

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

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Executive Summary

1. The variability of the nominal Kwacha against the major trading currencies declined over the last several years, and 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. The government should assess that cost as the basis for judging the need for capital account regulations.
3. Relative stability has also characterized the purchasing power parity ("real") exchange rate, which has displayed slightly more variation. We observe no tendency towards PPP exchange rate appreciation for recent years.
4. Statistical modelling indicates that nominal exchange rate stability has in part been the result of Bank of Zambia (BoZ) interventions.
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.
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 not necessary. However, shifting incentives toward non-mining tradables requires an integrated policy that would include exchange rate management.

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 Moona 2010b). A dramatic increase in copper export earnings has 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.

In this context 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 except through the major revenue generating role of the mining sector and foreign exchange earnings. 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.

Chapter 1: Analytical Framework

1.1 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 increases the foreign exchange cost of exports. Even more important, 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.

At some point 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 drive 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. Thus, 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.

The diagram shows three alternatives to the dysfunctional policy of discouraging both 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, where 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 the minimum currency depreciation in line with domestic inflation compared to inflation in competitor countries.

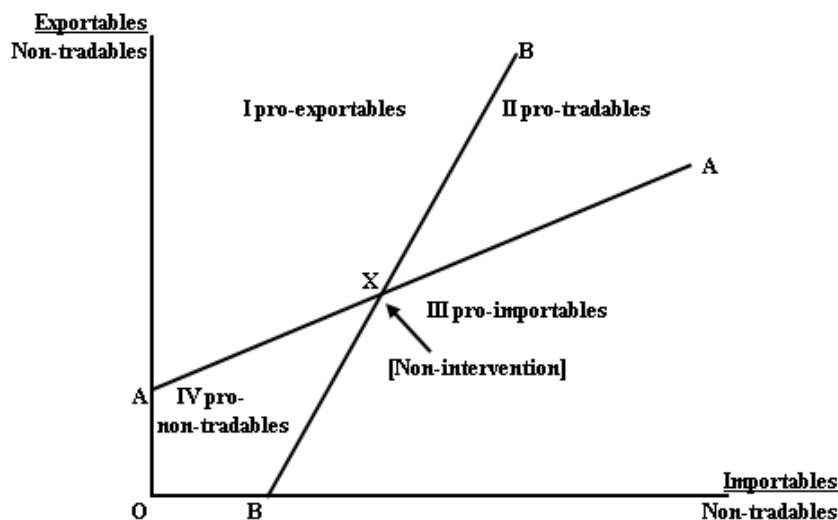
Diagram 1 demonstrates how a "strong currency" policy undermines growth in the short run and diversification in the medium term. This conclusion does not imply its opposite. A "weak currency" does not result in a "strong economy". In order to assess in more detail the appropriate exchange rate policy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

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

objectives of the government, and 2) country specific exchange rate dynamics. Objectives are treated here and exchange rate dynamics in the next section.

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



The exchange rate has distinct impacts 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 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.

The transmission of short term volatility is potentially quite important in Zambia, an importer of food and intermediate inputs to production. In addition, 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 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 depreciation pressure. Which occurs depends on the conjunctural context and the trend underlying the short term instability.

As we shall see, 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.

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 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. At the micro level, 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 The Exchange Rate in Zambia

In countries with developed financial sectors stock-flow balances determine the nominal exchange. The stock of assets in foreign currencies 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 this study addresses. We do not consider the impact of the exchange rate, however measured, on the "competitiveness of the economy", a concept without clear meaning in the Zambian context. Copper dominates the export trade of Zambia, and the nominal exchange rate has little short term impact on this trade. 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. The most important is 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 can potentially produce all the trade 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).

This process is strongly affected by the policies of the mining companies as to where they deposit and hold their export earnings. Were the mining sector still 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. As discussed in Section 3, it would be unwise to assume full transparency, the absence of which implies that observed and actual export revenue differ. With current information we cannot adjust for this probable data problem.

Cross country experience shows that the problem of misrepresentation of production, exports and foreign exchange flows characterizes metal production in many countries, be they developed or underdeveloped. Though country specific 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 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 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 of the determination of the Kwacha with respect to

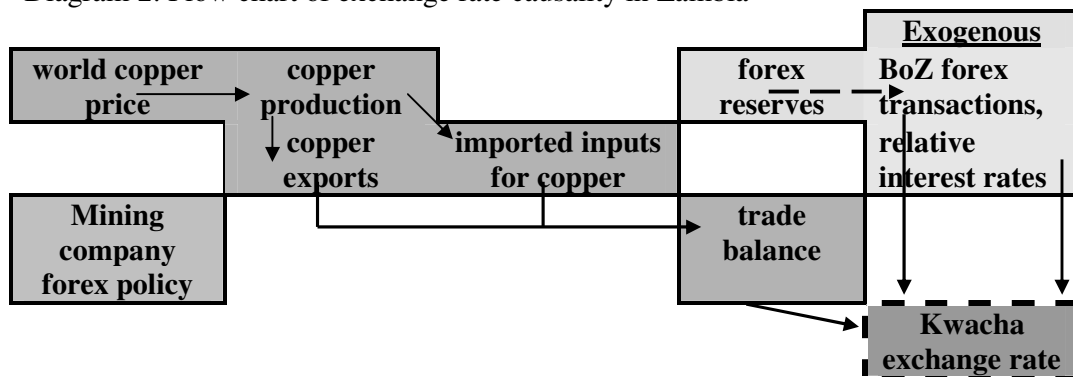
the currencies of Zambia's major trading partners other than China and Congo DR. Moving from left to right in the diagram, the world copper price (which is exogenous) is the major short term influence on the level of domestic production, and this is the most important determinant of exports. This production 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.

As explained above, 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.

For 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, attempt to raise the Kwacha price of foreign exchange). While the resulting increase in reserve holdings in theory could have a contradicting effect on private expectations, this is unlike to cancel the increase in relative supply of Kwacha.

This view of the determination of the Kwacha reverses the causality of the familiar Mundell-Fleming analysis. In that analysis the exchange rate and domestic interest rate determine balance of payments flows. In the current case the focus is on the exchange rate itself rather than the level of output consistent with balance of payments stability (see Weeks 2013).

Diagram 2: Flow chart of exchange rate causality in Zambia



Chapter 2: Empirical analysis

2.1 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 in this assessment 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. To continue with the example of the US dollar, 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.²

However, the statistics necessary for 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 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. The exchange rate movements 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.

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

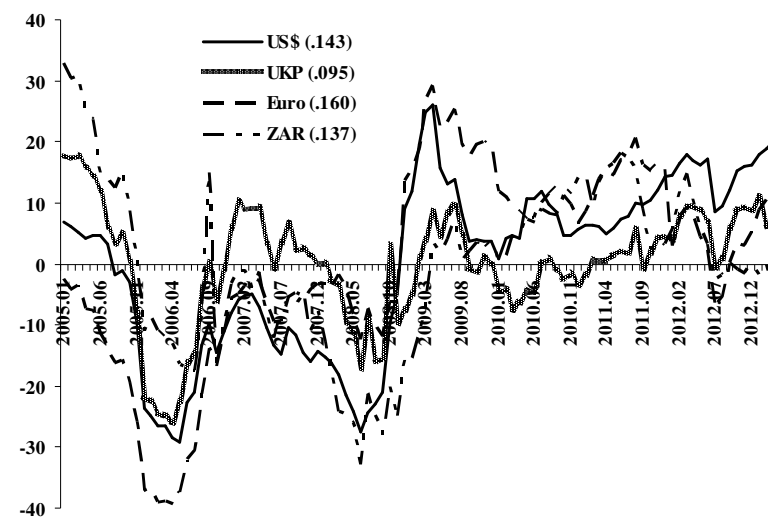
² Consider the calculation of a quarterly exchange rate. If both trade flows and the spot rate vary over the quarter, the average spot rate may differ substantially from the ratio of total trade in Kwacha and in dollars.

was inconsistent with underlying economic "fundamentals". This alleged inconsistency has led some to conclude that a decline in private sector confidence in government policies explains the depreciation, an issue treated in the next section.

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 than 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 first quarter of 2013, the coefficient of variation for the dollar was slightly less than .05, less than one-fourth 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.

Figure 1: Zambian Kwacha: Monthly nominal exchange rates against 4 currencies (US dollar, UK pound, euro and South African Rand), as percentage deviations from period average (average set to 0), 2005.1-2013.3



Sources & notes:

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

2.2 The "Real" Exchange Rate

The modifier "real" requires inverted commas because of the considerable ambiguities associated 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 that 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 also unnecessary because economic theory provides us with a much 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.³ 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 inputs. For this sector a ratio of international metals prices and international input prices would come closer to a relative domestic 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.

³ A thorough discussion appears in Liang (1992).

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.

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.

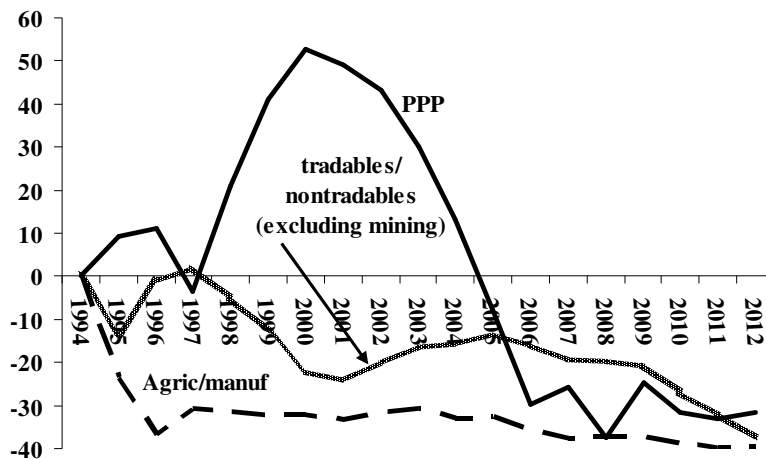
During 1997-2005 when the Kwacha suffered uncontrolled depreciation, the PPP measure suggests a general cheapening of Zambian goods and services. During the same years, the returns to tradables *declined* compared to the returns of non-tradables. The decline in relative returns persisted after 2005, 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.

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.⁴ In the case of Zambia, the coefficients of variation are very close for both nominal and real rates, though slightly larger for the latter except for the euro.

⁴ 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.

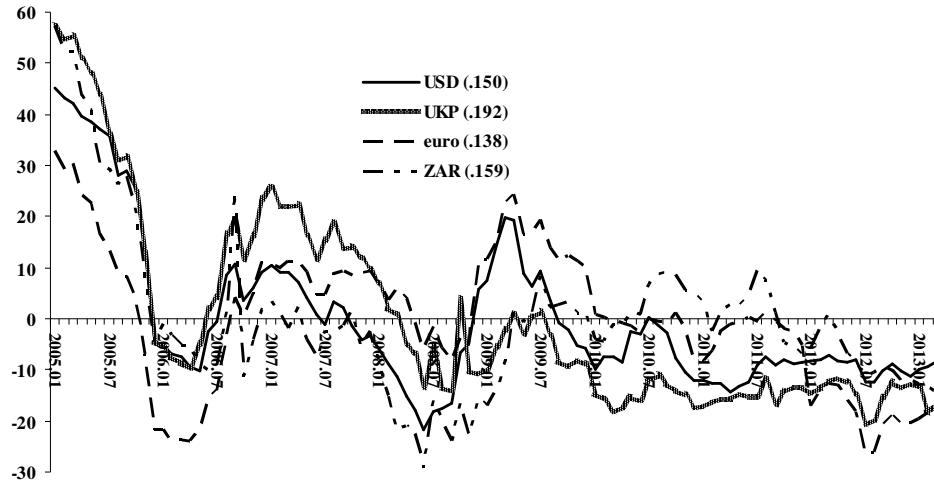
Four major conclusions result from the measures of the real exchange rate. First, the PPP measure does not indicate either competitiveness or the incentives for producing tradable commodities. Second, national income sectoral price indices suggest that the relative return to non-mining tradables at the beginning of the 2010s was considerably below the level of the second half of the 1990s. This suggests 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 (average = 100), 2005.1-2013.3



Sources & notes:

Bank of Zambia, *Statistics Fortnightly* (www.boz.zm)

USD – United States dollar, UKP – United Kingdom pound, ZAR – South African rand.

2.3 Trends in External Variables

This section presents the statistics for relevant 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.

The overall conclusion is that these variables indicate substantial pressures for depreciation during the last months of 2012 and into 2013. The 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 quarter, 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 27 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 quarter 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. We consider this below.

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

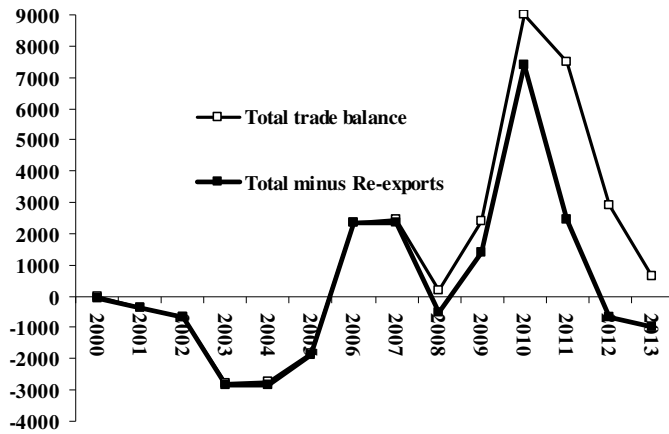


Figure 5a: Zambia, Monthly US dollar trade balance (without re-exports), 2003.01-2013.03 (millions of US dollars)

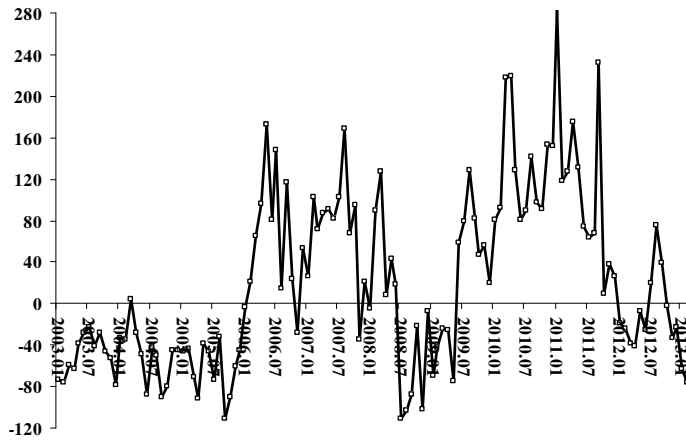


Figure 5b: Zambia, Quarterly trade balance (without re-exports), 2003.01-2013.03 (millions of US dollars)

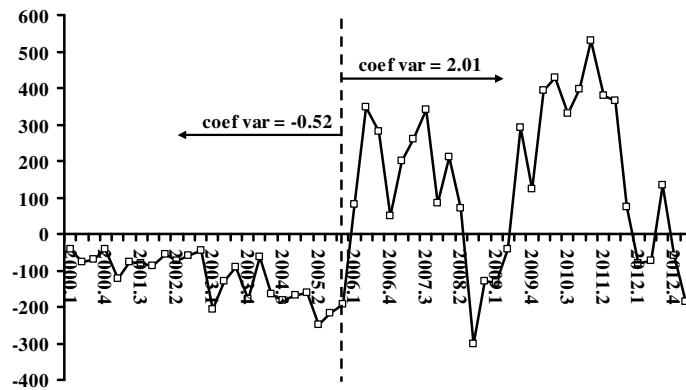


Figure 5c: Zambia, Petroleum and fertilizer as percentages of total imports, Quarterly, 2000.1-2013.1

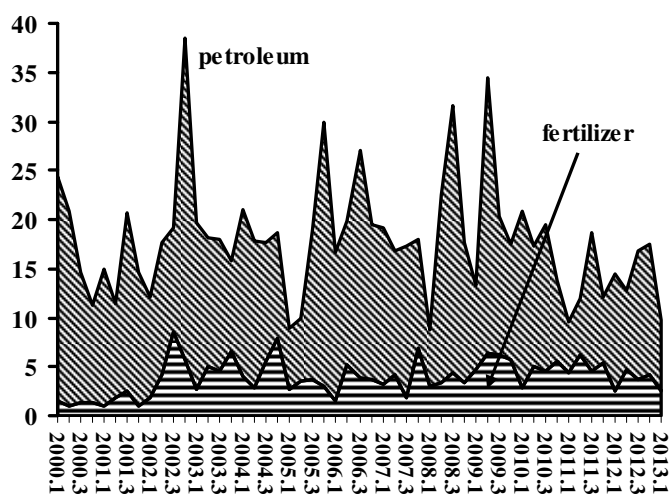


Figure 6 reports the net balance of the capital account over the same period as for the trade balance, 2000.1 through 2013.1. The capital account shows a substantial increase in quarterly variation after 2005, as one would expect from the previous charts of the trade balance (see Figure 5b). In Zambia 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.⁵ The time lag between the accounts implies that their variability does not coincide, which implies different impacts on the nominal exchange rate of any period.

Figure 6 shows 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 2012 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

⁵ 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.

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).

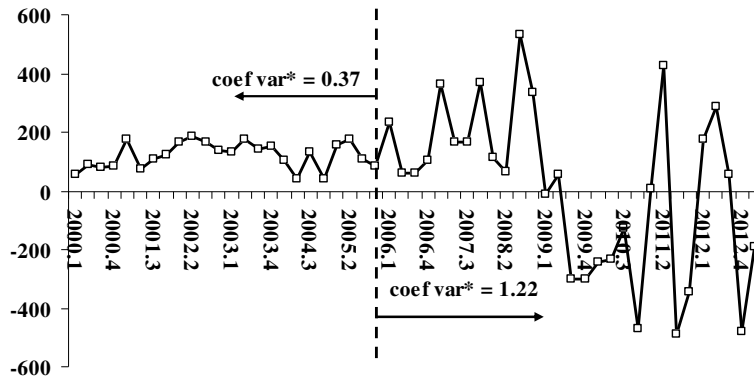
Figure 8 charts the percentage point spread between Zambian 91 day Treasury Bills and 24 month bond, on the one hand, and the US Federal Funds Rate on the other. The last, an average of public bond rates with maturities less than 12 months, serves as the indicator of "world interest rates". For the period 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 flows 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 for development assistance is that the moving average reduces ambiguities arising from the difference between scheduled and actual 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 we 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 cents per pound), and gross forex reserves in months of imports, 3 month moving average, percentage point deviations from period average, 2002.11-2013.03

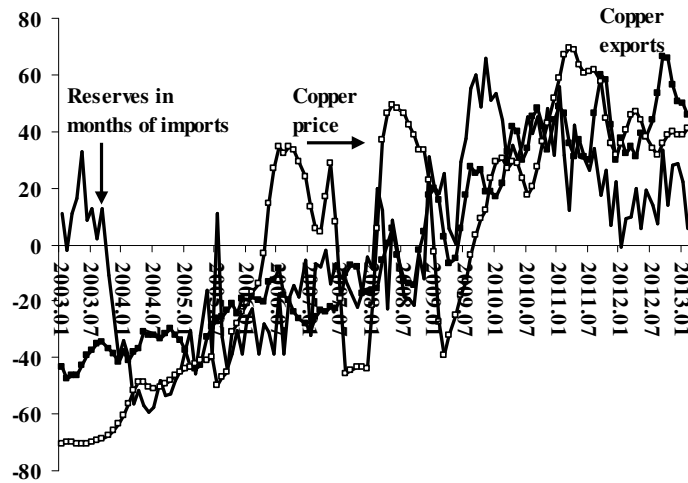
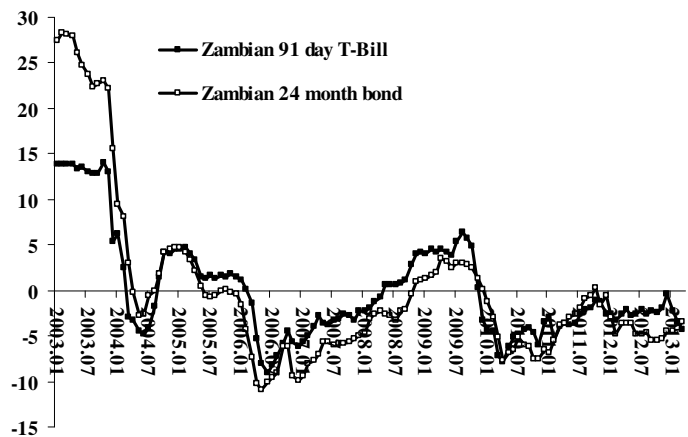


Figure 8: Zambia: Monthly percentage point spread, Zambian 91 day Treasury Bills and US Federal Funds Rate, deviations from period average, 2003.01-2013.03



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, 2003-2013 (US\$ millions, four quarter moving average)

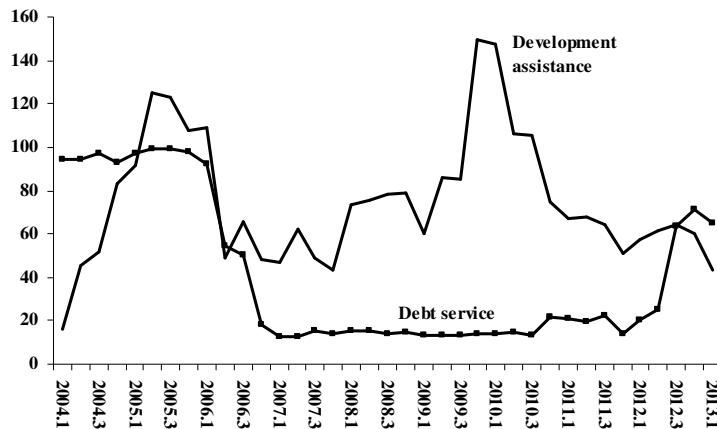
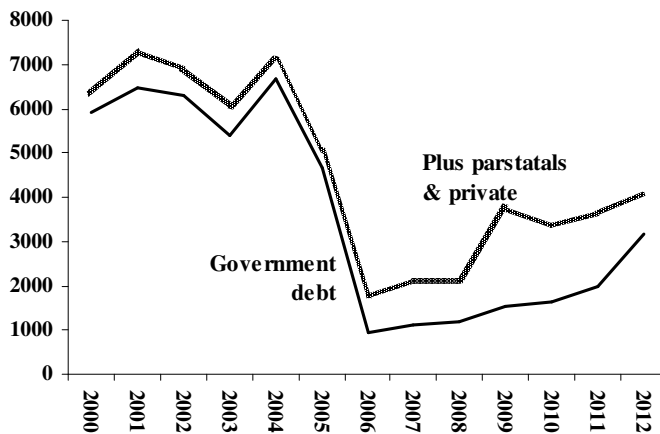


Figure 10: Zambia, External Debt, 2000-2012 (US\$ millions)



2.4 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.

Definition of variables:

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

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

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

$(BoZ \text{ Forex sales})_t$ = foreign exchange transactions by the Bank of Zambia in US dollars, period t (purchases are positive)

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

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.

$$(Kw/USD)_t^* = [(Exports/Imports)_{t-1}]^{\beta_2} + [(ZTBr/USFFr)_{t-1}]^{\beta_3} + [(BoZ \text{ Forex sales})_{t,3}]^{\beta_4}$$

$$\Delta(Kw/USD)_t = \alpha\{-[(Kw/USD)_{t-1}]^{\beta_1} + [(Exports/Imports)_{t-1}]^{\beta_2} + [(ZTBr/USFFr)_{t-1}]^{\beta_3} + [(BoZ \text{ Forex sales})_{t,3}]^{\beta_4}\}$$

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

$$\Delta(Kw/USD)_t = \beta_0 - \beta_1 \ln(Kw/USD)_{t-1} + \beta_2 \ln(Exports/Imports)_{t-1} + \ln[(ZTBr/USFFr)_{t,3}]^{\beta_3} + [(BoZ \text{ Forex sales})_{t,3}]^{\beta_4}$$

Table 1 provides the results of the estimation. We note that 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 strong, and all independent variables statistically significant. The statistical results provide confirmation of what we can call the reverse the Mundell-Fleming hypothesis. 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. For monthly observations

the results are much the same with similar overall statistical significance, though as to be expected the explanatory power is substantially lower.

The statistical results in Table 1 confirm the assessment in the previous section. Over the ten years, 2003Q1 through 2013Q1, 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 171 Kwacha per dollar, or 3.8% of the actual values. More interesting is the "BoZ effect", the estimation difference associated with Bank of Zambia interventions. This is 4.5% of the average Kwacha-dollar rate, implying as theory would predict that the Bank of Zambia has and can have 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 2003-2007 the Bank of Zambia intervened to reduce pressures for appreciation, as demonstrated 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 though small. The results indicate that BoZ interventions had a large effect for in preventing greater depreciation than arresting appreciation. Figure 13 shows the actual, estimated and estimated without the BoZ effect values.

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 because of the accumulation of foreign exchange reserves.

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. Should it conclude that the cost of holding sufficient reserves to achieve the desired stability of the exchange rate is excessive, then interventions to reduce capital account variability become relevant, as recommended in a recent speech by IMF director Christine Lagarde when she used the term "unconventional monetary policy".⁶ 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.

Table 1: OLS estimation for Kwacha-US dollar exchange rate, quarterly, 2003.1-2013.1, Dependent variable: first difference in the Kw/USD rate

Variable	coefficient	Significance of T
Constant	2.8136	.000
ln(Kw/USD)t-1	-.3212	.001
ln(Exports/Imports)t-1	-.1850	.002
ln(ZTBr/USFFr)2 qtr	-.0658	.016
(BoZ Forex sales)t1	.0008	.000
Adj R-square = .393 DF = 38 Serial correlation F-statistic = 7.16 @ .000 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.

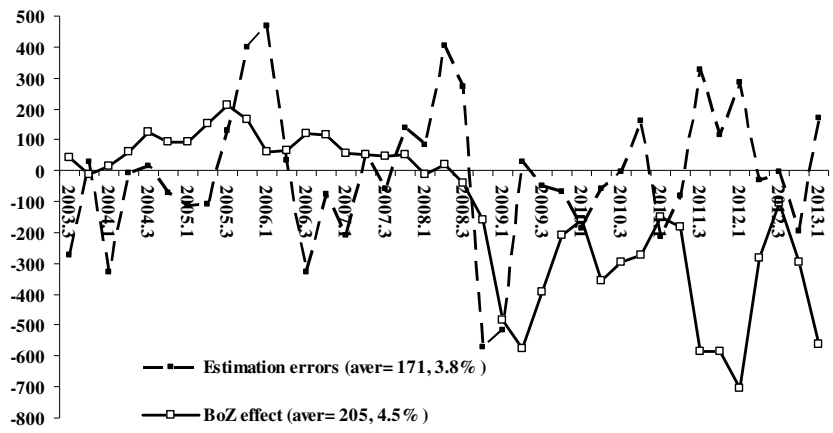
Table 2: OLS estimation of the quarterly variation in the Kwacha-US dollar exchange rate, 2003.1-2013.1, Dependent variable: 4 quarter moving coefficient of variation

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 DF = 36 Serial correlation F-statistic = 14.93 @ .000 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.

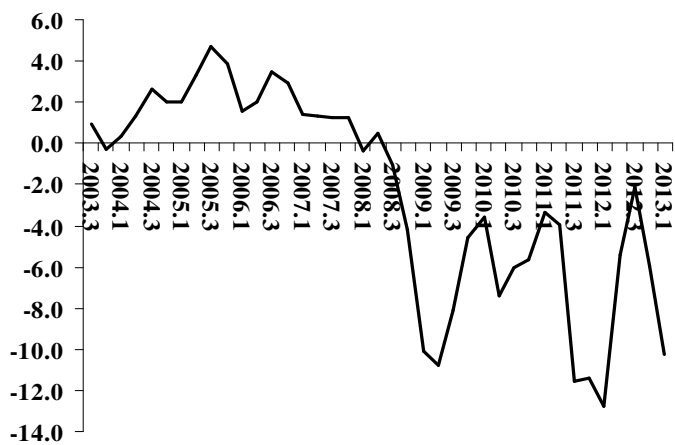
⁶ The full speech can be found at <http://www.imf.org/external/np/speeches/2013/082313.htm>.

Figure 11: Zambia, Estimation errors and Bank of Zambia effect, quarterly, 2003.3-2013.1 (number of Kwacha)



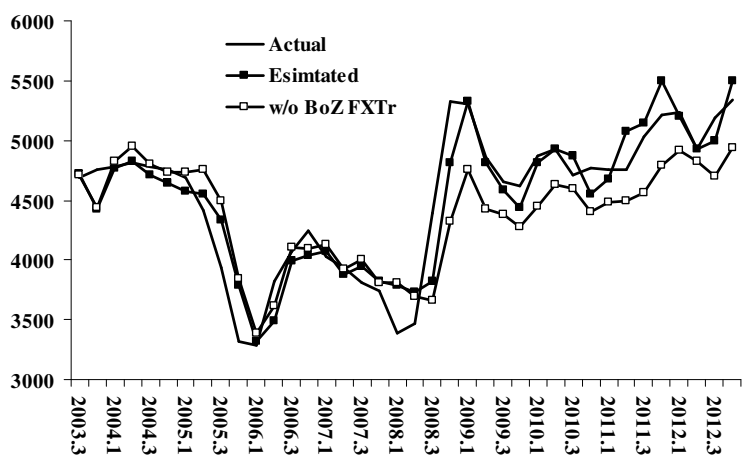
Calculated from statistics in Table 1.

Figure 12a: Zambia, the BoZ Effect in percentage of actual rate by quarters, 2003.3-2013.1



Calculated from statistics in Table 1.

Figure 13: Zambia: Actual and estimated Kwacha-US dollar rate, and the Bank of Zambia effect, quarterly, 2003.3-2013.1



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 Zambia 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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