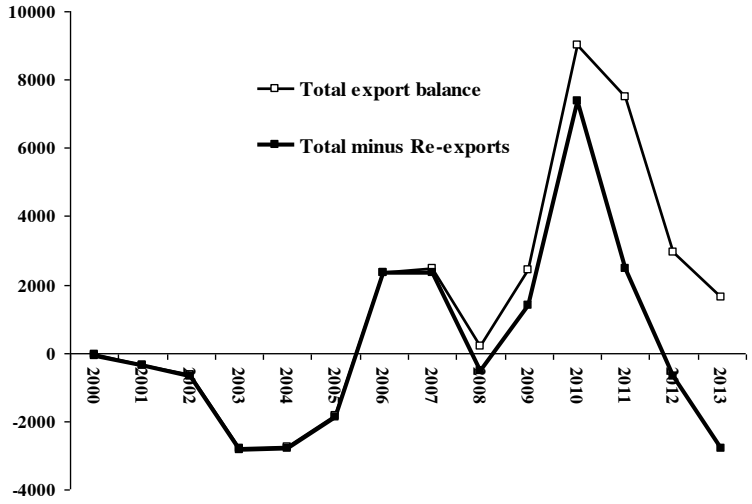
Figure 4 shows two measures of the annual trade balance, with and without re-exports. As noted above, the apparently large trade with Congo DR consists to a great extent of the transit of metals and other minerals. As a result, for this paper excluding re-exports provides a better indication of Zambia's trade performance. A glance at the chart shows why the Kwacha might experience depreciation after 2010, as the trade balance declined sharply. The trade balance for 2013 becomes negative using the measure without re-exports. Because the 2013 statistic refers only to the first and second quarters, it may understate the annual balance. Understatement becomes more likely because the quarterly balances show no seasonal pattern; that is, we have no evidence to attribute the 2013 negative balance to quarterly variation.

Figure 5a verifies the deterioration of the trade balance (without re-exports) in monthly data. During the 30 months beginning January 2010, the dollar value of the balance declines except for sharp increases in two months (September 2011 and September 2012). The same pattern appears in the quarterly statistics (Figure 5b), which we use for the statistical exercise in the next section.

In value terms petroleum and fertilizer have been the two largest import categories over the thirteen years since the beginning of 2000 (Figure 5c). These commodities do not account for the considerable increase in the value of imports. On the contrary, from a share of 20 to 30 percent of total exports during 2009 and the first half of 2010, the share for these two commodities fell into the 10-20 percent range from 2011 through the first and second quarters of 2013. While firm conclusions require a more detailed inspection of the import structure, it appears that the major increases have been in consumer products, not producer inputs and equipment. This outcome is consistent with generalized trade liberalization which began in the 1990s (WTO 1996 and 2009).

Previous sections pointed out the substantial decrease in the variability of both the nominal and PPP exchange rates since 2008. For the trade balance the opposite occurred (see Figure 5b). During 2000-2005 the quarterly coefficient of variation was about minus 0.5 (the denominator is negative), and subsequently slightly over two. This instability in the trade balance may have policy implications considerably more important than nominal and PPP exchange rate variability.

Figure 4: Zambia: Annual merchandise export balance with and without re-exports, 2000-2013 (millions of Kwacha, current prices)



Note: 2013 is for the first 7 months.

Figure 5a: Zambia, Monthly US dollar trade balance (without re-exports), 2003.01-2013.07 (millions of US dollars)

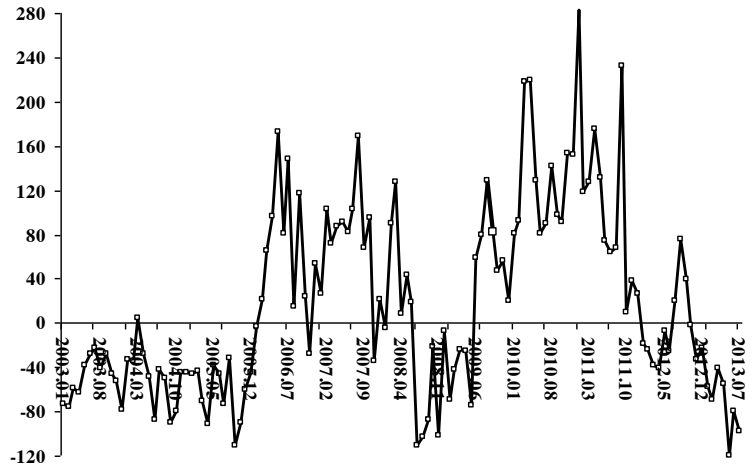


Figure 5b: Zambia, Quarterly trade balance (without re-exports), 2003.1-2013.2 (millions of US dollars)

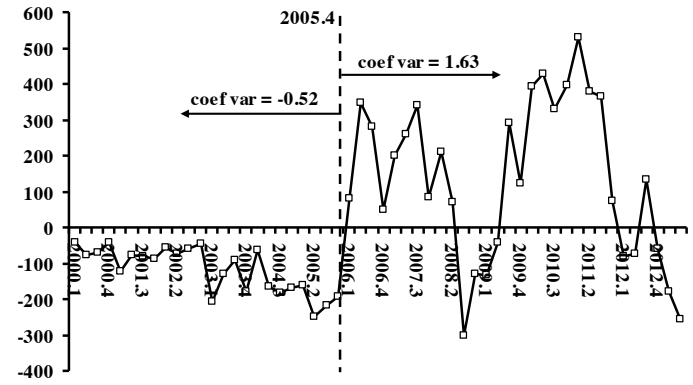


Figure 5c: Zambia, Petroleum and fertilizer as percentages of total imports, Quarterly, 2000.1-2013.1

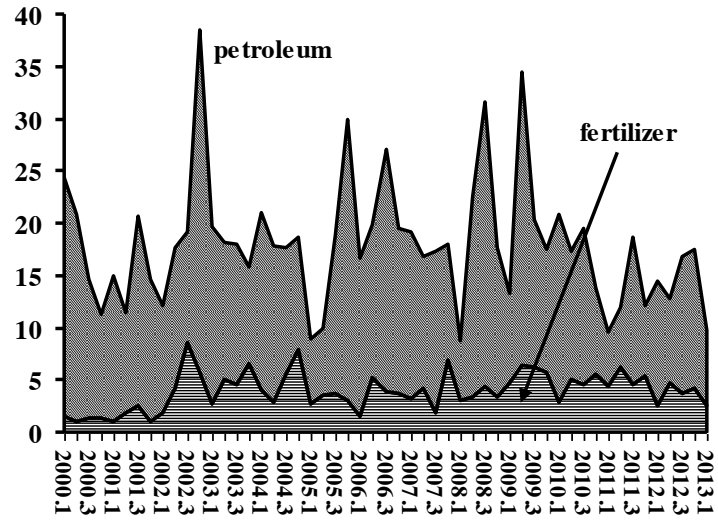


Figure 6 reports the quarterly net balance of the capital account, 2000.1 through 2013.1. The capital account shows a substantial increase in variation after 2005, as one would expect from the previous chart of the trade balance (see Figure 5b). In Zambia trade is the largest component of the current account, and by definition of measurement its volatility also increased along with the capital account. The quarterly and annual matches are not perfect because of lags in the balancing financial flows.[9] The time lag between the accounts implies that their variability does not coincide, which implies different impacts on the nominal exchange rate for any period.

Figure 6 reveals an obvious deterioration of the capital account over the last several quarters, which reinforces the previous evidence for pressures toward exchange rate depreciation. Figure 7 continues with further evidence of depreciation pressures, which measure three variables as percentage point variations from the period average. Following an almost continuously increasing tendency from early 2009 through early 2011, international copper prices began to decline, levelling off in the second half of

[9] When the two accounts are summed, the average quarterly residual during 2006-2013 is about US$30 million, less than five percent of the absolute value average. However, some quarterly values are quite large, for example plus 413 million for 2011Q3 and minus 412 for 2012.3.

2012 at about thirty percentage points below their peak value. As a result, the value of copper exports ceased to rise even though the quantity exported reached a new peak in the second half of 2012. After the review of other external indicators the relative decline in foreign exchange reserves comes as no surprise (solid line in Figure 7, measured as percent point deviations from the average).

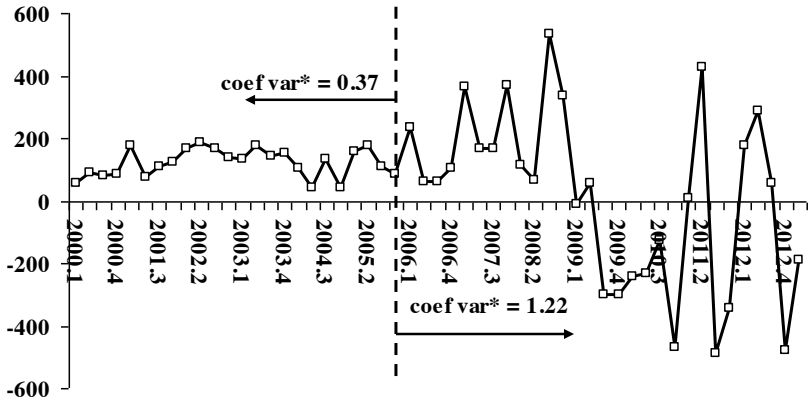
Figure 8 charts the percentage point spread between Zambian 91 day Treasury Bills and 24 month bond, on the one hand, and the US Federal Funds Rate on the other. The last, an average of public bond rates with maturities less than 12 months, serves as the indicator of "world interest rates". For the period as a whole, the Zambian rates averaged 11.3 and 17.0 percent, respectively, while the mean for the Federal Funds rate was 1.8 percent. The chart shows that the percentage point spread for both Zambian bonds was below the period average from the beginning of 2010 onwards. Because of the relative stability for the last two years, the spread would not have generated pressures for appreciation.

The last indicators are official inflows and debt. Figure 9 gives four quarter moving averages for development assistance and debt service. The averaging provides a clearer impression of tendencies because the quarterly variables show large variations. A further advantage in averaging development assistance is that the it reduces ambiguities arising from the difference between donor scheduled and actual deliveries of flows. The dramatic decline in debt service payments at the end of 2006 is consistent with the Kwacha appreciations during 2007-2008.

Similarly, increasing development assistance during 2009 allowed for accumulation of reserves when again the Kwacha appreciated (see Figure 1). After 2010 development assistance declined sharply, from US$150 million for the last quarter of 2009 to 43 million for the first quarter of 2013 (referring to moving averages). While development assistance levelled off well below its peak, debt service crept upwards, from below US$15 million for the last quarter of 2011 to over 60 million for the first quarter of 2013 (again, moving averages). As for all the other external indicators, movements in development assistance and debt service seem consistent with a depreciating exchange rate.

All major external indicators are consistent with the absence of pressure for currency appreciation and possible pressure for depreciation over the last year. During this period the nominal Kwacha exchange rates did depreciate, except for the Kwacha-Rand rate. There should be no mystery associated with exchange rate depreciation. It is implied by movements in the variables we would expect to influence it. In the next section I estimate the impact of these influencing variables.

Figure 6: Zambia: Quarterly capital account balance, 2000.1-2013.1 (US$ millions)



Notes: The coefficient of variation uses the absolute value of the mean. Capital account excludes the US$750 mn Euro bond sale in 2012 and the large debt cancellations during 2006-2009.

Figure 7: Zambia: Monthly copper exports (metric tons), prices (US¢/lb), and gross forex reserves in months of imports, % point deviations from period average, 2003.01-2013.06

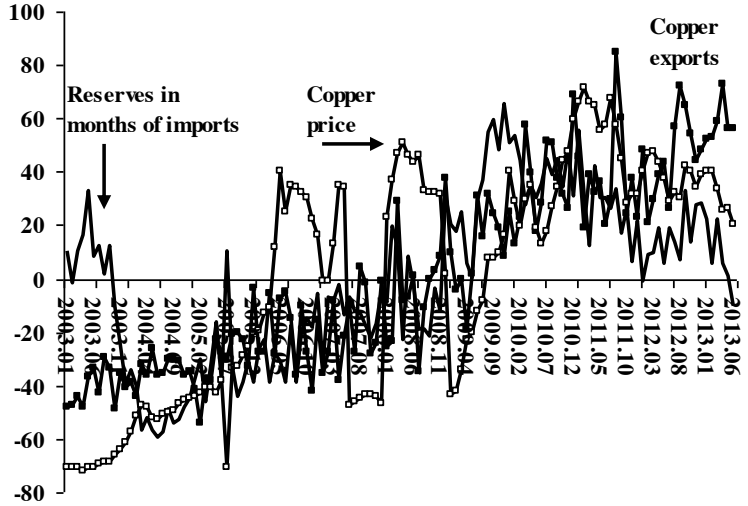
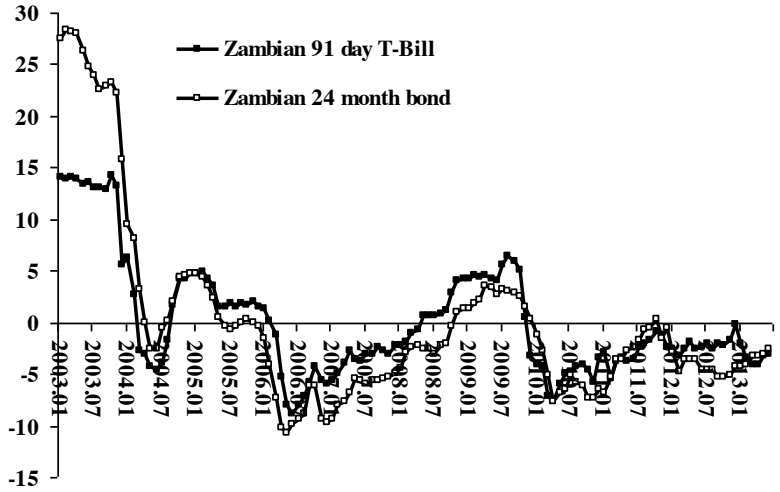


Figure 8: Zambia: Monthly percentage point spread, Zambian 91 day Treasury Bills and US Federal Funds Rate, deviations from period average, 2003.01-2013.06



Sources and notes: Zambia T-bill rate from Statistics Fortnightly (www.boz.zm)
US Federal Funds rate from US *Economic Report of the President*, Table 73, where it is defined. The spread is measured as monthly value minus the period average.

Figure 9: Zambia, Development Assistance and Debt Service, 2004.1-2013.2 (US$ millions, four quarter moving average)

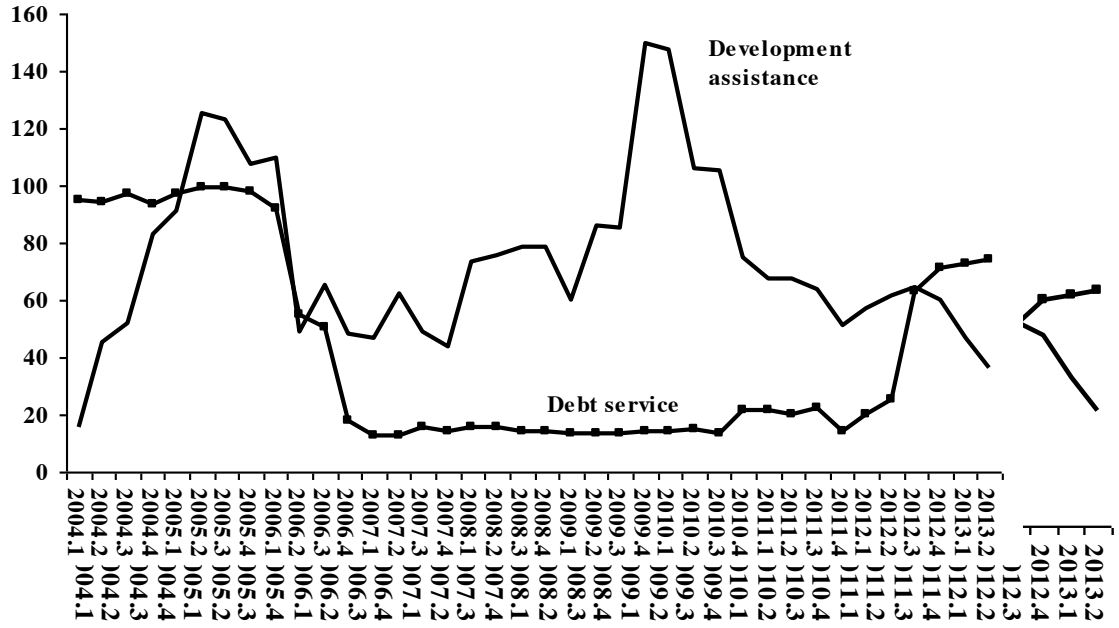
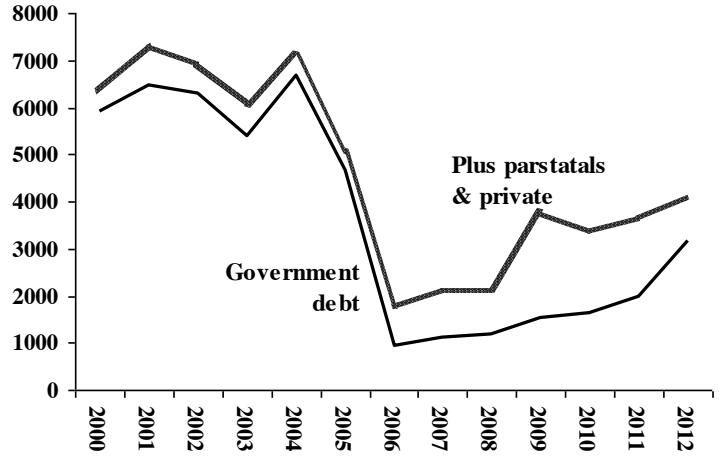


Figure 10: Zambia, External Debt, 2000-2012 (US$ millions)



1.3.4 Short run estimation for the nominal Kwacha

The previous discussion provides the basis for investigating the determination of the Zambian exchange rate. Rather than calculating a weighted index of exchange rates, the estimations below use the ratio of the Kwacha to the US dollar. Figures 1 and 2 demonstrated the close relationship among the various bilateral exchange rates, which implies that estimating only the Kwacha-dollar rate does not substantially affect the generality of our conclusions.

The statistical exercise below complements the more comprehensive Bank of Zambia model, focussing on the specific issue of the impact of BoZ participation in the foreign exchange market on the exchange rate.[10] This model works through the familiar partial adjustment to equilibrium process. Its equivalent of a closure condition holds when the desired exchange rate equals the actual. I begin by defining variables,

(Kw/USD)t = Kwacha to US dollar exchange rate in period t

(Exports/Imports)t = relative trade balance in period t

[10] Among other variables the BoZ model includes the copper price, petroleum prices and a measure of the money supply. The model in this paper differs in two major ways. First, the Bank of Zambia model does not include the interest rate differential, which was rejected as non-significant. Second, the model in this paper does not include a money supply measure. It is possible that the inclusion of the latter renders the former non-significant, and vice-versa. As explained in Section 1, the mechanism of the interest rate differential is commercial bank portfolio adjustment. If the money supply is partly endogenous with respect to the level of output, the domestic interest rate and the money measure would be correlated.

(ZTBr/USFFr)t = Bank of Zambia Treasury Bill rate divided by US Federal Funds rate in period t (average of short term rates for different maturity periods)

(BoZ Forex sales)t = foreign exchange transactions by the Bank of Zambia in US dollars, period t (purchases are positive)

$\Delta(Kw/USD)t = \alpha[(Kw/USD)t^* - (Kw/USD)t\text{-}1)]$

Define $(Kw/USD)t^*$ as the equilibrium level or the rate consistent with underlying determining variables. The underlying analytical framework of the formulation is that the actual rate partially adjusts each quarter to the equilibrium rate.

$$(Kw/USD)t^* = [(Exports/Imports)t\text{-}1]^{b2} + [(ZTBr/USFFr)t\text{-}1]^{b3} + [(BoZ\ Forex\ sales)t2,3]^{b4}$$

$$\Delta(Kw/USD)t = \alpha\{-[(Kw/USD)t\text{-}1]^{\beta 1} + [(Exports/Imports)t\text{-}1]^{\beta 2} + [(ZTBr/USFFr)t\text{-}1]^{\beta 3} + [(BoZ\ Forex\ sales)t2,3]^{\beta 4}$$

We can now show the predicted signs, except for the constant:

$$\Delta(Kw/USD)t = \beta o - \beta_1 \ln(Kw/USD)t\text{-}1 + \beta_2 \ln(Exports/Imports)t\text{-}1 + \ln[(ZTBr/USFFr)\ t2,3]^{\beta 3} + [(BoZ\ Forex\ sales)t1]^{\beta 4}$$

The time period for the estimation begins with the first quarter after Zambia reached the HIPC Completion Point (the third quarter of 2005). The substantial debt relief from the HIPC process, plus the cancelling of multilateral debt in the same year almost eliminated the entire external public debt of Zambia. Among the favourable results was a substantial improvement in private sector faith in the stability of the Kwacha.

Table 1 provides the results of the estimation. The variables pass the tests of stability. All variables enter with natural logarithm values with the exception of Bank of Zambia foreign exchange sales, measured in current US dollars, because the observations are both positive and negative. The explanatory variables are unambiguously exogenous. Exogeneity is achieved for the level of the Kwacha and the trade balance through the introduction of logged values. The Bank of Zambia Treasury Bill rate is a policy variable, as are foreign exchange market interventions. The US Federal Funds rate is a policy variable external to Zambia.

Given that the dependent variable is a rate of change, the explanatory level of the estimating equation is high, and all independent variables statistically significant. An increase in the trade balance generates pressure for exchange rate appreciation, as does an increase in relative interest rates. As expected, Bank of Zambia foreign exchange sales by increasing the availability of dollars and other trading currencies provokes depreciation.

The statistical results in Table 1 confirm the assessment in the previous section. Over the eight years, 2005Q3 through 2013Q2, the Kwacha moved in response to influences specified by basic macroeconomics, the trade balance, relative interest rates and Bank of Zambia interventions. The role of the Bank of Zambia in exchange rate determination requires elaboration. Figures 11, 12 and 13 provide the statistical information to do this.

Figure 11 shows the quarterly estimation errors of the model (dashed line) and the difference in the estimated value when Bank of Zambia interventions are set to zero. The mean of the absolute values of the estimation errors is 202 Kwacha per dollar, or 2.4 percent of the actual Kwacha average. More interesting is the "BoZ effect", the estimation difference associated with Bank of Zambia interventions. This is 6.8 percent of the average Kwacha-dollar rate, implying as theory would predict that the Bank of Zambia has a substantial short term impact on the exchange rate. Figure 12 charts the quarterly BoZ effect as percentage of the actual exchange rate that quarter. Two characteristics of Figure 12 are notable. First, during 2005-2007 the Bank of Zambia intervened to reduce pressures for appreciation, as found in an earlier study (Weeks, *et. al*. 2007). Since the beginning of 2008 the Bank of Zambia intervened to reduce pressures for depreciation. In both cases, reducing appreciation and moderating depreciation, the interventions were effective. The results indicate that BoZ interventions had a larger effect in preventing greater depreciation than arresting appreciation. Figure 13 shows the actual, estimated and estimated without the BoZ effect values. Inspection of lags between BoZ forex operations and the change in the exchange rate indicate that the full impact of the former manifests itself over two quarters, the one during which the intervention occurs and the one that follows.

From discussions with Bank of Zambia officials and the statistical results in this section, the conclusion seems justified that the Bank of Zambia has the potential for effective exchange rate management. It realized that potential over the last ten years. Table 2 suggests a second aspect of Bank of Zambia exchange rate management, the potential to reduce variability. The estimation in Table 3 uses the moving coefficient of variation of the Kwacha-dollar rate over four quarters. Two variables account for almost half the variation in this measure of instability, the lagged instability of the capital account and the lagged level of reserves. This result suggests that nominal exchange variation declined despite capital account instability when accumulation of foreign exchange reserves increased.

When in excess of precautionary needs, the accumulation of reserves has a substantial opportunity cost in foregone imports that might contribute to the rate of economic growth. This cost is for the government to assess. At the time this report was completed reserve holdings were below BoZ target. In the future the government conclude that the cost of holding sufficient reverses to achieve the desired stability of the exchange rate is excessive. Should this occur, then interventions to reduce capital account variability become relevant, as recommended in a recent speech by IMF director Christine Lagarde.[11] Capital regulation tools have been successfully used in a number of countries, especially in Latin America. Research in the Bank of Zambia would be required to determine those interventions which are feasible and have minimal side effects.

[11] The full speech can be found at http://www.imf.org/external/np/speeches/2013/082313.htm.

Table 1: OLS estimation for Kwacha-US dollar exchange rate, quarterly, 2005.3-2013.1, Dependent variable: first difference in the Kw/USD rate

Variable	coefficient	Significance of T
Constant	3.308	.000
ln(Kw/USD)t-1	-.3772	.001
ln(Exports/Imports)t-1	-.1603	.029
ln(ZTBr/USFFr)2 qtr	-.0867	.000
(BoZ Forex sales)t1	.0010	.000
Adj R-square = .470 F-statistic = 7.66	DF = 26 @ .000	Serial correlation rejected

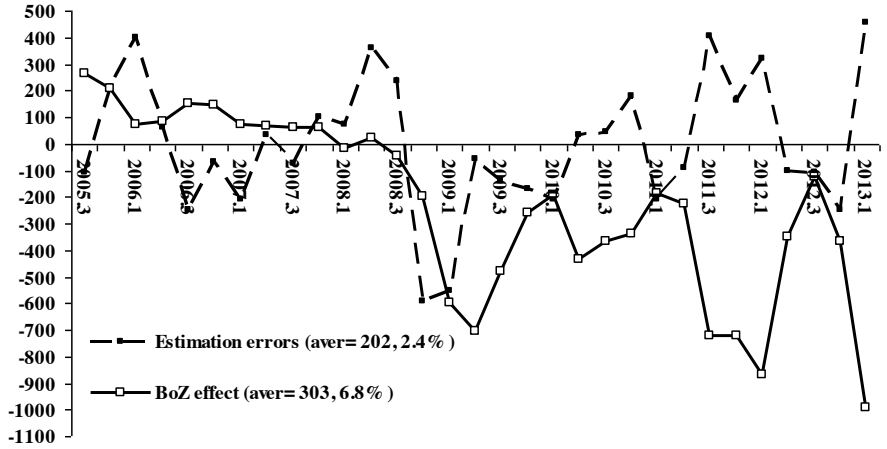
Notes: taken in order the variables are 1) Kwacha-US dollar exchange rate lagged one quarter, 2) the relative trade balance lagged one quarter, 3) difference ("spread") between the Zambian 91 day Treasury Bill rate to the US federal funds rate averaged for the current and previous quarter, and 5) Bank of Zambia foreign exchange sales for the current period.

Table 2: OLS estimation of the quarterly variation in the Kwacha-US dollar exchange rate, 2003.1-2013.1, Dependent variable: 4 quarter moving coefficient of variation

Variable	coefficient	Significance of T
Constant	-1.581	.268
ln(CoefVarCapAcc)	1.479	.000
ln(GIR)t-1	-0.579	.023
Adj R-square = .436 F-statistic = 14.93	DF = 36 @ .000	Serial correlation rejected

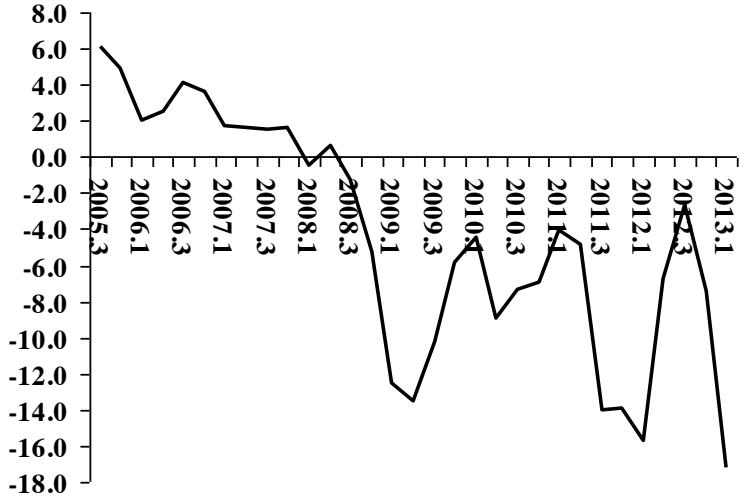
Notes: taken in order the variables are (in natural logarithms): 1) the 4 quarter moving average coefficient of variation of the capital account, and the level of gross international reserves lagged one quarter.

Figure 11: Zambia, Estimation errors & BoZ effect, quarterly, 2005.3-2013.1 (Kwacha)



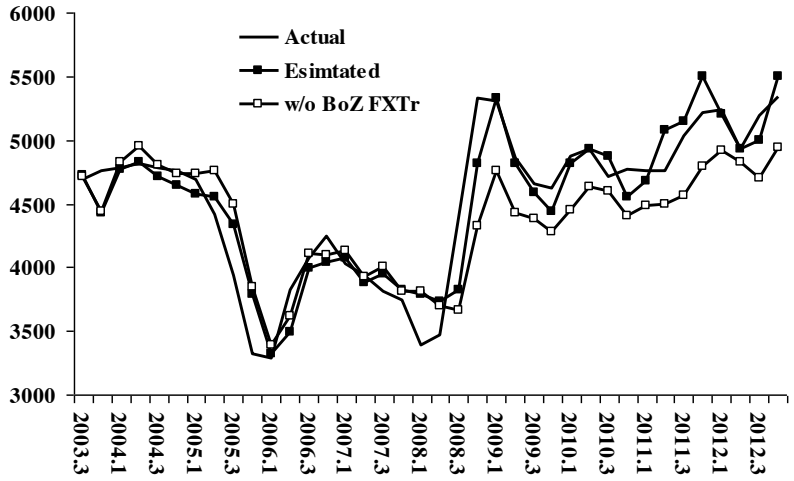
Calculated from statistics in Table 1.

Figure 12a: Zambia, BoZ Effect, % of actual rate by quarters, 2005.3-2013.1



Calculated from statistics in Table 1.

Figure 13: Zambia:, Actual & estimated Kwacha-US$ rate, and BoZ effect, quarterly, 2005.3-2013.1



Annex 1: Terms of Reference

{As amended in May 2013)

International Growth Centre

Determinants of the Zambia Kwacha

Copper has accounted for some 70-80 percent of Zambia's exports in 2009-11. With copper exports having recovered from less than 250,000 tons in 2002 to over 700,000 tons in 2011, and with copper prices exceeding $7,000 per ton, the incentive to diversify exports arises from fears of a slump in metal prices; the low labour content of mining (so that little employment results from it) and the lack of linkages from the mining industry. Agriculture and tourism are emphasized in the current Sixth National Development Plan (2011-16) as sectors offering potential for diversification, but in the long term, agro-processing and other manufacturing and service activities need to be developed for diversification as well as for employment generation.

Both micro and macro factors are believed to influence competitiveness and diversification. The high costs of doing business in Zambia and of trading between Zambia and the rest of the world undermine competitiveness and mitigate against diversification. These costs include poor infrastructure: excessive red tape and licensing: high finance costs and lack of access to finance: skill shortages and other labour market distortions.

At the macro level, an important issue is whether Zambia suffers from Dutch Disease, with its exchange rate (which is largely market-determined) influenced largely by high mineral prices which may inhibit the development of other exports. Indeed, the exchange rate might also be excessively volatile due to its links with commodity prices and trading conditions for the Kwacha. In addition to possible effects on the relative prices of tradables and non-tradables, it is also possible that there are important political economy effects and rent-seeking which tend to entrench the mining industry and mitigate against diversification.

It is therefore important to identify economic factors which have an impact on exchange rate movements of the Kwacha.

The aim of this study would be to examine the factors explaining the movements in the exchange rate at the present time as well as over the long run. The broader economic environment surrounding exchange rate determination would be examined.

Specifically, the study should:

Identify and weigh the key factors influencing exchange rate movements in the Zambian Kwacha;

This should include consideration of:

- the impact of policy, fiscal and monetary decisions (e.g. newly introduced SI33 prohibiting the use of foreign currency on local transactions),
- the impact of conditions in the Zambian economy such as the nature of the financial sector and capital markets and microeconomic factors for example,
- the general political and policy environment
- as well as the impact of the international environment on exchange rate developments;

Annex 2: Statutory Instrument 32 of 2013

[taken from Zambian Development Agency 2013a]

1 Introduction

The Zambian economy has persistently recorded sustained gross domestic product (GDP) in the last ten years, with favourable macroeconomic environment attracting significant amounts of foreign direct investments especially in the mining sector of the economy. Similarly, due to the debt write-off, it meant that the country had some fiscal space and, therefore, ample scope to affect the distributional effects of income in the economy in a positive manner. Zambia has also graduated to become a lower middle-income country in recent years.

However, income disparities still remain significant between the rich and the poor with poverty levels largely remaining constant with over 67 percent living below the poverty line living on less than US$2.00 a day.

The Bank of Zambia is on record saying that most exporters hold bank accounts outside the country where proceeds of exports are externalized. This suggests that the value of export earnings as compiled in the Balance of Payment may not reflect a correct position in the absence of new measures contained in the SI.

The Government signed Statutory Instrument (SI) No 32 of 2013, which seeks to monitor Balance of Payments in a transparent and accountable manner and encourage stakeholders to adopt genuinely transparent practices and standards. From the perspective of ZDA, the signing of the SI 32 of 2013 which will come into effect on 1st July, 2013 has various implications for doing business in Zambia as follows:

2 The Scope of SI 32 of 2013

The Statutory Instrument covers all export, import, debt instrument and remittance transactions in and out of Zambia. Under the new framework, all exporters and importers of goods and services are required to open a foreign currency account with a bank in Zambia.

This account will be used for receiving export proceeds in the case of exporters and for remitting import-related payments by importers.

The requirement to open a foreign currency account with a bank in Zambia represents a fundamental shift from the current practice where exporters choose to maintain these accounts outside the country and only bring partial export proceeds for purposes of meeting their local currency obligations in Zambia. Another salient feature of the new regulation is that exporters and importers are now required to complete the export form or import form confirmed by a financial service provider before proceeding with an export or import transaction. These forms have become part of the documents required for customs purposes.

Further, an exporter or importer will be required to acquit each transaction within 60 days by submitting relevant documentation to the effect that the proceeds of an export have been received or that the goods for which an import remittance has been made have been received.

The regulation also imposes obligations for investors who receive incentives under the Zambia Development Agency Act of 2006 to deposit the cash component of the investment pledges into an account held by a bank in Zambia. In cases where part of the investment pledge is equipment or machinery, an investor will be required to submit evidence of receipt of the equipment/machinery by way of customs

documentation so that the transaction can be acquitted. Other transactions that will be monitored will include dividends, royalties, management fees and other fees.

Annex 3: List of People and Organizations consulted

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Chapter 2. Copper and Diversification: are they Kwacha Fundamentals?

By

Oswald K. Mungule

Executive Summary 2

1). The empirical evidence indicates that there is a weak negative correlation between the Kwacha and the copper price.

2). The Kwacha is generally a stable currency.

3). The copper price cannot be seen to influence the Kwacha during the period of the study (1995q1-2011q4).

4). Copper dependence is high, but has accounted for a very small proportion of gross domestic product (excluding mining related infrastructure).

5). Copper and other export revenues can stimulate vertical and horizontal linkages in agriculture and other sectors.

6). Sectoral interlinkages to the copper industry are weak.

7). Industrial diversification can benefit from high copper prices, through propping up a copper fund.

8). In the long term, the Kwacha's value will depend on a highly diversified economy. Therefore, value-based industrial diversification will sustain a competitive long run Kwacha.

9). These findings are in line with the business sentiments of key stakeholders and the revised terms of reference on microeconomic and macroeconomic foundation (industrial diversification) approaches to exploring drivers of both the short-run and long-run Kwacha.

2.1 Introduction

This paper evaluates whether Copper can be used as a driver of industrial diversification or not. Industrial diversification means introducing wider and more diverse array of production facilities needed for wealth creation, increased domestic consumption, increased production of manufactured commodities, public revenue generation, improved export receipts and above all employment generation.

Most western countries like the United States of America, United Kingdom, Germany; Asian countries like Japan, China, India, Malaysia, and South Korea; and Latin American Countries like Brazil have made their economies highly competitive and efficient through industrial diversification. Even oil exporting countries like United Arab Emirates, Russia and Iran have diversified their economies away from dependency on oil by using oil revenues to industrialise. These countries have set up competitive and efficient manufacturing and tourism industries.

Unfortunately, Zambia like many developing African countries like Angola, Nigeria, Congo DR, depends on the export of primary products (copper, oil, Diamonds) as a largest export industry. Before 1998, Zambia heavily dependent on metal revenues through Zambia Consolidated Copper Mines (ZCCM), a state owned enterprise. Between 1964 and 1995, all metal export proceeds were channelled through Bank of Zambia. However, after privatisation of the metal industry among others, all metal export proceeds were externalised and mining firms were free to keep their export revenues in their parent companies bank accounts. This drained a lot of public revenues since mining firms paid little and sometimes no income tax. It is in this light that the government started exploring ways and means of retaining as more revenue as possible in the domestic economy. However, lack of contribution of export revenues to industrial diversification in the past two decades has contributed to lack of development in export led especially heavy manufacturing and Tourism. However, Zambia has light manufacturing going on across sectors.

The government has come up with industrial diversification programme which is based on industrial clusters and value addition to primary product outputs. The key to the success of the industrial diversification in Zambia lies in strengthening the forward, backward and horizontal linkages of all industries. This requires a master plan which can be refined at intervals during implementation. Some of the resources to implement the industrial clusters could be obtained from the mining industry through a good fiscal regime. Besides the fiscal implications of industrial diversification, are consumption and production implications.

As the industrial diversification framework takes care of resource rents, plans for stimulating consumer spending will be important because this will in turn stimulate industrial production. It is the industrial production that will be driving the Kwacha in the future. Thus, the exchange rate policy should be strongly linked to industrialisation. This basically implies linking the exchange rate policy to increasing financing of industrial diversification, increasing consumer spending and increasing production. The above ideas were sourced from key stakeholders as indicated in Annex A4.

The rest of the paper is structured as follows: Chapter 2.2 gives a detailed analysis on whether the Kwacha is driven by the Copper price. Chapter 2.3 presents the pros or cons of copper dependence. Chapter 2.4 presents a framework for industrial diversification. Chapter 2.5 presents the conclusion and policy implications.

2 .2 Is the Kwacha driven by the Copper Price?

2.2.1. Nature of the Kwacha-Copper Relationship

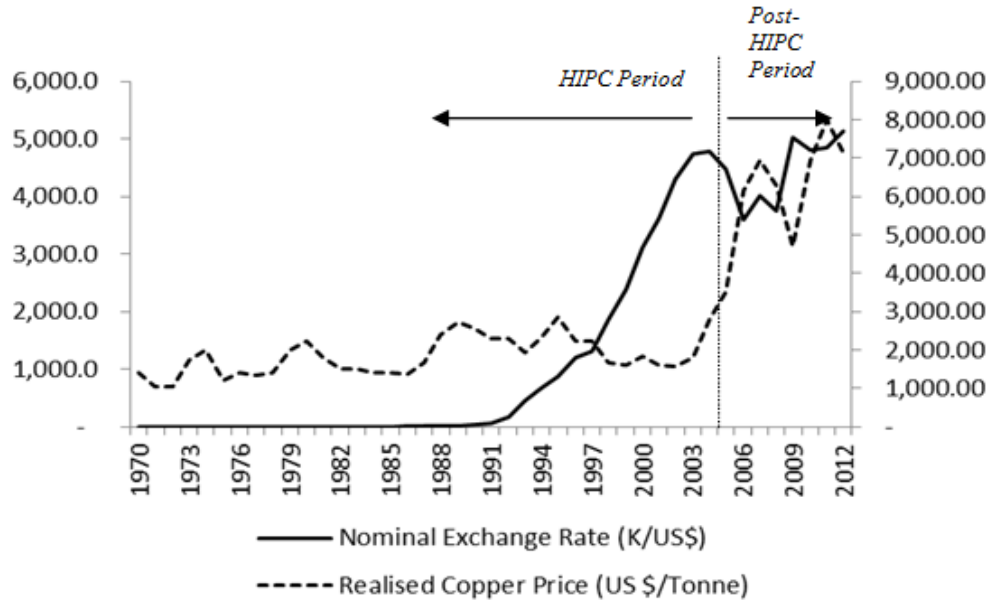
In this paper, we first establish the nature of the relationship between copper price and the exchange rate or the Kwacha. The exchange rate is a price used in international trade when exchanging kwacha for a foreign currency. In this case the exchange rate is defined as the value of the kwacha per unit of foreign currency. Therefore, an increase (a decrease) in the value of the kwacha per unit of a foreign currency is what is known as depreciation (depreciation), in a freely floating exchange rate regime such as the one in Zambia. We employ these definitions in this study.

We focus on the kwacha-copper linkage in order to interrogate the perception whether copper prices have had a significant negative or appreciation impact on the kwacha from the time the mines were privatised to the first quarter of 2013. We prefer this period because monetary policy stance is constant and is driven by setting money base targets. On March 1, 2013, Zambia adopted a new monetary policy system based on inflation targeting.

This essay favours strengthening the link between the kwacha and industrial diversification and the need to allow the kwacha to drive industrial diversification or manufacturing. This essay simultaneously recognises the importance of the copper price in driving fiscal rents required for industrial diversification. This essay strongly recommends that the exchange rate or kwacha should always be first stimulating local industrial production before any other consideration. Production should also be strengthened by fiscal rents. In this case, fiscal rents or tax revenues should strongly stimulate production. The expected result from increased production is that domestic consumption will be strengthened to support production further. Consumption management will have to be done through labour market wages which should respond to and reward productivity of the labour force. Our nation is currently shows signs of strongest economic growth in this region and needs to take advantage of this privileged position to export surplus to neighbouring countries. This essay proposes a commodity led industrialisation strategy, where copper still has a big role to play.

In this section, we focus on investigating the relationship between the copper price and the Kwacha in order to determine the impact of mining company practices on the domestic foreign exchange market. Thus, industrial diversification is handled in a different section. We slowly develop our way towards the section for industrial diversification. This essay employs three familiar macroeconomic relationships, the IS schedule for the goods market equilibrium, the Phillips curve for inflation, and the real exchange rate for its macroeconomic effects. The model might be viewed as an enhanced Mundell-Fleming framework that allows for the dynamics of the pass-through effects of inflation, the real exchange rate as well as the nominal exchange rate (Weeks 2013). The results show that movements in the copper price have a weak effect on the Kwacha. There is support for this from Figure 1, which indicates that the exchange rate depreciated as the copper price increased. In other words, the Kwacha weakened despite following a rising copper price trend. We also observe that the trend is non-linear and conclude that the copper price and the exchange rate follow a non-linear trend.

Figure 2.1- Copper Price and the Exchange Rate



Note: The left-hand axis measures the exchange rate, while the righ hand side axis measures the copper price in US dollar per metric tonne.

The appreciation of the Kwacha began after news became public information that the country had qualified for cancellation of debt under Heavily Indebted Poor Countries (HIPC) initiative in April 2005. Appreciation of the Kwacha began way before the completion point and continued after the completion point. The Bank of

Zambia did not initially intervene in the foreign exchange market leading to kwacha appreciation. The appreciation resulted from inflows from foreign investors as the country's risk rating drastically improved following debt write-off by multilateral institutions and most bilateral creditors. The moderation of kwacha fluctuations followed the appreciation episode leading to depreciation and now we see a fairly stable kwacha. Persistent Bank of Zambia interventions into the foreign exchange markets have contributed to the stability of the kwacha. Market interventions are justified since the market is characterised by few traders who could disadvantage the entire country if the Bank of Zambia did not do anything and just watched.

Generally, Figure 2.1 supports the view that there is a weak negative correlation between Copper prices and the exchange rate. This result is supported by a simple correlation test for real prices in Table 2.1 below.

Table 2.1- Correlation Matrix for Real Copper Price and Kwacha (1995Q1-2011Q4)

	REAL COPPER PRICE	REAL EFFECTIVE EXCHANGE RATE
REAL COPPER PRICE	1.00	-0.28
REAL EFFECTIVE EXCHANG RATE	-0.28	1.00

Source: Eviews Output generated by the Author.

Note: LNREER is the logarithm of effective real exchange rate; LNREALCOPPER is the logarithm of the real copper price (nominal copper price minus inflation)

Table 2.2 considers more currencies by determining their correlation using monthly nominal data. We still find weak correlation between copper price and the kwacha.

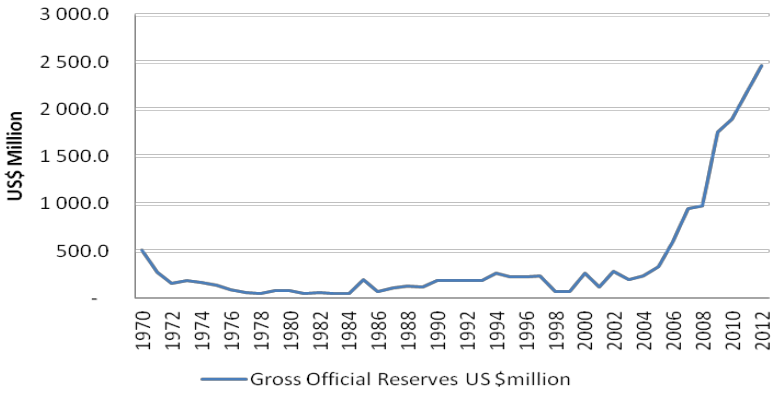
Table 2.2- Expanded Correlation Matrix for Nominal Prices (2009M1-2013M3)

	COPPERP	DOLLARMIS	EUROMIS	RANDMIS	SWISSFRANCMIS	YUANMIS
COPPERP	1.00	-0.45	-0.10	0.51	0.02	-0.45
DOLLARMIS	-0.45	1.00	0.44	-0.02	0.44	0.98
EUROMIS	-0.10	0.44	1.00	0.26	0.80	0.52
RANDMIS	0.51	-0.02	0.26	1.00	0.40	-0.03
SWISSFRANCMIS	0.02	0.44	0.78	0.40	1.00	0.54
YUANMIS	-0.45	0.98	0.52	-0.03	0.54	1.00

Source: Eviews Output generated by the Author.

We also note from Table 2.3 that both the real effective exchange rate and the real copper price do not follow a normal distribution pattern (i.e. Kurtosis test is significant) indicating possible mispricing of both the Kwacha in relation to other currencies and of the copper at international markets. The exchange rate mispricing is attributed to volatility smoothening by the Bank of Zambia's market interventions. The Bank of Zambia started building up foreign exchange reserves after the HIPC completion point. Since then the Bank of Zambia has used these reserves to intervene in the foreign exchange market (see Figure 2.2). Therefore, the Bank of Zambia price and financial market stabilisation strategies were the key drivers of the Kwacha.

Figure 2.2- Gross Official Reserves



Data Source: Bank of Zambia.

Table 2.3- Real Kwacha Normality Test

Sample: 1995Q1 2011Q4		
	REAL EFFECTIVE EXCHANGE RATE (log)	REAL COPPER PRICE (log)
Mean	5.274031	2.082362
Median	5.322063	1.573062
Maximum	5.506445	3.961216
Minimum	4.659215	0.632742
Std. Dev.	0.165633	1.092267
Skewness	-1.995932	0.476743
Kurtosis	7.639097	1.634585
Jarque-Bera	106.1259	7.858229
Probability	0.000000	0.019661
Sum	358.6341	141.6006
Sum Sq. Dev.	1.838099	79.93410
Observations	68	68

Source: Eviews Output generated by the Author.

NOTE: Real Effective Exchange rate is computed by Bank of Zambia. This exchange rate weights all currencies of Zambia's major trading partners. Real Copper Price is the nominal copper price minus inflation

Table 2.4- Nominal Kwacha Normality Test

	COPPERP	USDOLLAR	YUAN	EURO	RAND	SWISSFRANC
Mean	336.56	4975.70	758.45	7426.33	636.74	5091.68
Median	349.00	4944.63	747.09	7460.15	628.68	4983.41
Maximum	447.59	5653.55	857.36	8342.28	711.64	6318.77
Minimum	146.09	4514.55	661.66	6589.47	509.65	4173.99
Std. Dev.	72.06	263.99	55.45	375.26	43.99	526.40
Skewness	-0.99	0.49	0.13	0.05	-0.41	0.17
Kurtosis	3.66	2.59	1.76	2.71	3.14	1.88
Jarque-Bera	9.29	2.43	3.42	0.19	1.50	2.92
Probability	**0.01**	**0.30**	**0.18**	**0.90**	**0.47**	**0.23**
Sum	17164.39	253760.5	38681.05	378742.8	32473.92	259675.8
Sum Sq. Dev.	259629.8	3484580.	153724.7	7041101.	96784.28	13855218
Observations	51	51	51	51	51	51

Source: Eviews Output generated by the Author.

Table 2.4 indicates that the nominal prices are normally distributed and indicate no signs of mispricing. However, the nominal copper price is not normally distributed indicating the presence of fat tails in the distribution and therefore some mispricing. These normality tests are based on monthly statistics beginning January 2009 through March 2013.

We further explore whether movements in the Kwacha precedes those of the Copper price. We test the hypothesis that the copper price has a strong impact on the Kwacha. We call this type of analysis as a pairwise Granger causality test, given in Table 5. We find that the Kwacha does not precede the copper price and the copper price does not precede the Kwacha. In this case, there is no relationship between the copper price and the Kwacha. We can conclude that the copper price and the Kwacha are independently distributed events and no Dutch Disease is present as a result of depending on copper exports.

Table 2.5-Pairwise Granger Causality Tests: Exchange Rate and Copper Price

Sample: 1995Q1 2011Q4
Lags: 3

Null Hypothesis:	Observations	F-Statistic	Probability
LNREALCOPPER does not Granger Cause LNREER	65	0.81224	0.4923
LNREER does not Granger Cause LNREALCOPPER		2.83054	0.0462

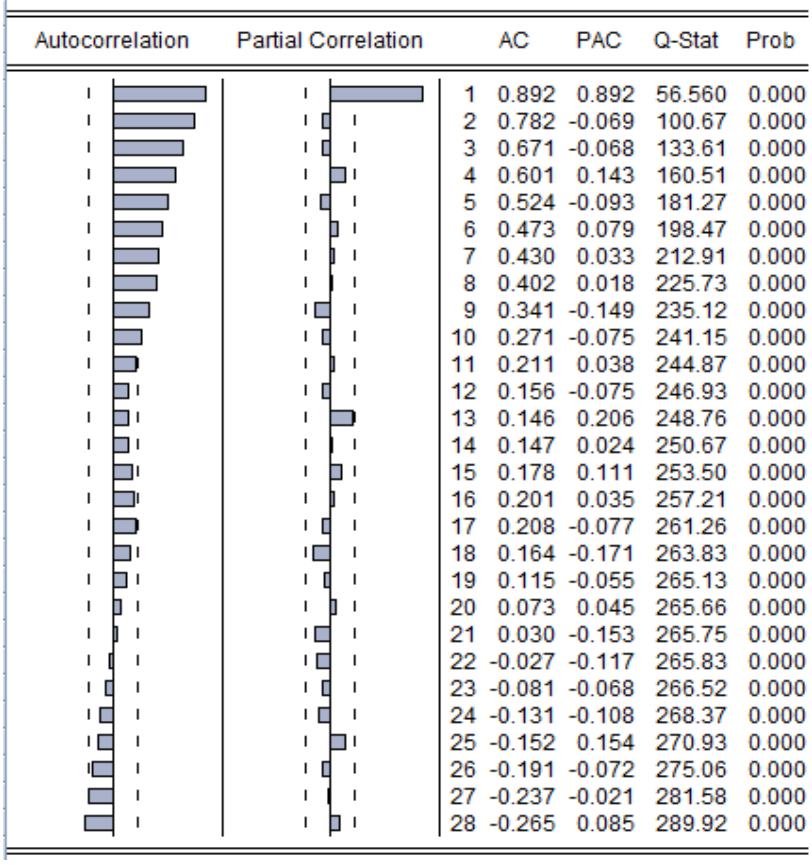
Source: Eviews Output generated by the Author.

Note: LNREER is the logarithm of effective real exchange rate; LNREALCOPPER is the logarithm of the real copper price (nominal copper price minus inflation)

Figure 2.3 is meant to give us more information about the stability of the Kwacha (i.e. effective exchange rate data from Bank of Zambia). We test the hypothesis that the exchange rate is unstable. The results indicate that the exchange rate is indeed very unstable in the first quarter but it stabilises in the second quarter and thereafter.

Figure 2.3-Correlogram of Effective Real Exchange rate

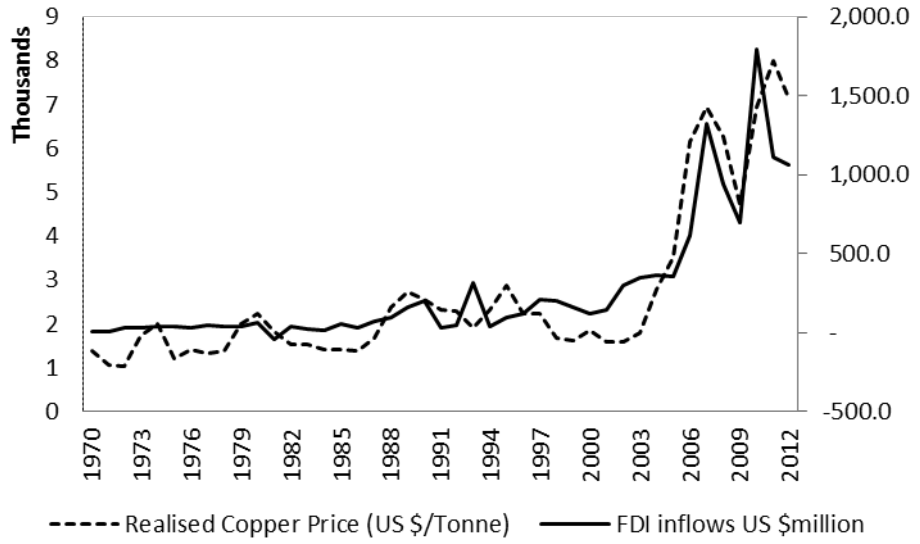
Date: 09/01/13 Time: 12:42
Sample: 1995Q1 2011Q4
Included observations: 68



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.892	0.892	56.560	0.000
		2	0.782	-0.069	100.67	0.000
		3	0.671	-0.068	133.61	0.000
		4	0.601	0.143	160.51	0.000
		5	0.524	-0.093	181.27	0.000
		6	0.473	0.079	198.47	0.000
		7	0.430	0.033	212.91	0.000
		8	0.402	0.018	225.73	0.000
		9	0.341	-0.149	235.12	0.000
		10	0.271	-0.075	241.15	0.000
		11	0.211	0.038	244.87	0.000
		12	0.156	-0.075	246.93	0.000
		13	0.146	0.206	248.76	0.000
		14	0.147	0.024	250.67	0.000
		15	0.178	0.111	253.50	0.000
		16	0.201	0.035	257.21	0.000
		17	0.208	-0.077	261.26	0.000
		18	0.164	-0.171	263.83	0.000
		19	0.115	-0.055	265.13	0.000
		20	0.073	0.045	265.66	0.000
		21	0.030	-0.153	265.75	0.000
		22	-0.027	-0.117	265.83	0.000
		23	-0.081	-0.068	266.52	0.000
		24	-0.131	-0.108	268.37	0.000
		25	-0.152	0.154	270.93	0.000
		26	-0.191	-0.072	275.06	0.000
		27	-0.237	-0.021	281.58	0.000
		28	-0.265	0.085	289.92	0.000

Source: Eviews Output generated by the Author
Note: AC is the Autocorrelation statistic; PAC is the Partial Autocorrelation statistic; Prob is the probability.

Figure 2.4- Copper and Foreign Direct Investment



Source: Bank of Zambia

Besides the copper-exchange rate linkage, we also seek to find the best proxy for copper price for the Zambian economy. That is, we seek to understand the variable that can be used to represent the copper price. Therefore, Figure 2.4 unveils an important characteristic of the Copper industry. We establish that foreign direct investment tracks the performance of the Copper industry. Thus, the copper industry will continue to determine inflows of foreign direct investment. This implies that foreign direct investment will continue to trickle in as long as the copper price continues rising. Foreign direct investment is good for infrastructure and employment generation and it is a good form capital inflow. Thus, the link between copper and diversification is strengthened by foreign direct investment. However, the copper price is driven by foreign demand, which domestic policy has no control over. In this case, copper based diversification is only good when the copper price is increasing, given a stable Kwacha and fixed mineral royalty tax. The idea of strengthening sectoral linkages to the mining sector is good but highly risky. Thus, the revenue generated during boom periods could be used to support other sectors' manufacturing processes during recessions. During recessions, demand for other industries' outputs may be low. To insulate other industries' production systems from collapse, the export fund can be used to stimulate foreign demand for locally made products through products standards improvement. Another way of protecting local industries from a copper generated recession is to establish export oriented industries with capabilities to produce for the regional and world markets. These views have been

supported by key stakeholders and therefore a diversification framework should not be entirely dependent on revenues from copper. The statistics presented above give a clear warning sign regarding the copper price instability. However, the advantage for diversification is that the Kwacha is generally stable.

2.2.2 Testing Copper-Kwacha Dynamics in a Macroeconomic Model

This subsection explains the empirical method, results and the implications of the results for exchange rate management within a macroeconomic and price stabilisation system.

2.2.2.1. Empirical Method

The effect of the real copper price on the real Kwacha is interrogated in a simple macroeconomic model. We apply a simple structural model where a direct exchange rate channel affects real output, which in turn directly affects inflation. Thus, an indirect real exchange rate channel influences inflation. The real exchange rate is determined by the real short term interest rate differential and the real copper price. This specification facilitates the interrogation of the impact of the copper price on the Kwacha; while at the same time allowing the real exchange rate volatility to directly pass through real output volatility and indirectly through inflation (*see Annex A1 for details*).

The empirical analysis covers a seventeen years period which includes the period of privatisation of mines and facilitates the discussion of mining development agreements and changes in monetary policy implementation. Furthermore, to investigate the impact of copper price, a longer time period is essential. Specifically, a longer view allows for assessment of the kwacha over HIPC and post-HIPC periods.

The analytical framework for the real exchange rate is the uncovered interest parity condition, augmented with the copper sector and market shocks. However, we also recognise that the Copper price has a strong correlation with foreign direct investment in Zambia. The foreign direct investment is in turn driven by the copper price, which is our variable of keen interest.

2.2.2.2 Empirical Results

The empirical results provide us some evidence that the real copper price has an insignificant negative impact on the real Kwacha. Thus, the copper price did not affect the real Kwacha. These results support the earlier tests which show weak correlation and lack of Granger causality.

The empirical results (see Table 4A, Annex A2) show that the real copper price volatility has the expected negative sign on the real exchange rate volatility, but very insignificant. The volatility of the real interest rate differential has a significant positive impact on the real exchange rate volatility. All other variables are significant in the model, except for the real interest rate in the IS curve. The real interest rate volatility has a weak negative effect on real output volatility. A nonlinear estimation method (see Annex A2) is used for the structural model and gave us the empirical results. Specifically, we find that a quadratic relationship exists in the structural model.

The empirical evidence specifically shows the short-run regression results indicating the dynamic interaction among the macroeconomic variables in the IS curve, the accelerationist Phillips curve and the real effective exchange rate. The weak / insignificant impact of interest rates on real output shades some light as to why the Bank of Zambia did not use short-term interest rate as a target monetary policy rule in the past. This implies that the Bank of Zambia could not have directly employed interest rate to stabilise prices and foster financial stability.

Therefore, the expansion in the real output or real gross domestic product (RGDP) could be attributed to the direct government expenditure, foreign direct investment, re-invested profit and other foreign inflows including foreign aid. The results are consistent with the above statistical data.

Theoretically, the transmission channels for the RGDP volatility works through the negative real interest rate gap, negative real exchange rate gap and the positive lagged real output gap (see equation 1, Annex A1). The optimal lag structure that empirically

fits the IS curve variables are; four (4) for real domestic interest rate, one (1) for real exchange rate, and one (1) for past level of real output gap.

As expected, what is on the ground is that the real exchange rate has a negative effect on RGDP growth, while the lagged real output has the predicted positive effect on the current level of real output growth. But the real short term interest rate has a weak negative impact on real output.

Considering the transmission channel for the accelerationist Phillips curve (see equation 2, Annex A1), empirical evidence indicate that the transmission channel is propelled by a powerful lagged real sector output growth and a strong previous levels of inflation growth. The empirical evidence for the accelerationist Phillips curve gives the theoretically predicted signs on the variables used. Somewhat startling is the strength of real sector growth on inflation. The statistical evidence suggests that a one unit decline in real sector growth reduces inflationary pressures by one unit. This indicates that productivity or real output growth could be a powerful monetary policy rule.

The real exchange rate channel indicates that real capital account factors did not lead to kwacha appreciation over the study period. For instance, the multilateral real effective exchange rate model (see equation 3, Annex A1) is significantly affected by the capital account factors (i.e. interest rate differential) in a positive way, but current account factor (i.e. copper prices) has an insignificant negative impact on the value of the Kwacha. This implies that the increase in the copper price did not lead to noticeable appreciation of the Kwacha. We conclude that there was no Dutch Disease effect during the period covered by this study.

The empirical results agree with other work being done at the Bank of Zambia and confirmed by the Director[12] of Financial Markets at the Bank of Zambia during the recently held joint International Growth Centre/London School of Economics conference, 25 September 2013. We confirm that the Kwacha is a weak commodity

[12] Refer to Growth Week 2013 Conference presentation by Dr. Emmanuel Mulenga Pamu, Director of Financial Markets, Bank of Zambia. September 25, 2013. London. Consult the International Growth Centre, London, for his recorded presentation.

currency,[13] we find that the copper price conforms to the negative theoretical prediction but it is not strong enough to drive the Kwacha. For example, statistical data indicate that the Kwacha depreciated despite the recorded huge copper export revenues arising from copper price increases and appreciated despite experiencing a slowdown in the copper revenue.

2.2.3 Implications of Empirical Results

The structural framework improves the single equation model, because it provides for a feedback effect among the variables in arriving at their respective equilibrium values. The structural model provides a way of explaining both the theoretical and practical drivers of the exchange rate with a focus on the copper industry. The purpose of the system of equations is to bring in the practicality of the drivers of the exchange rate.

The empirical results show that copper prices do not directly lead to appreciation the Kwacha. Additionally, the kwacha cannot be used to increase copper exports. The exchange rate is driven by foreign monetary policy in relation to movements in the domestic short term interest rates. Open market operations which involve selling of treasury bills could affect the short-term domestic interest rates and therefore impacting the Kwacha. In addition, a contractionary monetary policy which leads to selling of treasury bills would lead to an increase in short term interest rates and leading to an appreciation. A depreciation will occur if the foreign interest rate is greater than the domestic interest rate.

The government's monetary policy instruments such as treasury bills, and sterilised interventions in the foreign exchange market, can be used to appreciate or depreciate the Kwacha, since the market is very small. Further, the model's preliminary results imply that the Bank of Zambia should consider developing a framework that would penalise output variability in its conduct of monetary policy. This might require

[13] Evidence on whether the Kwacha is a commodity currency is mixed, with Cashin et al (2002) contradicting Bova (2002). we have made some improvements over previous studies by using a structural macroeconomic model instead of single cointegrating regression models (Cashin et al. (2002); Bova (2009)) and generalised autoregressive conditional heteroskadasticity (GARCH) (Chipili (2010)) models. In our model, we make a contribution by allowing for interaction among many variables in the structural model.

changes to the current monetary policy, especially with regard to proposals for inflation targeting.

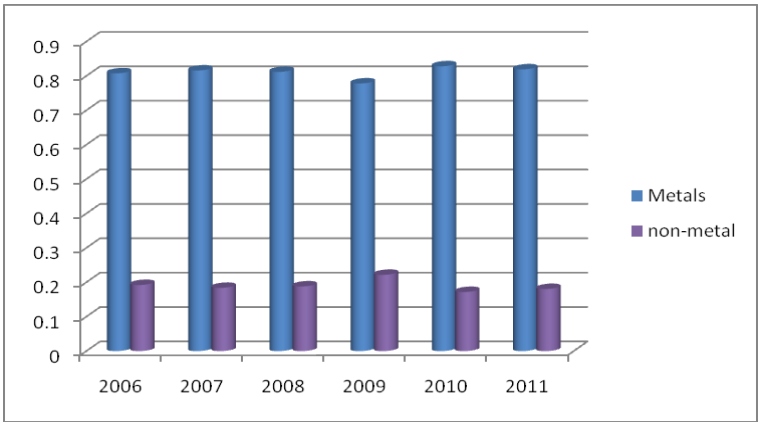
2.3 Pros or Cons of Copper Dependence

This section argues that Zambia's dependence on copper exports has not translated into significant wealth creation and economic prosperity. Instead, the Kwacha has moved from being stronger than the United States dollars at independence to being a weaker currency. Furthermore, the weak kwacha has not been helpful in expanding the export base for non-traditional goods and services.

2.3.1 Statistical Evidence of Dependence

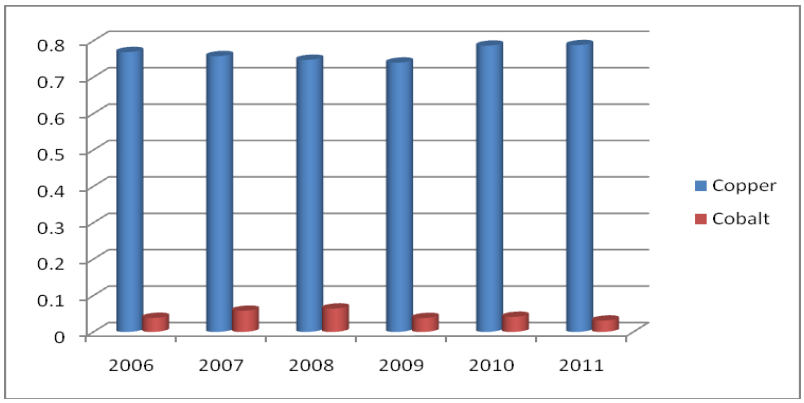
Copper is Zambia's major export commodity, contributing about three-quarters of total exports and 3.6 percent of Gross Domestic Product in 2011. Figure 2.5 indicates that metal exports outperformed non-metal exports in the ratio of 1:4. Figure 2.6 also shows that of the metals, copper exports far exceeded those of cobalt. Table 2.6 provides the basic balance of payments accounts for selected years, 2005-2011. The current account balance was positive during 2009-2011, implying accumulation of foreign exchange reserves, indicated by the negative financial account. Tables 2.7 and 8 show sector contributions; with agriculture, construction, wholesale and retail being the main components of gross domestic product. The mining sector accounted for a surprisingly low 3.6 percent of gross domestic product in 2011. Figure 2.7 suggests the possibility of over invoicing between 2005 and 2011, with production value consistently different from export value. The statistical data used in these graphs and Tables is sourced from the Ministry of Finance.

Figure 2.5 Share of Metals and non-metals in total exports, 2006-2011



Source: Ministry of Finance (2012)

Figure 2.6- Share of Copper and Cobalt Exports in Total Exports, 2006-2011



Source: Ministry of Finance (2012)

Table 2.6: Zambia's Recent Balance of Payments Condition (millions of US dollars)

Year	BOP	Financial Account	Current Account
2005	821.6	-1,593.0	142.8
2006	310.5	842.6	-754.9
2007	12.7	837.7	-1,089.1
2009	540.1	-172.5	538.4
2010	83.3	-1,076.4	1,143.6
2011	243.8	-429.9	236.1

Source: Ministry of Finance (2012), Economic Reports, Various

Table 2.7: GDP by Sector (current Prices), 2008-2011 (in K' Billion)

	Sector	2008	2009	2010	2011
1	Agriculture, Forestry and Fishing	10,863.8	13,461.4	15,642.3	18,072.4
2	Mining and Quarrying	1,998.9	1,682.1	2,837.8	3,346.3
3	Manufacturing	5,149.6	6,016.9	6,779.0	7,769.1
4	Electricity, Gas and Water	1,512.4	1,779.8	2,201.8	2,910.4
5	Construction	8,811.4	11,819.5	15,711.6	20,737.3
6	Wholesale and Retail Trade	8,539.1	9,908.2	11,209.5	13,056.3
7	Restaurants, Bars and Hotels	1,610.8	1,545.2	1,829.5	2,141.2
8	Transport, Storage and Communication	2,248.9	2,355.2	3,076.5	3,553.0
9	Financial Intermediaries and Insurance	4,373.6	5,534.6	6,745.1	7,568.8
10	Real Estate and Business Services	3,138.4	3671.6	4,306.3	5,326.3
11	Community, social and Personal Services	5,465.5	6,649.0	8,148.8	9,695.3
12	Total GDP at Market Prices	54,839.4	64,615.6	77,679.4	93,354.2

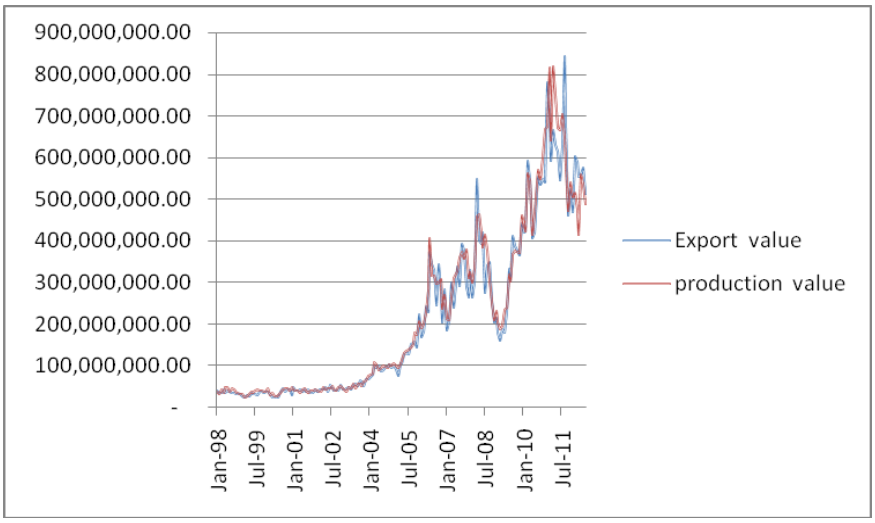
Source: Central Statistical Office in Ministry of Finance, Economic Report -2012

Table 2.8: Percentage Share in GDP by Sector

	Sector	2008	2009	2010	2011
1	Agriculture, Forestry and Fishing	19.8	20.8	20.1	19.4
2	Mining and Quarrying	3.6	2.6	3.7	3.6
3	Manufacturing	9.4	9.3	8.7	8.3
4	Electricity, Gas and Water	2.8	2.8	2.8	3.1
5	Construction	16.1	18.3	20.2	22.2
6	Wholesale and Retail Trade	15.6	15.3	14.4	14.0
7	Restaurants, Bars and Hotels	2.9	2.4	2.4	2.3
8	Transport, Storage and Communication	4.1	3.6	4.0	3.8
9	Financial Intermediaries and Insurance	8.0	8.6	8.7	8.1
10	Real Estate and Business Services	5.7	5.7	5.5	5.7
11	Community, social and Personal Services	10.0	10.3	10.5	10.4
12	Total GDP at Market Prices	100.0	100.0	100.0	100.0

Source: Ministry of Finance (2012)

Figure 2.7: Monthly Copper Production and Export (in MT)



Source: Ministry of Finance (2012)

From about 80 percentage share in total exports in 2011 metal exports declined to 59 percentage share in June 2013, the month before the Statutory Instrument no. 55 (SI 55), which aims at monitoring of balance of payments transactions, came into effect (CSO, 2013). The SI 55 is meant to reduce the foreign exchange or capital flights. This measure will have a significant effect on the Kwacha. However, the above fall in the share of metals exports did not destabilize the economy, even though metal exports represent a key driver of foreign exchange inflows.

The substantial percent point increase in exports of non-traditional products, from 20 percent of the total in 2011 to over 40 percent in June 2013 resulted largely from the decline in recorded copper sales. This decline was in part due to a falling copper price. In addition to metals and non-metal sources of export revenue, the tax

regime for mining companies represents an additional possible source of foreign exchange inflows. Foreign exchange inflows have been restricted under the past and present fiscal regime through the Development Agreements that guide how taxes and exemptions are calculated. Simpasa (2011) and Zambia Revenue Authority (2013) provide a basis for the key features of the mining fiscal regime as follows:

1) exemption of import duties for all mining companies on capital and other imports;

2) corporate income tax of 25 percent, 10 percentage points below what non-mining companies pay;

3) mineral royalty rate of 6 percent, which is well below the global rates, that range between 5 and 10 percent for developing countries, according to IMF estimates;

4) 100 percent allowable deduction on capital expenditure for new mining firms, reduced to 25 starting 2013 fiscal year;

5) provision to carry forward losses for 15 to 20 years;

6) provision for tax deductibles including interest on loans and repatriation of proceeds including dividends.

We would not expect this fiscal regime to stimulate inflows of foreign exchange, let alone significantly impact on movements in the exchange rate. Correlation results indicate a weak negative relationship. Simpasa (2011:42) supports this argument by concluding that ..."*the poor design of development agreements embodying generous tax and other concessions precluded the country from generating meaningful fiscal benefits from the copper boom, which accompanied privatisation of mines*". He further argues that the windfall gains from the copper boom accrued largely to foreign mining firms.

As early as 2008, the government cancelled resource contracts and replacing them with the mineral tax code aimed at capturing a sizeable share of mineral revenue (Simpasa, 2011). Windfall tax was introduced which effectively scrapped off the tax code. Later windfall tax was also abolished and most recently on July 1, 2013 government introduced the Statutory Instrument number 55 (SI 55). The SI 55 could have a substantial and positive impact on foreign exchange inflows and the operations of mining firms. Under this instrument, the Bank of Zambia has the mandate to monitor all balance of payments transactions, including those of mining firms. To make implementation effective, the Bank of Zambia has developed guidelines that all

companies and individuals should follow for effective implementation. Procedures include monitoring export receipts; import purchases and remittances, as well as loan registration.

The new policy rules have the potential to increase the flow of foreign exchange into the economy. However, the same policies might be used as a conduit for foreign exchange outflows. Thus, effective monitoring mechanisms by the Bank of Zambia are a necessary condition for SI 55 achieving its intent. The SI 55 when well functioning is expected to increase money supply and most likely lead to lowering interest rates, if government borrowing from banks is controlled. If the real sector is boosted by declining interest rates, production is most likely to increase. The increases in productivity will fundamentally support a strong Kwacha and further lower imported /consumer inflation. This transmission mechanism supports the Bank of Zambia mandate of lowering inflation.

2.3.2 Current Structure of the External Trade Sector

Table 2.9 depicts commodities that Zambia imports and is presented in terms of value and percentage share. Capital goods are the largest imports followed by consumer goods. Intermediate goods are third largest imports and raw materials are the fourth largest as at June 30, 2013. This data is sourced from the Central Statistics Office.

Table 2.9 – Imports Structure for Zambia

Description	June 2013		May 2013	
	Value (K'Million)	% Share	Value (K'Million)	% Share
Consumer Goods	908	20.7	775	16.9
Raw Materials	741	16.9	887	19.3
Intermediate Goods	811	18.5	928	20.2
Capital Goods	1,929	44.0	2,003	43.6
Total	4,389	100.0	4,593	100.0

Source: Central Statistics Office, 2013

Table 2.10 shows the percentage shares of main imported commodities by trading partner. The data is sourced from the Central Statistical Office. The reason for showing this data is to shade some light on commodities which can be part of the

industrial diversification process. As at June 30, 2013, South African imports were the largest. The imports were mainly iron and steel structures and parts, other silicates excluding potassium and sodium. Table 2.9 gives details of imported commodities.

Table 2.10– Imports Sources by Products for June 2013

Country	Description	Value (K'Million)	% Share
South Africa		1,274	100
	1).Structures and Parts of structures of iron and steel	34	2.7
	2). Other silicates (excl. Potassium and sodium)	34	2.7
	3).Dumpers for off highway use	29	2.3
	4).Ammonium dihydrogen	23	1.8
	5). Sulphur	19	1.5
	6). Parts of Machinery	28	3.0
	7). Diesel dual purpose vehicles for both persons & goods up to 5 tons	18	1.4
	8). Telephones for cellular networks or for other wireless networks	17	1.3
	9). Cutting oil, grease cutting oils, cleaning oils, etc	16	1.3
	10). Other Products	1,046	82.1
	Percentage of Total	29.0	
Congo DR		697	100
	1). Copper ores and concentrates	633	90.8
	2). Cobalt Oxides and hydroxides; commercial cobalt oxides in bulk	54	7.7
	3). Other carbonates in bulk	4	0.6
	4). Parts for boring or sinking machine	3	0.4
	5). Copper powders and flakes	2	0.3
	Percentage of Total	15.9	
China		371	100
	1). Iron and steel structures-minlead frames	44	11.9
	2). Generating sets	28	7.5
	3). Self-propelled graders and levellers	19	5.1
	4). Aircraft engines	13	3.5
	5). Amonium Sulphate	12	3.2
	6). Crushing or grinding machines for earth, stone, ores, etc	12	3.2
	7). Goods vehicles	9	2.4
	8). Self-propelled bulldozers, excavators	7	1.9
	9). Self-propelled tamping machines and road rollers	7	1.9
	10). Self-propelled front-end shovel loaders	7	1.9
	11). Other products	213	57.4

Source: Central Statistics Office 2013

Table 2.11 shows the structure of the export sector. The most current data on exports indicate a 0.4 percentage increase in exports of traditional commodities in terms of percentage shares, in Table 2.11. Nevertheless, export of traditional commodities has been estimated at 60.0 percent and 58.8 percent in July 2013 and June 2013, respectively. However, the non-traditional exports were estimated at 40.0 percent and 41.2 percent in July 2013 and June 2013, respectively. These export statistics indicate a decline in traditional exports from 71.3 percent in July 2012 and an increase in non-traditional exports from 29.7 percent in June 2012 (see Table 2.11).

Table 2.11 –Exports Structure for Zambia

Description	July 2013		June 30 213		June 2012		July 2012	
	Value (K'Mil)	% Share	Value (K'Mil)	% Share	Value (K'Mil)	% Share	Value (K'Mil)	% Share
Traditional Exports (mainly Metals)	2,747	60.0	2,646	58.8	2,449	70.3	2721	71.2
Non-traditional Exports	1,835	40.0	1,852	41.2	1,035	29.7	1098	28.8
Total Exports	4,582	100.0	4,498	100.0	3,484	100.0	3819	100.0

Source: Central Statistics Office, 2013

The above information indicates a downward trend in the proportion of traditional exports in total exports since 2011. At the same time, the composition of non-traditional exports in total exports has been increasing since 2011. Such changes in the copper exports have not been significant in influencing the value of the kwacha. We therefore conclude that the copper price is not a significant factor or fundamental of the kwacha.

2.4 Copper and Industrial Diversification

2.4.1. Introduction

Industrial diversification is the basis for supporting the Kwacha in the long run because of positive real sector contributions through manufacturing output. We present the best practice[14] diversification framework by aligning with the Revised Sixth National Development Plan (R-SNDP). This framework has support from key stakeholders (see Annex A4).

The funding for the industrial diversification framework could partly come from a percentage of the total copper export revenue. Thus, a fiscal rents programme to generate a copper fund could be undertaken in a separate study. The copper fund could then be supplemented with other industrial diversification funds, which have already been computed under the Citizens Economic Empowerment Commission's current value-chain clusters framework.

2.4.2. Current Framework for Industrialisation

The current key finding is that copper is weakly linked to the Kwacha and economic value addition. The contribution by this study is to find a way of improving industrial diversification by using revenue from copper and other exports. However, this study is live to the dangers of a complete dependence on copper industry. The copper industry can be managed by fostering both revenue and capital inflows. Thus, this section presents the national framework for industrialisation, which is in line with current thinking in Government.

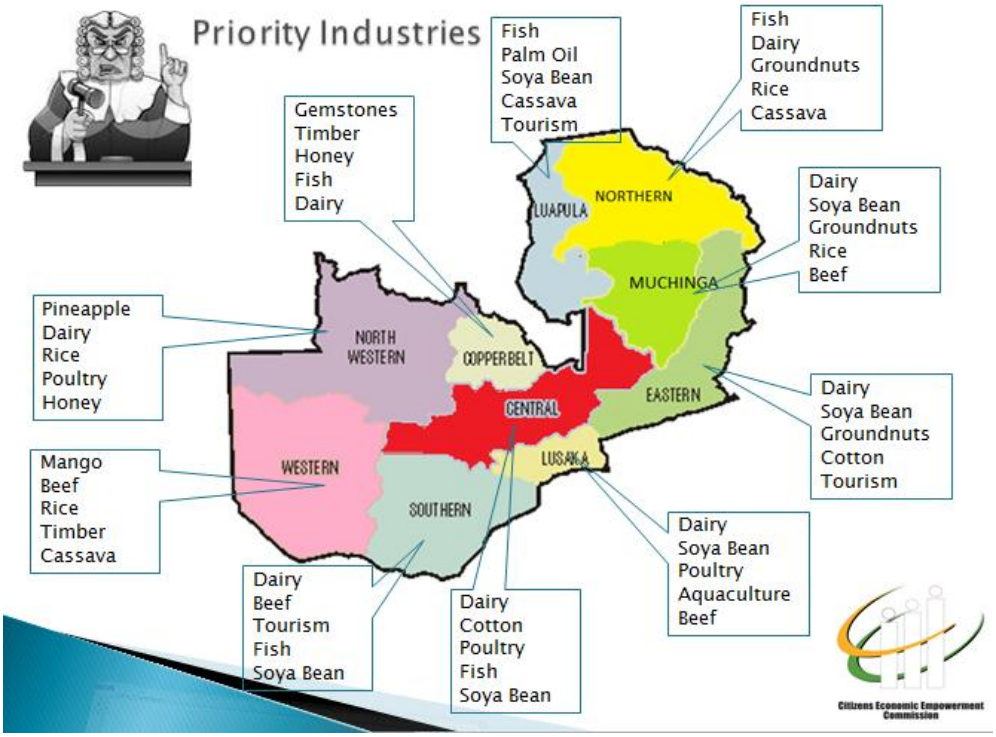
For Example, the Ministry of Commerce, Trade and Industry is implementing both value chain based clusters and industrial clusters based programmes. This industrialisation programme is based on resource and manufacturing firms mapping

[14] We also extract best practices from other reports such as recommendations by the United Nations Industrial Development Organisation (2013) and the United Nations Economic Commission for Africa (2013).

across the country. Under this industrialisation programme, three products are selected from each province. Then the Citizens Economic Empowerment Commission (CEEC) has been mandated to finance value-based clusters projects, while the Zambia Development Agency (ZDA) is responsible for sourcing private sector to set up firms in these provinces. The Zambia Bureau of Standards is mandated to enforce quality assurance of all products. The map below shows priority industries in all ten (10) provinces.

This current system needs strengthening by making sure that horizontal, vertical and forward linkages are fostered. This is a sufficient condition for industrial takeoff in Zambia. This sub section focuses on analysing production linkages which are required under the current diversification framework in Zambia.

Figure 2.8- Map of Priority Industries in Zambia



Source: Ministry of Commerce, Trade and Industry (2013)

Table 2.12- Priority Industries by Districts

Province	District	industry
1. CENTRAL	Kabwe	Dairy
	Mumbwa	Cotton
	Itezhi Tezhi	Fish
2. COPPERBELT	Ndola-Kitwe-Luanshya Cluster	Fish
	Luanshya	Dairy
	Lufwanyama	Timber
3. EASTERN	Mambwe	Rice
	Chipata	Dairy
	Petauke	Groundnuts
4. LUAPULA	Nchelenge	Fish
	Mansa	Soya Bean
	Mwense	Palm Oil
5. MUCHINGA	Mpika	Dairy
	Isoka	Soya Bean
	Chinsali	Soya Bean
6. NORTHERN	Mungwi	Groundnuts
	Mpulungu	Fish
	Kasama	Soya Bean
7. NORTHWESTERN	Ikelenge	Pineapple
	Kabompo	Honey
	Solwezi	Dairy
8. SOUTHERN	Choma	Dairy
	Namwala	Beef
	Siavonga	Fish
9. WESTERN	Kaoma	Cassava
	Sesheke	Timber
	Mongu	Fruit
10. LUSAKA	Lusaka	Poultry
	Chilanga	Dairy
	Rufunsa	Fish

Source: CEEC (2013)

Table 2.12 further indicates the programmed agricultural products by province/district. The strength with this framework is that it focuses on a few products in specified districts. The aim of the framework is to use the selected products to stimulate agri-business and or vertical integration. However, production linkages should be the focus of our diversification framework and this has not been well addressed. The current framework needs to be further improved to include innovation and manufacturing of products as inputs into other production processes. The focus should also be on generating high efficiencies through reduced trading costs and increasing labour productivity. Thus, a diversification framework that is silent on skills development (financial, and entrepreneurship), especially for the Youths in Zambia, is most likely to fail.

On the financing channel for the diversification framework, copper and other export revenues have not been addressed in the current framework. However, some financing for industrial diversification should come from both the metal and non-metal industries.

2.4.3 Extent of Commodity-Industry Linkages

The major mining firms expressed interest in intensifying the commodity-industry linkages and youth skills development, especially hard skills. Based on business sentiments and government programmes, an industrial diversification programme should be structured as follows.

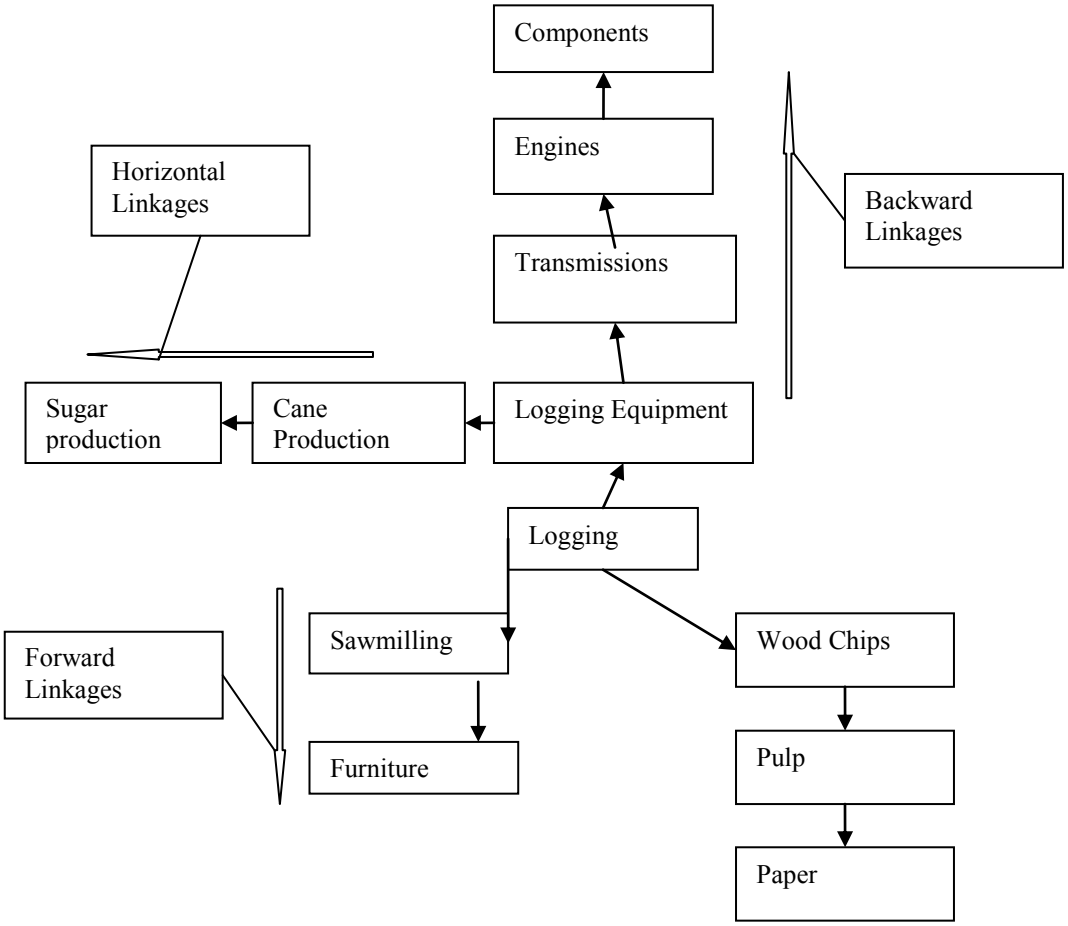
The proposed framework follows the Hirschman model (1981), which proposes three major types of linkages from the commodities to the industrial sector. The fiscal linkages segment is the first component of the Hirschman model. Under this component the resource rents which government is able to harvest from the commodities sectors in form of corporate taxes, royalties and taxes on incomes of workers. These rents can be used to promote industrial development in sectors unrelated to commodities. The second component is the consumption linkages. Under this category, the demand for the output of other sectors comes from the incomes earned in the commodities sector. In this case, incomes earned by employees in the commodities sector had the potential to provide a major spur to industrial production

as workers and capitalists spend their incomes earned in the resources sector. The third category is known as production linkages. Under this form, we have both forward (processing commodities) and backward (producing inputs into the commodities sector) linkages from the resources sector. The production linkages pave the way for industrial diversification.

Figure 2.9 shows several types of linkages through a schematic overview of the linkages in a soft commodities value chain, basing on the timber sector for Sesheke and Lufwanyana districts, as examples. Feeding into the timber logging link in the chain are a series of backward "upstream" linkages involving tiers of suppliers. Logging equipment is the first tier and is supported by tier two, suppliers of transmissions, tier three- suppliers of engines, and tier four- suppliers of components. Complementing these backward linkages are a series of forward "downstream" linkages to tier 1 processing firms such as sawmills and woodchip producers and tier 2 firms which transform the timber into manufactures such as furniture, pulp and paper firms. Figure 2.9 also illustrates tier 1 and tier 2 horizontal linkages on the supply side, such as logging equipment which is then used in sugar cane cutting which feeds into sugar production. The United Nations Industrial Development Organisation (UNIDO) report 2013 can be accessed for details and applications to selected countries including Zambia.

Zambia's current industrial diversification programme should clearly explain the above preferred linkages for Sesheke and Lufwanyama districts, for example. For instance, where are the local sources for manufacturing of logging equipment? What is the government industrial policy on logging equipment? Currently, it is not clear what government policy is on logging equipment. This can also be extended to other equipments and thereby improving production efficiencies.

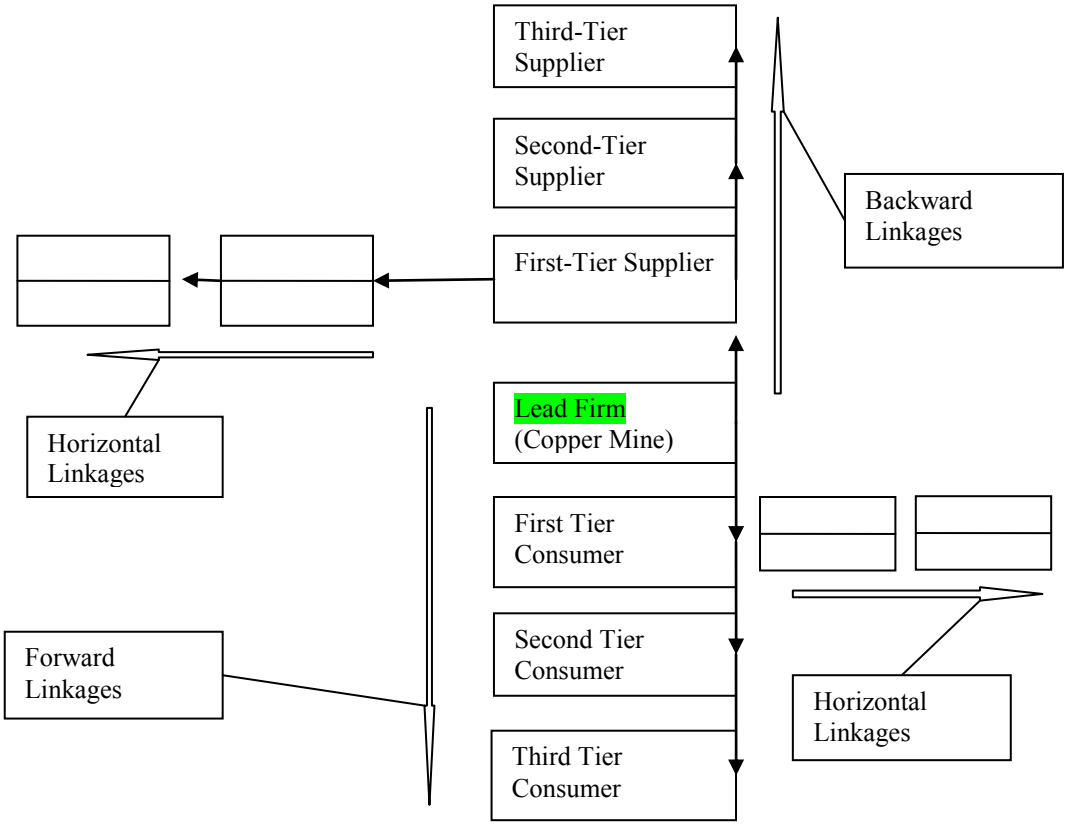
Figure 2.9- Backward, Forward and Horizontal Linkages in the Wood and Timber Sector



Source: Hirschman (1981) in UNIDO (2013)

As explained in detail above, Zambia's external position has been characterised by the dominance of copper. However, the export of copper has not translated into a large contribution to GDP, but the economy has experienced an increase in the GDP shares of other sectors. For the commodities sector, the framework for industrial diversification would take the framework in Figure 10 below. The aim of the proposal is to improve mining related production efficiencies.

Figure 2.10- Backward, Forward and Horizontal Linkages from the Commodities Sector*



Source: Hirschman (1981) in UNIDO (2013)

*= The entire supply-chain includes varying sizes of shares of domestic value-added in locally acquired inputs and locally processed outputs.

Figure 2.10 shows how production processes are organised in the commodities sector in general and copper in particular. In this framework, a copper mining firm is a lead firm with a three tier backward and forward linkages. Horizontal linkages are positioned at the first tier level for both backward and forward linkages. This picture is depicting the importance of derived demand for copper. Example, copper production is driven by China's appetite for copper. Most importantly, the copper industry has complex supplier and consumer chains. These complex chains are what government need to manage, if full benefits are to be realised from copper. A proposal for training tax administrators in complex copper chains should be key to realising copper benefits in the future.

All mining firms (see Annex A4) talked to agree to the idea of a structural change towards a value-addition based industrialisation strategy. They are also agreeable to the copper value-chain, illustrated in Annex A5. If this is achieved the exchange rate might once again resume its role as a purposeful policy tool, given a recommitment by the Government (CEEC, 2013), to drive diversification. An increase in the share of the non-metal exports in total exports combined with an increase in the balance of payments monitoring to include mandatory depositing of export proceeds locally reinforce the pace of diversification. None the less, a substantial increase in exports from manufacturing will take some time to materialise, since local demand will have to be satisfied first.

The policy focus for Zambia should be on increasing production of secondary commodities. However, if economics works appropriately, production of tradables[15] is negatively influenced by the lagged exchange rate, among other factors. This implies, production of non-tradeables is not directly influenced by the exchange rate. This is our first phase in the industrial diversification programmes. Since manufacturing in Zambia is import dependent for capital and intermediate goods, manufactures require special incentives to boost production, at least non-tradables in the short-run. Specifically, the investment strategy would be to boost the inflow of the Kwacha in the domestic economy to boost production. This requires an industrialisation strategy that takes into account backward, forward and horizontal linkages from the commodities sector. The importance of this strategy is that it boosts the flourishing of fiscal, consumption and production linkages.

2.5 Conclusion and Policy Implications

This paper shows the Kwacha and the Copper price have a very weak negative correlation between them. This implies that the copper price does not affect the Kwacha and there is no Dutch Disease in the economy. The policy implication of this result is that government needs to implement policies to encourage copper export

[15] This is the long-term or second phase of industrial diversification.

revenues come back to the domestic economy and should benefit the domestic economy. This way the copper price will have a strong effect on the Kwacha.

The interest rate and the copper price are not seen to help the economy grow in the short run. We see a policy implication here, which is to minimize on issuing treasury instruments such as treasury bills in order to increase liquidity in the domestic market. The SI 55 will compliment efforts to decelerate outflows of financial assets in order to grow the economy.

Copper dependence is very high in Zambia but the industry contributed very same proportion of gross domestic product, if we exclude mining related infrastructure development, which is discussed foreign direct investment. The policy implication is that there should be direct focus on the copper industry in order to stimulate production in other sectors of the economy, such as agriculture, agribusiness, timber, manufacturing, and tourism, among others. This is important because the copper industry already has forward and backward linkages which need strengthening by way of a deliberate policy.

The focus of this paper is to have a long run Kwacha in mind which is driven by industrial production. This can be achieved by a government deliberate policy to quicken to the pace of industrial cluster based industrial diversification, while at the same time aligning the monetary and fiscal policies in driving high productivity.

Annex A1: Description of the Macroeconomic Structural Model

A structural macroeconomic model is preferred to single models because it allows for back and forth interaction among variables in the system of equations. This model provides a second scenario of modelling real exchange rate fundamentals and how these fundamentals are influenced by other macroeconomic factors.

We assume that economic activity in a small open economy is driven by three macroeconomic blocs, namely; the IS bloc, the consumer inflation bloc proxied by the Phillips curve and the asset price bloc proxied by the real exchange rate.[16] There are three prices in the model: the real interest rate, the real copper price and the effective real exchange rate. These can be treated analogously to asset prices that interact in determining the exchange rate path. We assume that the central bank uses the short-term interest rate as a policy instrument and follows a Taylor-type rule to set it. The following system of equations summarizes the structure of the model:

$$y_t = \theta_{yy}(L)y_t - \theta_{yr}r_{t-1} - \theta_{yq}q_{t-1} + \varepsilon_t, \quad (1)$$

$$\pi_t = \theta_{\pi\pi}(L)\pi_t + \theta_{\pi y}y_{t-1} + \eta_t, \text{ such that } \sum\theta_{\pi\pi}(L) = 1 \quad (2)$$

$$q_{t+1} = \theta_{qr}(r^f_{t+1} - r_{t+1}) + \theta_{qs}s_{t+1} + v_{t+1}, \quad (3)$$

Where,

y_t is the logarithm of the deviation of real output from its potential or steady state level (i.e. real output gap);

r_t is the logarithm of the deviation of the real short-term domestic discount rate (i.e. the nominal short-term rate minus the domestic inflation) from its steady state;

[16] This model is consistent with Svensson (1997, 1998, 1999), Ball (1998), and Kontonikas and Montagnoli (2006).

r_t^f is the deviation of the log real short-term foreign discount rate from its steady state;

q_t is the deviation of log effective real exchange rate from its steady state level (i.e. effective real exchange rate gap)-where a higher q means real depreciation,

s_t is the deviation of log real copper price from its steady state level.

Note that the effective real exchange rate is defined as the Kwacha per unit of the foreign currency. π_t is the inflation gap, defined as the deviation of the log of inflation rate from its steady state level. θ_{ij} are positive parameter coefficients. The $\theta_{ii}(L)$ functions are standard multiple lag operator functions. The terms $\varepsilon, \eta,$ and v are white-noise shocks in to output, inflation and exchange rate gaps, respectively.

Equation (1) describes a small-open economy's IS schedule, in which the real output gap is determined by a lagged real output gap, lagged real interest rate gap, lagged effective real exchange rate gap, and a demand shock. The last represents changes in consumer and business confidence.[17] Equation (1) depicts three theoretical channels through which output gap is influenced. The interest rate channel is negative, implying that the real policy interest rate has a negative effect on real output gap. We expect a positive relationship between real output gap and its lags. The third channel is negative, *via* the exchange rate. The real output gap is negatively affected by the real exchange rate, through the effects on impact of current and capital accounts factors for capital inflows and trade, respectively.

Equation (2) is a small-open economy Phillips curve,[18] in which the consumer price index drives inflation. The inflation model involves a simplified aggregate output function. This is the accelerationist version of the Phillips curve, that we augment so that lagged real output depends positively on the lagged inflation values. There are two indirect channels by which inflation is influenced. The first is through real exchange rate effects on real output gap with a lag. The second indirect channel is through real interest rate effect on real output gap with a lag. The lag is three months. The random disturbance term captures the cost-push shocks to inflation.

[17] This follows Svensson (1998) and Ball (1998).
[18] Ball (1998), Svensson (1998:16) and Kontonikas and Montagnoli (2006)

Equation (3) captures the dynamic evolution of the effective real exchange rate, driven by current and capital account variables, such as the real interest rate differential and the real copper price. Demand shocks are included to capture speculative business sentiments. The real copper price is exogenously determined in the model. The concurrent study also considers an exogenously real copper price because the market for copper is driven by external demand, which is complex to model and include in this study. Our approach allows for the real interest rate parity condition to determine the real effective exchange rate, along with commodity price volatility and exchange rate shocks.

The key variables determining the real exchange rate path are the real interest rate differential and the real copper price volatility. Similar to the concurrent study, the real interest rate differential is determined from the uncovered real interest rate parity condition. Theory specifies both the real interest rate differential and the real copper price to have a negative effect on the real exchange rate. This implies that an increase (decrease) in any of the two fundamentals leads to an appreciation (depreciation) of the Kwacha. We augment the uncovered real interest rate parity condition with copper price volatility to illustrate the presence of deviations from interest parity.[19]

The model captures the interactions of key macroeconomic variables for a small-open economy dependent on commodity exports. In an economy described by the IS curve, the Phillips curve, and exchange rate, we assume that the central bank sets monetary policy by adjusting the short-term real policy interest rate through the targeting of the money base. In this case, the base money growth is the key policy indicator for monetary policy that aims at reducing inflation. Through the monetary base target, the Bank of Zambia has managed to bring down inflation from 54.6% in 1994 to 26.7% in 2002 and down to 7.1 % on August 31, 2013[20]. We consider the real discount rate as a short-term policy rate which reflects changes in real monetary base. In practice, central banks' policy tools operation on nominal variables not real ones. However, for a given inflation rate, the central bank in effect targets a real interest rate. In

[19] This expression depicts practice and is broader than just augmenting the interest rate parity with risk premium to indicate possible deviations from parity, as in Svensson (1998). In this exchange rate model, the Svensson (1998) risk premium is accommodated in the provision for exchange rate shocks.
[20] Central Statistical Office – *"the Monthly"*, August 2013

principle it can do this by adjusting the monetary base. We assume a strict link between the money base and the short-term interest rate.[21]

The structure of this open economy macroeconomic model implies that at time t, the authorities have the instruments to set the interest rate, r_t, which affects concurrent real exchange rates via the balance of payments, next period's output growth. Current period inflation and real output growth are predetermined by past decisions and current exogenous shocks.

The dependent variables that we use in the regression analysis are integrated of order zero, implying stationary variables. Since the variables are calculated as deviations of real variables from their steady state, they have effectively been generated by eliminating trends, making them fluctuate around a mean of zero of their respective series.[22]

[21] A similar approach is found in Woodford (2001), who explains the assumptions that would justify using short-term real interest rate as a variable sufficient to link monetary policy to the macroeconomic environment via the equilibrium relationship between the IS curve and the Phillips curve and the foreign exchange market.

[22] This allows us to estimate a model with includes dummy variables to account for shifts in the policy framework. Note that the variables are price deflated gaps. A gap is calculated as deviations of the actual from steady state values. We follow the estimation of the later by using the standard Hodrick-Prescott filter technique. Nevertheless, detailed information can be obtained from the authors.

Annex A2: Empirical Results from the Structural Macroeconomic Model

Table 4A shows that the real copper price volatility has an expected negative sign on the real exchange rate volatility, but very insignificant. The volatility of the real interest rate differential has a significant positive impact on the real exchange rate volatility. All other variables are significant in the model, except for the real interest rate in the IS curve. A nonlinear estimation method is used for the structural model. Specifically, quadratic relationships exist in the structural model.

Table 4A: Structural Model's Estimated Coefficients

Macroeconomic Model, Systems Regression (t-values in parenthesis)	
Real Output Gap	Effective Real Exchange Rate Gap
θ_{yr} = -0.006 (-0.75)#	θ_{qr} = 0.06 (3.78)
θ_{yy} = 0.40 (6.12)	θ_{qs} = -0.002 (-1.37)#
θ_{yq} = -0.03 (-2.04)	
Inflation Gap	
$\theta_{\pi\pi}$ = 0.61 (8.19)	
$\theta_{\pi y}$ = -1.10 (-2.22)	

# Indicates that the sign is correct as economic theory predicts, but insignificant. The results implies that (i) the real interest rate could not have been used a monetary policy instrument in Zambia, and (ii) the real copper price is not a driver of the real Kwacha.

The Seemingly Unrelated Regression (SUR) method has been employed in order to correct for contemporaneous autocorrelation and Heteroskedasticity in the residuals. This correction generates a stable equilibrium solution, and allows for predictions and simulations of an equation system.

Annex A3: Terms of Reference

{As amended in May 2013)
International Growth Centre
Determinants of the Zambia Kwacha

Copper has accounted for some 70-80 percent of Zambia's exports in 2009-11. With copper exports having recovered from less than 250,000 tons in 2002 to over 700,000 tons in 2011, and with copper prices exceeding $7,000 per ton, the incentive to diversify exports arises from fears of a slump in metal prices; the low labour content of mining (so that little employment results from it) and the lack of linkages from the mining industry. Agriculture and tourism are emphasized in the current Sixth National Development Plan (2011-16) as sectors offering potential for diversification, but in the long term, agro-processing and other manufacturing and service activities need to be developed for diversification as well as for employment generation.

Both micro and macro factors are believed to influence competitiveness and diversification. The high costs of doing business in Zambia and of trading between Zambia and the rest of the world undermine competitiveness and mitigate against diversification. These costs include poor infrastructure: excessive red tape and licensing: high finance costs and lack of access to finance: skill shortages and other labour market distortions.

At the macro level, an important issue is whether Zambia suffers from Dutch Disease, with its exchange rate (which is largely market-determined) influenced largely by high mineral prices which may inhibit the development of other exports. Indeed, the exchange rate might also be excessively volatile due to its links with commodity prices and trading conditions for the Kwacha. In addition to possible effects on the relative prices of tradables and non-tradables, it is also possible that there are important political economy effects and rent-seeking which tend to entrench the mining industry and mitigate against diversification.

It is therefore important to identify economic factors which have an impact on exchange rate movements of the Kwacha.

The aim of this study would be to examine the factors explaining the movements in the exchange rate at the present time as well as over the long run. The broader economic environment surrounding exchange rate determination would be examined.

Specifically, the study should:

Identify and weigh the key factors influencing exchange rate movements in the Zambian Kwacha;

This should include consideration of:

- the impact of policy, fiscal and monetary decisions (e.g. newly introduced SI33 prohibiting the use of foreign currency on local transactions),
- the impact of conditions in the Zambian economy such as the nature of the financial sector and capital markets and microeconomic factors for example,

- the general political and policy environment
- as well as the impact of the international environment on exchange rate developments;

Annex A4: List of People and Organizations consulted

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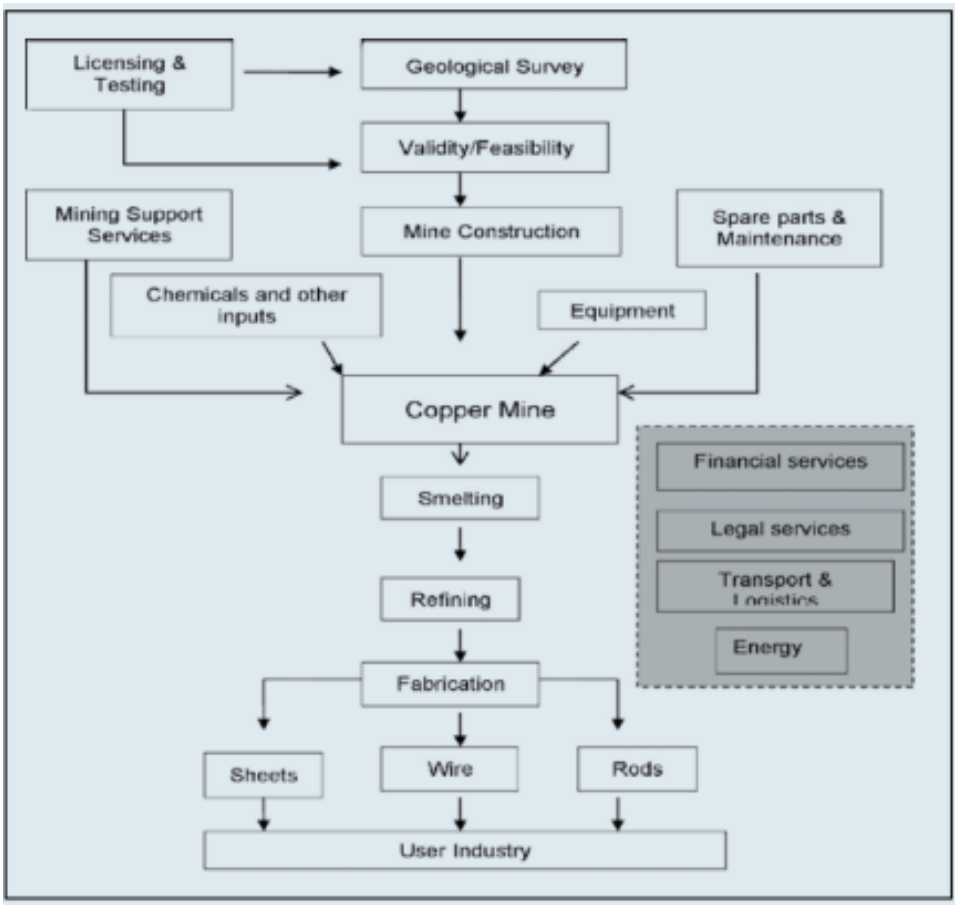
Annex A5: The Copper value-chain Framework



Source: UNIDO (2013:155)

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