Issues On The Zambian Economy

Bank *of* Zambia

THE BOZ READER, VOL.01, NO. 03

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2006

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EDITORIAL COMMITTEE

Published by the Bank of Zambia
Bank Square
Cairo Road
P.O. Box 30080
Lusaka
Zambia

http://www.boz.zm

ISBN: 9982 - 870 - 00-9

Printed by Mission Press, Ndola - Zambia

First Printed in August 2003

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Foreword

In the recent past, Zambia experienced a significant improvement in its economic performance, attributed mainly to positive external sector developments and sound macroeconomic management. The challenge we face now as a country is to sustain this performance and improve on it. This can best be achieved with an understanding of how the Zambian economy responds to policies and shocks, both domestic and external. Accordingly, the generation of a body of research on the Zambian economy is an urgent imperative.

The Bank of Zambia has thus always felt compelled to contribute to the growing literature on the performance of the Zambian economy. To attain this, the Bank of Zambia has undertaken to publish the Bank of Zambia Reader on an annual basis. The first Reader was published in 2003 and the second in 2004. This volume is the third in the series and should go a long way in providing useful insights into a number of important economic developments that have taken place in Zambia in the recent past.

The Reader series are directed at economists, financial advisors, policy makers in government and the private sector, international agencies, universities and other research institutions for insights into the Zambian economy and to assist in making informed decisions .

It is gratifying to note that the articles in this Reader have not only been drawn from the Bank of Zambia staff, but also from researchers outside the Bank. This shows the interest the Reader has cultivated amongst researchers. It is hoped that in future even more researchers from outside the Bank of Zambia will contribute articles to the Reader.

To enhance the Reader, the Bank of Zambia would like to invite comments on the articles published in the Reader. The comments should be addressed to the Director, Economics Department, Bank of Zambia, P. O. Box 30080, Lusaka, Zambia. Alternatively, comments can be emailed to pr@boz.zm.

I would like to thank all those who contributed articles for publication in this Reader. My thanks also go to the members of the editorial committee who worked tirelessly to ensure successful publication of this volume .

Finally, may I take this opportunity to mention that the views and interpretations expressed in this Reader are those of the authors and do not necessarily represent the views and policies of the Bank of Zambia.

Caleb M. Fundanga

Governor

Bank of Zambia

November 2006

Macroeconomic Implications of High Copper Prices on the Zambian Economy

By

Mulenga Emmanuel Pamu

Abstract

This paper analyses the implications of the high international price of copper on the Zambian economy. Using a general equilibrium model, it is shown that the 24 percent real appreciation recorded in August 2005 is less than what would be required to move the economy to the new equilibrium. The appreciation would have been higher without Bank of Zambia purchases of foreign exchange. It is also explained that it is nigh impossible to reach an equilibrium position. The economy is continuously moving to a new equilibrium as fundamentals change. Thus, it is difficult to state where the exchange rate should be without reference to the direction of the economic fundamentals. It is suggested that the most appropriate policy response would be to carry out sterilized purchases of foreign exchange to build reserves. These would reduce the chances of self-fulfilling speculative attacks on the exchange rate. In the absence of this, the appreciation of the real exchange rate that has been experienced so far is a phenomenon that cannot be avoided and the appreciation occurs either through the nominal exchange rate appreciation or the increase in the supply of money and higher domestic inflation.

1 Introduction

Zambia is a highly mineral dependent economy. At independence in 1964, copper supplied 90 percent of Zambia's foreign exchange earnings, over 60 percent of tax revenues, 20 percent of formal sector employment and contributed almost half to GDP. Mineral dependence has persisted despite significant growth of the non-traditional export sector. During the period 1964 to 1972, Zambia experienced rapid economic growth not only in comparison with earlier periods but also in comparison with growth rates experienced in many sub-Saharan countries. This was because copper production and prices were high enough to earn foreign exchange and generate tax revenues on a scale that was not far short of the absorptive capacity of the economy.

When copper prices began to fall in 1974, the country resorted to external financing and pursued demand management policies aimed at attaining macroeconomic stability and correcting balance of payments deficits. The policies pursued to change the structure of the economy to make it less dependent on the mining sector by boosting non-traditional exports were ineffective. With the change of Government in 1991, across the board economic liberalization measures were implemented. Despite the good prospects created by these measures, sustained macroeconomic stability was not achieved with economic performance depending on the mining sector and external aid inflows.

The main drawback to the effectiveness of economic policies was the external debt that the economy accumulated after the negative copper price shock of 1974. This significantly reduced investment and the ability of the economy to service its debt from its own resources. The external debt burden prevented any positive copper price shock from being

translated into savings and investment as was the case prior 1974[1]. The country thus depended on external aid inflows to avoid defaulting on external debt service and to finance investment.

In April 2005, Zambia reached the Heavily Indebted Poor Countries (HIPC) initiative completion point which was expected to reduce Zambia's external debt by US$3.9 billion from $7.1 billion as at December 2004. Further, the copper price increased sharply in 2003 and has continued to rise since then. The main objective of this paper is to analyses the implications of the increase in the copper price on the Zambian economy in the context of the reduced external debt following the HIPC completion point. Specifically the paper seeks to determine whether the nominal exchange rate overshot its long-run equilibrium level in 2005. The paper is organized in five sections; section 2 provides an analysis of the Dutch Disease effects of high copper prices, in section 3 we estimate the change in the equilibrium real exchange rate following the increase in the copper price, section 4 analyses the implications of the nominal appreciation for monetary and fiscal policy while section 5 concludes.

2 Dutch Disease Effects of High Copper Prices

The term Dutch Disease is derived from the adverse effects on manufacturing of the natural gas discoveries of the nineteen sixties, essentially through the subsequent appreciation of the Dutch real exchange rate. The fundamental assumption underlying the Dutch Disease is that the positive shock is permanent and is perceived to be so by the agents in the economy. The Dutch Disease occurs essentially through two channels, the spending effect and the resource movement effect. The spending effect occurs when the higher incomes in the booming sector, in the Zambian case the mining sector, results in higher relative prices of non tradable goods.

The resource movement effect occurs when labour moves from the non-booming tradables and the non-tradable sectors to the booming sector as a result of higher wages in the booming tradables sector. The movement of labour from the non-booming tradables sector is called direct deindustrialisation and does not require an appreciation of the real exchange rate. The movement of labour from the non-tradable sector creates excess demand in this sector leading to a further increase in the relative price of non-tradables. This increase in the relative price of non-tradables leads to a further movement of labour from the non-booming sector to the tradables sector. The final output in the non-booming tradables sector can be higher depending on the relative magnitudes of the spending and resource movement effects. In terms of income distribution, both effects tend to lower the rents in the non-booming sector and this is the essential problem of the Dutch Disease (Corden 1984)

While the real aspects of the Dutch Disease analyzed above are important, most of the policy issues it raises involve monetary considerations. Goods market equilibrium entails a positive relationship between the nominal exchange rate and the price of non-tradable goods while money market equilibrium implies a negative relationship between these variables. An increase in the exchange rate (i.e. a depreciation) creates excess demand in the non-tradable goods sector so that the price of non-tradables increases in order to restore equilibrium. In the money market, a deprecation reduces real money balances by increasing prices so that equilibrium is restored when domestic prices fall to reduce the general price level, assuming money supply is constant(Corden, 1984)

[2]Investment as a percentage of GDP declined from 33 percent in 1970 to 7 percent in 1989. This was despite the copper price being higher in 1989 than it was in in 1970

An increase in the price of copper raises real incomes and the relative price of non-tradables. The increase in real incomes also increases the demand for real money balances so that if domestic money supply is not increased, the price level must fall to restore money market equilibrium. This occurs through the appreciation of the nominal exchange rate so that domestic prices of traded goods unambiguously fall but the price of non-traded goods falls or rises compared to the pre-boom level. The net result depends on the relative shifts of the goods market and money market equilibrium loci.

If the exchange rate is fixed at the initial level, the balance of payments surplus that follows an increase in the demand for money leads to a build up of reserves so that provided the authorities do not attempt to sterilize this inflow, the money supply gradually increases. The required increase in the relative price of non-traded goods (i.e. the real exchange rate appreciation) is brought about by the rise in their nominal price rather than the fall in the nominal price of traded goods.

If the central bank is committed to a fixed exchange rate but is concerned about the inflationary consequences of the boom, their only option is to sterilize the liquidity injection resulting from the purchase of foreign exchange. This is what Corden (1981) called exchange rate protection: the central bank acts so as to suppress the real appreciation, so protecting the tradable goods sector and mitigating the effect of deindustrialisation. The cost of such a policy does not arise from the divergence between domestic and foreign prices (as with orthodox tariff protection). Rather, to the extent that the policy is successful, it arises from the reduction in aggregate consumption below the level of national income reflected in continuing balance of payments surpluses.

Previous studies analysed the effects of copper price shocks in Zambia in periods characterised by economic controls (Aron 1999, Kayizi-Mugerwa 1991). These studies suggest that the increase in the copper price had Dutch Disease effects. However, these were ameliorated by the existence of controls especially through the fixed nominal exchange rate. Pamu (2002) showed that shocks to the copper price can have Dutch Disease consequences in a liberalised economic set up. However, the effect is weakened by the country's heavy indebtedness. The standard predictions of theory on the effect of external shocks are qualified not just by the control regime in operation but also by the existence of a huge external debt.

With a significant reduction in the external debt position, we should expect the high copper prices to have significant Dutch Disease effects through the appreciation of the real exchange rate. The realised international copper price increased by more than 134 percent from US$0.70 per pound in 1999 to US$1.64 in October 2005. The trend in copper prices is shown in Table. 1

Table 1: Average Realised Copper Prices in US$ per pound

Year	1999	2000	2001	2002	2003	2004	2005
Copper Price	0.70	0.82	0.78	0.71	0.77	1.20	1.64

Copper production in 2005 was projected at 417,000 metric tones. Using counterfactual analysis, we determine the magnitude of the boom in Table 2. The counterfactual value of exports was computed using the 1990 average copper price of US$ 0.70 per metric tone. The magnitude of the boom was estimated at US$864 million in 2005. This represented approximately 12 percent of GDP and a significant increase in export earnings which was

expected to result in an appreciation of the real exchange rate[2].

Table 2: Magnitude of the Copper Boom in US$ millions

Year	2005
Volume of Exports	417,000 metric tones
Value of Exports	1508
Counter-Factual Value of Exports	644
Magnitude of the Boom	864

The trend in the real effective exchange rate supports this expected appreciation as shown in Table 3. Beginning 2003, the real effective exchange rate has been appreciating with the most significant rate of the appreciation experienced in 2005. For instance, for the period December 2004 to August 2005 there was a real appreciation of 24 percent. The real appreciation occurred mainly through the nominal effective exchange rate.

Table 3: End Period Real Effective Exchange Rate Index

Year	1998	1999	2000	2001	2002	2003	2004	2005
REER	111.2	108.39	120.78	82.5	116.2	109.42	96.56	73.76

The question we wish to answer is whether the nominal exchange rate has overshot its long run equilibrium level. In attempting to answer this question, we apply a small general equilibrium model (the 123 model) to Zambia to determine the appropriate long run adjustment of the real exchange rate following the increase in the copper price.

3 Estimation of the Change in the Equilibrium Real Exchange Rate Using the 123 Model

In this section, we attempt to estimate a new equilibrium real exchange rate using the 123 model developed by Devarajan et al. (1993). The model decomposes the goods market into non-tradables, exportables and importables. It is not our intention in this paper to present the details of the 123 model. However, the core result of the model is;

$$P^d = \frac{(\sigma - 1)\pi^m + (1 + \Omega)\pi^e + \lambda}{\Omega + \sigma} \qquad (1)$$

P^d denotes the price of non-tradable goods, π^m the price of imports, π^e the price of exports λ, capital inflows, Ω is the elasticity of transformation in supply while σ is the elasticity of substitution in demand. Equation (1) gives the equilibrium change in the price of domestic goods for a given change in the world prices or in foreign capital inflows. In a market with a freely floating exchange rate regime, the adjustment to a change in the terms of trade and sustainable capital inflows is expected to take place through the nominal exchange rate rather than the money supply and domestic prices. Equation (1) can therefore also be

[1]The exchange rate is caused by many other factors. However, our argument is that with the significant increase in the international price of copper, the supply of foreign would be higher than in the counterfactual, which is expected to have an effect on the exchange rate.

interpreted as the equation for the equilibrium nominal exchange rate. It can be rewritten with the rate of change in the nominal exchange rate included explicitly as:

$$R = p^d - \frac{(\sigma\pi^m + \Omega\pi^e)}{\sigma + \Omega} - \frac{(\pi^e - \pi^m)}{\sigma + \Omega} - \frac{\lambda}{\sigma + \Omega} \qquad (2)$$

Equation (2) suggests that the equilibrium nominal exchange rate is depreciated by domestic inflation and appreciated by foreign inflation, an improvement in the terms of trade and sustainable capital inflows. We now use the above equations to determine the changes in the equilibrium real exchange rate in Zambia following the increase in the international price of copper of 37 percent in 2005 and an increase in the international oil price of 43 percent. We do this for various combinations of export transformation elasticities and import substitution elasticities. The results are presented in Table 3.

Table 3: Change in the Equilibrium Real Exchange Rate in Zambia (in percent)

Export Transformation Elasticity (Ω)	Import Substitution Elasticity (σ)				
	0.25	**0.50**	**0.60**	**0.75**	**1.00**
0.25	-28	-33	-34	-36	-37
0.50	-31	-34	-35	-36	-37
0.60	-32	-34	-35	-36	-37
0.75	-33	-35	-35	-36	-37
1.00	-33	-35	-36	-36	-37

The change in the equilibrium exchange rate ranges from 28 percent to 37 percent depending on the export elasticity of transformation and the import elasticity of substitution. Devarajan (1993) computed average elasticities for Cameroon and used 0.5 for the export transformation elasticity and 0.6 for the import substitution elasticity. Applying these elasticities gives an appreciation of 35 percent. The actual appreciation in the real exchange rate for the period December 2004 to August 2005 was 24 percent, which is lower than all the figures in Table. 3. The appreciation in the real exchange rate could have been mitigated by Bank of Zambia purchases of foreign exchange amounting to US$124.1 million in 2005. The above model simulation assumes no change in sustainable capital inflows which would imply a higher real appreciation in the equilibrium real exchange rate. This implies that the appreciation in the equilibrium real exchange rate will be much higher when the inflows and debt relief following the HIPC completion point are considered.

The results of the above simple general equilibrium model imply that the appreciation in the real exchange rate is a natural consequence of changes in the economic fundamentals relating to the external sector. The observed appreciation in the nominal exchange rate is therefore not surprising as the nominal exchange rates as it was simply moving to its new equilibrium level.

From Comparative Statics to Dynamic Analysis

The question one may ask is where then should the exchange rate settle, at K4000? The answer to this question is that it is near impossible to reach the steady state equilibrium level. This is so because as economic agents interact in response to a shock and move price variables such as the exchange rate to the new equilibrium level, the equilibrium level

changes before the dynamic adjustment process is completed. It is an ever moving target as long as the fundamentals are changing. The nominal exchange rate is expected to continue appreciating as long as the terms of trade for Zambia continue improving due to the increase in the international price of copper with concomitant Dutch Disease consequences for non-traditional exports. One would then ask the next question, should authorities respond to protect non-traditional exporters? We will attempt to address this question by analyzing the implications of the nominal exchange rate appreciation for monetary, and to some extent, fiscal policy in Zambia.

4 Implications of the Nominal Appreciation for Monetary and Fiscal Policy

The nominal exchange rate, like any other asset price, is a function of expected future exchange rates which in turn is a function of future fundamentals. These fundamentals include the expected future monetary policy which affects future interest rates, the terms of trade and capital inflows. The observed appreciation of the nominal exchange rate implies that the economic agents expect the exchange rate to appreciate. This increases the return on domestic assets relative to foreign assets as investors are expected to gain twice through the yield rate and capital gains. Naturally, this will attract short term foreign capital into the economy and appreciate the exchange rate until the interest parity condition is satisfied.

These short term inflows, to the extent that they are not used for productive investment, provide limited benefits to the real economy. In-fact they leave the economy vulnerable to twin currency and financial crises as these flows are reversed due to inconsistent policy driven fundamentals, exogenous negative terms of trade shocks and herding behaviour of investors.

When this trend continues for some time, nominal interest rates are expected to decline. This will occur through two channels, through the expansion in money supply as the central bank increases its foreign assets to accommodate the increased demand for domestic currency and through the portfolio adjustment of commercial banks from foreign assets to domestic currency, increasing demand for domestic assets such as Government securities. The increase in demand for Government securities relative to supply increases the price of the securities, reducing the yield rate on these securities. When this becomes protracted, lending rates would also decline as commercial banks increase their supply of loanable funds to the private sector. The decline in Government securities yield rates would reduce domestic interest costs and improve Government fiscal performance.

Monetary authorities have two policy options in response to the increased foreign exchange inflows and the appreciation of the nominal exchange rate. In line with the freely floating foreign exchange rate regime, the Bank of Zambia could adopt an inert approach and let the nominal exchange rate appreciate to its new equilibrium level. This would appreciate the nominal exchange rate beyond the appreciation that has been experienced thus far. The appreciation of the real exchange rate would therefore occur mainly through the appreciation of the nominal exchange rate. However, the Bank of Zambia could also respond to the positive terms of trade shock by purchasing the excess foreign exchange supply to maintain the nominal exchange rate at a certain level. This would results in increased money supply and prices of non tradable goods. In this case, the appreciation of the real exchange rate occurs through the increase in the price of non tradable goods. Therefore, the real exchange rate appreciation occurs whichever of the above policies is adopted.

In order to avoid the rise in prices as a result of the increase in the supply of money, the central bank could sterilise the liquidity injection arising from the purchase of foreign

exchange. This has the effect of increasing domestic interest rates. The resulting higher interest rates and expected appreciation of the nominal exchange rate due to the persistently high copper prices would attract more short term capital inflows leading to a further appreciation of the nominal exchange rate. Higher domestic interest rates would also worsen fiscal performance by increasing Government domestic interest costs.

The increase in short term inflows into the country as a consequence of high expected returns from interest risk free Government securities and the expected appreciation of the Kwacha expose the economy to a considerable risk of a currency and financial crisis. A revision in expectations on the external sector performance of the Zambian economy would lead to a sudden reversal of flows culminating in a currency crisis. The tight monetary policy that may be implemented in order to mitigate the effect of the crisis would cause a financial crisis as interest rates rise increasing the amount of non-performing loans in the financial sector, particularly in recent years when commercial bank loans and advances are increasing relative to investment in Government securities.

An important variable on which expectations on the exchange rate are anchored are the official reserves of the Bank of Zambia. Low official reserves can adversely affect expectations on the future path of the exchange rate and thus could contribute to a currency crisis. It is therefore advisable for the Bank of Zambia to take advantage of positive terms of trade shocks to accumulate more international reserves.

5 Conclusion

The paper has made an analysis of the implications of the significant increase in the international price of copper on the Zambian economy. It has been established in the paper that the magnitude of the boom is significant. Using the 123 general equilibrium model, it is shown that the appreciation of the real exchange rate as a result of the increase in the copper price ranges between 28 percent and 37 percent, depending on the import substitution elasticity and the export transformation elasticity. The 24 percent real appreciation recorded for the period December 2004 to August 2005 is therefore less than what would be required to move to the new equilibrium. This was could have been due to the intervention by the Bank of Zambia through its foreign exchange purchases. This implies that the appreciation would have been higher without these purchases. It is also explained in the paper that it is nigh impossible to reach an equilibrium position. The economy is continuously moving to a new equilibrium as fundamentals change. Thus, it is difficult to state where the exchange rate should be without reference to the direction of the economic fundamentals.

The paper also outlines the policy options available to the central bank in response to the high copper price. The paper suggests that the most appropriate policy response would be to carry out sterilized purchases of foreign exchange to build reserves. This would reduce the chances of self-fulfilling speculative attacks on the exchange rate. In the absence of this, the appreciation of the real exchange rate that has been experienced so far is a phenomenon that could not be avoided. The appreciation occurs either through the nominal exchange rate appreciation or the increase in the supply of money and higher inflation.

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High Net Interest Margins in Zambia: Reasons and Rationale

By

Mwiza Mbewe[1]

Abstract

Commercial Banks in Zambia have long argued that the high levels of yield rates on government securities, statutory reserve requirements, inflation and non-performing loans have significant bearing on the wide spread between lending rates and savings rates and hence high net interest margins. However, empirical evidence in this paper suggests that only yield rates on government securities and inflation have a bearing on net interest margins. The statutory reserve requirements and non-performing loans do not have the suggested bearing. The paper further argues that the underlying rationale for the existence of high net interest margins stems from the desired level of profitability by the shareholders and management of the commercial banks, thus encouraging the undertaking of high risk projects.

1.0 Introduction

The spectre of wide spreads between lending and savings rates in Zambia is a feature that has been in existence predominantly from 1995 to date. The feature is of particular concern given that on a comparative basis, the spreads are wider in Zambia as compared to other African economies (Ndhlovu, 2004).

In discussing the matter, the paper utilises the concept of net interest margins (NIM) as a means of assessing the differences in spreads between the lending and saving rates in Zambia compared with other countries. Net interest margin is conventionally defined as the difference between interest income and interest expenses. It is usually expressed as a percentage of average interest earning assets. The net interest margin is a guide to the profitability of a company's investments. With specific regard to the term 'average interest earning assets', the average of the stock of loans, advances and securities for the year in which the interest margin is computed and that of the previous year are utilised for the denominator. BOX 1 below provides a simple example for calculating net interest margins.

[1]This paper is a revised draft of an earlier paper that was circulated to the commercial banks at the Governor's meeting with the Chief Executive Officers of the commercial banks in January 2005. However, it must be noted that the views expressed in the paper remain those of the author and not necessarily those of the Bank of Zambia.

BOX 1

Assume a small bank is able to mobilise deposits amounting to K1,000,000 which it immediately lends out whilst maintaining the deposit for the whole year.

The applicable rates are as follows:

Savings Rate: 3%

Lending Rate: 28%

Using the simple interest formula, after one year the savings account will yield K30,000 for the depositor while the loan will yield K280,000 for the commercial bank.

Assuming further that the loan is the only interest earning asset, the net interest margin will be calculated as follows:

$$NIM = (\text{net interest income/loan}) \times 100\% = 25\%$$

The net interest margin therefore represents the spread between the lending rate and the savings rate. NIM could therefore be used to assess the level of profitability for personal loans, corporate loans and foreign denominated loans.

The immediate implication of a high net interest margins as shown in the box above is that the spread between the commercial banks' lending rates and the deposit rates is significantly wide. The problem with this is that when very low rates are offered on deposits by commercial banks while very high lending rates are employed on loans people are unwilling to save monies in the commercial banks and generally opt to source funds outside the banking. Furthermore, large net interest margins indicate inefficient banking operations, high risks in lending and monopoly power of banks (Podpiera, 2004).

Comparative data in Table. 1 below shows the net interest margins for Zambia, Uganda, Kenya and South Africa over a five year period from 1999 to 2003.

Table 1: Net Interest Margins (%)

	1999	2000	2001	2002	2003	**Average**
Zambia	17	14	14	16	13	**15**
Uganda	10	16	16	11	n/a	**13**
Kenya	9	9	8	9	8	**9**
South Africa	4	4	5	4	4	**4**

n/a not available

Source: Calculated by the author from various central banks' annual reports

The data indicate that on average, net interest margins have been higher in Zambia compared to those prevailing in the selected countries. There are various reasons which can be attributed to the differences in the net interest margins. Among the reasons are: different levels of economic activity and development, different product ranges offered by the commercial banks, availability of alternative products offered by other financial institutions and competition amongst the commercial banks themselves.

For example, for the years 2000 and 2001, Uganda recorded relatively higher net interest margins. This was on account of substantial shifts by the commercial banks to investing in government securities which had favourable interest rates compared to private loans. Another contributing factor was the poor repayment performance exhibited by the private loans. In the meantime, the rates applied on savings and time deposits remained relatively unchanged during the two years (Bank of Uganda Annual Report 2000, 2001).Given the concerns over the continued high levels of net interest margins in Zambia and the associated wide spreads between lending and deposit rates, this study seeks to identify the underlying reasons and rationale which motivate the commercial banks in the management

of their income and expense streams, particularly with regard to interest rate management. The analysis was conducted on a consolidated basis such that data from the banking industry as a whole was utilised for the review period.

The paper is arranged as follows: Section II draws upon the literature to identify the determinants of interest rate management. Section III undertakes a comparative analysis of the net interest margins in Zambia and the identified countries while Section IV discusses specific factors that have impacted on the Zambian banking industry. Section V concludes the discussion by outlining policy considerations.

2.0 Interest Rate Management

A key feature that prevails in the aspects of liquidity, solvency and profitability for the banks is their interest rate policy. Considering that the role of the banks is basically that of a middleman between lenders and borrowers, one may be tempted to think that the principal task of establishing the 'interest rate spread' is straightforward. However, competitive pressures and the basic service character of the banking business tend to erode the importance of the spread in daily decisions (Herrick, 1978).Banks manage the interest rate spread by choosing among a variety of securities and loans and matching the interest rates of these assets with various deposits and debentures.

The two key issues, which bear strongly on the management of the interest rate spread, are whether the bank prices its loans on the basis of its incremental cost of funds and how the bank matches the maturities of its interest earning assets and interest bearing liabilities (*ibid*).Pricing on the basis of incremental costs occurs when a bank is certain that each additional loan has a sufficient spread to cover all of the interest costs related to obtaining the matching funds for the loan. The spread therefore remains steady throughout changes in market interest rates. Meanwhile, a bank holding the overall sensitivities of its assets and liabilities in balance is in a position to respond to changes in market interest rates so that the changes in these interest rates are fully passed along to clients.

The position of the bank is then neutral to changes in interest rates and the bank neither benefits nor is it penalised by interest rate changes.In reality, most banks do not balance the interest rate sensitivities of their assets and liabilities. They act on incompletely hedged forecasts of future interest rates and thus carry potential risks and rewards. If the yield curve is positive, earnings are enhanced as banks generally borrow at lower rates and shorter maturities while lending at higher rates and longer maturities. A negative yield curve implies potential losses.The slope of the yield curve also has significant influence on the banks' net interest income. A very steep and positive yield curve for a sustained period implies that net interest margins are likely to be higher.

This is on account of a re-pricing of the assets and liabilities resulting in higher rates being applicable to the assets relative to those applicable to the liabilities (English, 2002). Again a steep negative yield curve would bear the opposite consequences.In a paper discussing the results of a survey undertaken by the Bank of Zambia with regard to the determination of lending rates, the commercial banks identified five specific factors. The factors identified were the yield rates on Government securities, the level of statutory reserve requirements, inflation, default risks on loans obtained and policy credibility (Chembe, 2004). While the survey's focus was on high lending interest rates prevalent in Zambia, the paper's comparative analysis of four countries during the period 1995 to 2002 showed a positive relationship between the level of lending rates and the magnitude of interest rate spreads.

Furthermore, with specific reference to Zambia, the paper noted that beginning the mid-1990's, the lending rates begun to rise while the deposit and savings rates remained low. On the basis of the foregoing, it can be presumed that the factors that cause high lending rates by the commercial banks also contribute to the existence of wide spreads between lending and deposit rates and thus relatively high net interest margins.

Having earlier noted that net interest margins are effectively a representation of net interest income/expense flows, the identified factors should therefore be evaluated on the basis of their capacity to impact on the said net income/expense flows.

The role of government security yield rates as a baseline consideration for the commercial banks' lending rates impacts on their income flows. Assuming that government security yield rates can easily be projected given the availability of information derived from the fiscal budget, commercial banks are then able to determine their expected or desired income flows for the forthcoming period on the basis of available funds. It must be noted that lending to the Government is a 'risk free' venture.

The commercial banks thus impose premiums on loans to non-government entities as determined by the potential risks associated with failure of recovery. Obviously, the desired income flows should have a considerable bearing on the premiums applied to non-government loans.The imposition of statutory reserve requirements is considered in the context of being an expense item by the commercial banks. It must be noted that whereas the deposit or savings account will bear interest costs on the whole 100% funding, the amount extended as loans is less than 100%.

In other words, the commercial banks are unable to obtain interest earnings on the equivalent of a 100% deposit. However, the interest rates applied on the loans advanced are such that the interest income flows are analogous to a 100% loan. As a result, the level of statutory reserve requirements could have a fundamental bearing on the interest rate spread and subsequent net interest margins.With regard to inflation, its role in interest rate management is drawn from its ability to erode the value of financial assets and liabilities over time. Keeping in mind that an asset entitles an entity to future benefits (interest income) while a liability imposes future obligations (interest expense), high lending rates and low savings/deposit rates ensure that the commercial banks shield their net income flows from the effects of inflation over time. Inflation thus impacts on both the income and expense sides of the commercial banks.

The failure by a commercial bank to recover monies lent to borrowers will eventually erode its capital base. The preservation or growth of the capital base arises from income flows. Based on experience and expectations, a commercial bank may determine the value of loans that are at risk of default. The interest rate applied on loans to borrowers thus includes a premium for potential defaults as a means of preserving its capital base. In general, the overall business conditions, income and cost considerations are likely to have an impact on the overall interest spread of the banking sector.

Additionally, the legal framework and its ability to resolve financial disputes within efficient timeframes has an impact on the costs of the banking sector and thus on the interest rate spread (Demirguc-Kunt *et al,* 2003). In most cases, commercial banks utilise some form of financial models that capture bank behaviour and thus guide the bankers in their decision making. The basic idea is to give the bankers a means of handling numerous, subtle and simultaneous interactions amongst their balance sheet items while ensuring that their traditional concerns for liquidity, solvency and profits are not ignored (Luckett, 1980).

The next section provided a comparative analysis of the factors discussed above as they pertain to Zambia, Uganda, Kenya and South Africa.

3.0 Comparative Analysis: The Reasons

On the basis of the reasons advanced by the commercial banks as regards the relatively higher net interest margins in Zambia, the expectation is that the results for Zambia in respect of government security yield rates, statutory reserve requirements, inflation and non-performing loans should reflect higher values in comparison to those for the other countries. The tools of analysis in this regard are very simple as the results are presented in tabular form in order to make comparisons as to whether the commercial banks' contentions hold. The results are outlined below.

Table 2: Annual Average Government Security Rates (%)

	1999	2000	2001	2002	2003	**Average**
Zambia	48	42	53	44	36	**45**
Uganda	12	13	12	10	21	**14**
Kenya	13	14	13	12	10	**12**
South Africa	12	12	10	12	10	**11**

Source: Calculated by the author from various central banks' annual reports

Table 2 presents the yield rates for 12 month government securities for Zambia, Uganda and Kenya. However, the average Reserve Bank's annual accommodation rates were utilised for South Africa due to an inability to obtain 12 month government security rates.

As is evidenced from the data in Table 2, Zambia recorded the highest level of yield rates as compared to the other countries during the period 1999 to 2003. The higher yields were attained on individual annual basis as well as for the period average. Furthermore, the 1999 2003 trend movement of the yield rates was such that whereas for Zambia the changes from one to the next were frequent and significant, the other countries results reflected relatively steady states of affairs, with the exception of Uganda in 2003. The significant jump in yield rates for Uganda in 2003 was attributed to the task of managing excess liquidity that arose from donor-funded government expenditure to support poverty reduction.

In light of the results, the commercial banks' argument that the relatively higher government security rates in Zambia induce them to apply higher lending to non-government borrowers is supported. As stated earlier, loans to the government are 'risk free' and from an income perspective represent guaranteed flows. Non-government loans are not risk free and thus the application of the premium to account for potential losses.

Table 3: Inflation Rates (%age)

	1999	2000	2001	2002	2003	**Average**
Zambia	21	30	19	27	17	**23**
Uganda	10	4	(5)	6	6	**4**
Kenya	9	10	1	4	8	**6**
South Africa	5	5	6	9	6	**6**

Source: Calculated by the author from various central banks' annual reports

Table 3 presents the inflation rates. Zambia consistently recorded higher inflation rates than those pertaining in the other countries which on average had single digit rates. In the same manner with government security rates, the magnitude of the changes in the inflation rates for Zambia were quite significant compared to those in the other three countries. The results thus support not only the existence of higher commercial banks' lending rates but also the prevalence of lower deposit rates; the key reason being to preserve the value of their net interest margins over time.

Table 4: Statutory Reserve Requirements (%) during most of the year

	1999	2000	2001	2002	2003	**Average**
Zambia	8.0	8.0	10.0	15.0	17.5	**11.7**
Uganda	12.0	10.0	10.0	10.0	6.0	**9.6**
Kenya	8.5	8.5	9.5	9.5	9.5	**9.1**
South Africa	2.5	2.5	2.5	2.5	2.5	**2.5**

Source: Calculated by the author from various central banks' annual reports

Table 4 presents the comparative statutory reserve requirements for the four countries.

The findings for statutory reserves requirements were contradictory and inconclusive. The contradiction arose on account of the observed trend for the mentioned factors against the trend for the net interest margins. The inconclusiveness arose from the comparative examination. While the net interest margins for the Zambian commercial banks reflected a declining trend from 1999 to 2003, the statutory reserve requirements actually reflected a rising trend. Secondly, on a comparative basis for the years 1999 and 2000, the commercial banks in Zambia incurred lower statutory reserve requirements than for those in Kenya before being equal in 2001. Despite this fact, the commercial banks in Zambia still attained higher net interest margins during the three-year period.If the argument by the commercial banks that, statutory reserve requirements have a significant influence on net interest margins is to be followed keenly, then the expectation would be that net interest margins should have tracked the rising trend of statutory reserve requirements. Furthermore, for the period 1999 to 2001, the net interest margins attained by the commercial banks in Zambia should have been less than those attained in Kenya.

In light of the results, the argument advanced by the commercial banks that statutory reserve requirements have a fundamental bearing on the higher lending rates and subsequent net interest margins is debatable.

Table 5: Non-Performing Loans to Total Loans (%)

	1999	2000	2001	2002	2003	**Average**
Zambia	11	27	24	11	5	**16**
Uganda	34	38	30	30	26	**32**
Kenya	17	11	16	11	n/a	**14**
South Africa	5	4	3	3	2	**4**

Source: Calculated by the author from various central banks' annual reports

Table 5 presents the ratio of non-performing loans to total loans for the four countries.

The ratio of non-performing loans to total loans generally rose during the period of 1999 to 2001 for the commercial banks in Zambia. During the same period, net interest margins generally declined as evidenced in Table 1. Again, in comparison to the ratio attained by the commercial banks in Kenya, it was noted that through out the period of 1999 to 2003 the non-performing ratio was lower in Zambia. The evidence in respect of non-performing loans was thus contradictory for the period 1999 to 2001 and inconclusive for the whole period, given the higher level of non-performing loans ratio attained in Kenya compared to that attained in Zambia. The fact that net interest margins reflected higher levels in Zambia compared to those in Kenya despite the level of non-performing loans (1999 2003) and statutory reserve requirements (1999 2000) being higher for the commercial banks in Kenya could imply a degree of inefficiencies in the intermediation processes in Zambia.

From the foregoing, the factors most likely to be responsible for higher net interest margins by the commercial banks in Zambia are government security yield rates and inflation. While these factors may provide the reasons for the existence of high net interest margins in Zambia, their existence has to be rationalised by managing the associated financial flows and stocks.

In the next section, the study therefore utilises financial analysis tools to identify the manner in which the commercial banks manage profit and loss items as well as their balance sheets in order to underscore the causes for high net interest margins.

4.0 Financial Analysis: The Rationale

Net interest margins are basically dictated by the interest rate management policies of individual commercial banks. As stated earlier, commercial banks handle several transactions in their balance sheets while ensuring that their concerns for liquidity, solvency and profits are not ignored. In other words, the management of assets and liabilities by the commercial banks entails the existence of net interest margins at desired levels. It must be recalled that the primary business of commercial banks is that of linking lenders and borrowers. The intermediary role played by the commercial banks enables them to attain the net interest margin. In that regard, this section will show that the high net interest margins attained by the commercial banks in Zambia are a deliberate and resolute objective set by their management, directors and shareholders.The results from the examination of the consolidated financial statements for the commercial banks in Zambia are provided below.

Table 6: Structure of Income (% of total income)

	1999	2000	2001	2002	2003	**Average**
Interest Income	64	59	70	66	66	**65**
Non-interest Income	36	41	30	34	34	**35**

Source: Calculated by the author from BOZ's annual reports

Table 7: Structure of Expenses (% of total expenses)

	1999	2000	2001	2002	2003	**Average**
Interest	30	29	32	28	28	**29**
Expenses	70	71	68	72	72	**71**

Source: Calculated by the author from BOZ's annual reports

Tables 6 and 7 basically provide evidence of the management of the high net interest inflows. While the interest income for the period averaged 65% of total income, interest expenses averaged a mere 29% of total expenses. Furthermore, an analysis of the interest expenses as a proportion of interest income reveals that on average this amounted to 31%; meaning that the difference between interest income flows and interest expense flows averaged 69% for the 5-year period.

The picture is magnified even more when the absolute expenditures are assessed as a proportion of absolute income. On average, interest expenses were 20% of the total income while the non-interest expenses were 49% of the total income; leaving 31% of the net income inflows to constitute net profits. The evidence thus pinpoints a critical issue which the commercial banks tend not to discuss while presenting the usual argument that the sustained high net interest margins are utilised to meet the high operating costs which include Bank of Zambia penalties, telecommunications, technology and taxation (Ndhlovu, 2004). The issue that is not explicated is that the wide net interest margins assist in attaining the profit objectives of the commercial banks.

In addition, the issue of penalties as a major cost element should not be a primary issue. Penalties are applicable only when individual commercial banks breach set rules and/or regulations.

As a crude measure, the net interest flows of 69% were in excess of the average inflation for the period (23%) by 46%. This implies that 46% of the *real* net interest flows were utilised to meet operational expenses associated with intermediation as well as the profit objective.

Non-interest expenses include salaries and employee benefits, occupancy expenses, equipment expenses, depreciation, education and training, audit, legal and professional fees, insurance, frauds and forgeries and the all-encompassing 'all other expenses'. However, most of the non-interest expenses appear to have been substantially controlled as they tended to be insignificant. Salaries and employee benefits, and all other expenses were the costs that showed a level of significance.

Table 8 below shows that salaries & employee benefits and all other expenses dominated in terms of non-interest expenses. Together, they were in excess of 50% of total expenses from 1999 to 2002 before dropping to 40% in 2003.

Table 8: Major Components of Non-Interest Expenses (% of total expenses)

	1999	2000	2001	2002	2003	**Average**
Salaries	28	29	30	32	23	**28**
All Other[2]	22	25	22	24	17	**22**

Source: Calculated by the author from BOZ's annual reports

In order to assess the management of the net interest margins by the commercial banks, the predominant sources of interest income and interest expenses are shown in tables 9 and 10 below.

[2]All Other encompasses non-interest expenses which are not itemized on the standard income statement such as advertising costs, travel costs, supervisory fees and motor vehicle maintenance costs.

Table 9: Structure of Interest Income (% of total interest income)

	1999	2000	2001	2002	2003	**Average**
Government Securities	19	30	38	47	55	**38**
Loans and Overdrafts	71	59	52	44	38	**53**
Leases	1	1	1	1	2	**1**
Balances with financial institutions	7	8	6	5	3	**6**

Source: Calculated by the author from BOZ's annual reports

Table 10: Structure of Interest Expenses (% of total interest expenses)

	1999	2000	2001	2002	2003	**Average**
Demand Deposits	47	37	16	11	11	**24**
Savings Deposits	5	12	20	18	16	**14**
Time Deposits	25	31	42	40	37	**35**
All Other Interest expenses	17	11	14	22	24	**18**

Source: Calculated by the author from BOZ's annual reports

Table 9 shows that interest income from government securities and loans and overdrafts have on average been accountable for approximately 90% of total interest income. Meanwhile Table 10 shows that interest expenses from the three deposits averaged 74% of total interest expenses while showing a declining trend from 78% in 1999 to 64% in 2003. Furthermore, Table 10 shows that the proportion of interest expenses on demand deposits declined as a proportion of total interest expenses to a period average of 24% while the proportion of interest expenses on time deposits increased to a period average of 35%. This occurred despite the average proportion of demand and time deposits to total liabilities being 50% and 10%, respectively (Table 12).

Other than investing the deposits in loans and advances commercial banks apply administrative charges on maintenance of deposit accounts as an additional means of income generation. Such charges sometimes exceed the interest paid on the deposit in these accounts. A number of commercial banks have imposed charges or fees for the maintenance of accounts to the extent that where minimal balances are maintained the income raised by the commercial banks actually exceeds the interest paid on the deposits.

Tables 9 and 10 thus reveal the manner in which the commercial banks ensure that they maintain high net interest margins as a means of ensuring profitability and solvency. Liquidity, however, is generally ensured through asset and liability management. Tables 11 and 12 highlight the liquidity perspective in greater context than the previous tables.

Table 11: Structure of Assets end of year (% of total assets)

	1999	2000	2001	2002	2003	**Average**
Government securities	12	10	18	22	26	**18**
Net Loans and Leases	36	33	28	19	23	**28**
Balances: FIs abroad	27	31	25	26	19	**26**
Balances: BOZ	7	9	11	13	13	**11**

Source: Calculated by the author from BOZ's annual reports

Table 12: Structure of Liabilities end of year (% of total liabilities)

	1999	2000	2001	2002	2003	**Average**
Demand Deposits	48	53	49	50	51	**50**
Savings Deposits	9	10	10	10	12	**10**
Time Deposits	11	9	10	10	10	**10**
Other Liabilities	10	9	12	11	11	**11**

Source: Calculated by the author from BOZ's annual reports

The relationship of the two tables vis-à-vis the liquidity perspective as required in the commercial banks' financial models is dictated by the dominance of demand deposits with a period average of 50% as a proportion of total liabilities. Given the potential liquidity risk associated with demand deposits a mitigating feature the consolidated commercial banks' balance sheets has been the rising trend in holding of government securities and balances at Bank of Zambia over the 5-year period.

Apart from the ease with which government securities and term deposits can be liquidated with the Bank of Zambia and within the interbank market (term deposits can only be liquidated within the interbank market), the yields on government securities have also proved to be attractive.

However, with regard to the period average figures, net loans and leases as well as balances with financial institutions abroad have dominated with end of year holdings at 28% and 26% of total assets, respectively. The illiquidity nature of loans and leases has been compensated by the higher lending rates applied on these asset types compared to those on government securities and advances to the Bank of Zambia. Meanwhile the balances abroad were compensated by the persistent depreciations during the review period. The compensation, though unrealised, was generated by holding foreign assets whose values would increase as the local currency depreciated. For instance, in 2002 and 2003 unrealised trading gains from foreign exchange holdings amounted to K10.1 billion and K21.2 billion, respectively.

With regard to the liabilities, it must be noted that while demand deposits have dominated as a proportion of total liabilities during the period, the interest expenses on these liabilities have declined as a proportion of total interest expenses from 47% in 1999 to 11% in 2003 (Table 10). This in itself provides evidence of the commercial banks' hand in ensuring that net interest margins are maintained at the noted high levels. As earlier stated, the imposition of maintenance fees of deposits by the commercial banks has effectively reduced the cost element on deposits further. Tables 11 and 12 thus provide evidence of the manner in which the commercial banks have shifted their assets and liabilities as a means of sustaining high net interest margins over the years.Before concluding the matter, it is important to undertake a synopsis of the income and expenses structures for the commercial banks in the other three countries. The results are tabulated below:

Uganda

Table 13: Structure of Income (% of total income)

	1999	2000	2001	2002	2003	**Average**
Interest Income	66	70	69	64	n/a	**54**
Non-interest Income	34	30	31	36	n/a	**26**

Source: Calculated by the author from BOU's annual reports

Table 14: Structure of Expenses (% of total expenses)

	1999	2000	2001	2002	2003	**Average**
Interest Expenses	28	23	21	14	n/a	**17**
	72	77	79	86	n/a	**63**

Source: Calculated by the author from BOU's annual reports

Table 15: Major Components of Non-Interest Expenses (% of total expenses)

	1999	2000	2001	2002	2003	**Average**
Salaries	28	29	27	33	n/a	**23**
All Other	23	40	43	52	n/a	**32**

Source: Calculated by the author from BOU's annual reports

Kenya

Table 16: Structure of Income (% of total income)

	1999	2000	2001	2002	2003	**Average**
Interest Income	76	72	70	66	61	**69**
	24	28	31	34	39	**31**

Source: Calculated by the author from CBK's annual reports

Table 17: Structure of Expenses (% of total expenses)

	1999	2000	2001	2002	2003	**Average**
Interest Expenses	30	30	32	23	17	**26**
	70	70	68	77	83	**74**

Source: Calculated by the author from CBK's annual reports

Table 18: Major Components of Non-Interest Expenses (% of total expenses)

	1999	2000	2001	2002	2003	**Average**
Salaries	21	24	26	28	30	**26**
All Other	25	25	28	30	36	**29**

Source: Calculated by the author from CBK's annual reports

South Africa

Table 19: Structure of Income (% of total income)

	1999	2000	2001	2002	2003	**Average**
Interest Income	82	79	77	81	77	**79**
	18	21	23	19	23	**21**

Source: Calculated by the author from SARB's annual reports

Table 20: Structure of Expenses (% of total expenses)

	1999	2000	2001	2002	2003	**Average**
Interest Expenses	71	66	64	70	69	**68**
	29	34	36	30	31	**32**

Source: Calculated by the author from SARB's annual reports

Table 21: Major Components of Non-Interest Expenses (% of total expenses)

	1999	2000	2001	2002	2003	**Average**
Salaries	15	16	17	14	15	**15**
All Other	12	14	15	13	13	**13**

Source: Calculated by the author from SARB's annual reports

The average results for the commercial banks' structures of income and expenses in the three countries reveal the following:

- the interest income for the commercial banks in Uganda is proportionally greater than the non-interest income. Meanwhile, the interest expense is proportionally less than the non-interest expenses;
- the interest income for the commercial banks in Kenya is proportionally greater than the non-interest income. Meanwhile, the interest expense is proportionally less than the non-interest expenses; and
- the interest income for the commercial banks in South Africa is proportionally greater than the non-interest income. However unlike the other countries, the interest expense is proportionally greater than the non-interest expenses.

In summary, while the commercial banks in Uganda and Kenya exhibit the same tendencies with regard to the management of net interest margins, the commercial banks in South Africa present a scenario which explains their relatively lower net interest margins.

Comparatively, the average net interest margin for the South African commercial banks was 11 percentage points lower than the average for the Zambian commercial banks while for Kenya and Uganda, the net interest margins were 6 and 2 percentage points lower, respectively.

It must also be noted that the factors identified by the Zambian commercial banks as being key determinants for the lending rates and associated net interest margins exhibited lower levels in South Africa compared to the other three countries. Furthermore, whereas Zambia,

Kenya and Uganda reflected a relative dominance of salaries and other operational expenses as components of non-interest expenses respectively amounting to 50%, 55% and 55% on average, in South Africa, the two components added up to a mere 28% .

A key consideration with regard to the level of net interest margins in South Africa is also obtained from the 2003 financial results for Standard Bank of South Africa Limited, wherein it is stated that the performance of their domestic business is particularly sensitive to net interest margins. Furthermore, the interim results for 2004 pointed out that a 535 basis point reduction in the average prime interest rate resulted in substantially lower interest being earned on shareholders' funds, and reduced interest margins on transactional deposits such as current account credit balances. What is immediately inferred from the Standard Bank 2003 annual statement and the 2004 interim statement is that the level of interest rates by individual commercial banks in South Africa is a competitive tool to obtain deposits and to provide loans. A reduction in the prime interest rate thus results in lower lending rates but not necessarily deposit rates and thus the reduced interest margins obtained in the first half of 2004.

In terms of future prospects, the annual results noted that sound economic fundamentals together with low inflation and lower interest rates in South Africa were expected to support further growth in credit demand, although at a lower rate than that experienced in 2003. The interim statement also stated that reduced cost growth in a lower inflationary environment should also provide further assistance in maintaining domestic financial performance.

The average structure of expenses showed that whereas South Africa reflected proportionally lower non-interest expenses (32%), Kenya (74%), Zambia (71%) and Uganda (63%) reflected proportionally higher levels. Furthermore, the movements for Kenya and Uganda reflected rising trends for non-interest expenses, South Africa reflected a declining trend particularly from 2001 while Zambia reflected a somewhat steady state with marginal changes on a year by year basis. With specific regard to the net income inflows which constitute net profits, it must be noted that the commercial banks in Zambia attained the highest average income level of 31% while the commercial banks in other countries attained average profit levels as follows: Kenya 9%; South Africa 13%; and Uganda 27%.

The comparative cost analysis therefore implies that there is capacity for the commercial banks in Zambia to reduce their net interest margins by lowering their lending rates. In essence, the evidence from the financial analysis shows that the commercial banks in Zambia have implemented credit rationing by limiting the potential number of borrowers through high lending interest rates. At the same time, they have limited the potential number of savers through the imposition of very high minimum savings balances, very low savings interest rates and the imposition of maintenance fees on all deposits. All this has been done to ensure that the profit levels for the commercial banks in Zambia are maintained at levels in excess of those obtaining for the commercial banks in the neighbouring countries.

5.0 Conclusion

While the commercial banks in Zambia assert that inflation, statutory reserve requirements, non-performing loans, and government securities yield rates determine their lending rates and by implication the wide net interest margins, the comparative results indicate that inflation and government security rates appear to have a significant influence while statutory reserve requirements and non-performing loans provide inconclusive results.

The role of the regulatory authorities is also of critical significance. The regulators need to

undertake a critical self assessment as regards the impact of statutory reserve requirements, government security yield rates and inflation on the level of interest rates. The results of the self assessment should provide the basis for the relevant polices which would assist in creating an appropriate environment for reduced net interest margins. However, it must be noted that any form of policy change would have to be conducted within an environment that requires a balancing act between lower interest rates and the fight against inflation. Furthermore, while various statutes are in place to ensure the resolution of financial disputes, the protracted time in which the courts of law resolve the cases results in the erosion of the financial variable's value. The general perception is therefore that the legal framework does not support the resolution of financial disputes or crimes within reasonable timeframes. There is therefore need to establish a framework of resolving financial and other corporate disputes within an appropriate time frame which essentially recognises the potential costs associated with delayed resolutions.

In conclusion, it is recognised that the perception of an unstable economic environment is one of the primary causes of high net interest margins as the commercial banks utilise the high net interest margins to capture the potential risks that exist in the economic environment. However, it is also a matter of reality that an environment of high net interest margins creates a significant gap with respect to credit risk management given that the high lending rates only encourage borrowers with significantly high risk and high return projects to obtain funds from the commercial banks. Meanwhile, low risk projects are not considered as potential borrowers due to their low returns.

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An Empirical Investigation of the Determinants of Lending Rates in Zambia

By

Peter Zgambo

Abstract

In this paper, the determinants of lending rates in Zambia in the post financial sector reforms period (1992 to 2003) are investigated using cointegration techniques in a multivariate framework. Empirical findings indicate the presence of long-run cointegrating relationships between the lending rate, money supply, expected inflation, domestic debt, expected domestic currency depreciation or appreciation and foreign interest rates. Furthermore, empirical evidence shows that domestic and external factors influence the determination of lending rates in Zambia following financial sector reforms. Policy prescriptions arising from the results include the need to create a stable macroeconomic environment reflected in low and stable inflation rates and the pursuit of consistent and credible economic policies by the Government in order to reduce lending rates in both nominal and real terms.

1. Introduction

There is reason to believe that the implementation of financial sectors reforms in Zambia in the early 1990s significantly altered the determination of interest rates in the economy. This is because financial sector reforms, among other objectives, are aimed at liberalising interest rates in order to make them market determined. In this regard, financial sector reforms place the market mechanism at the centre of interest rate determination, in sharp contrast to the pre-reform period of 1965 to 1991 when interest rates were set administratively and tended to remain fixed for long periods of time. Although the literature on interest rate determination in developing countries following financial sector reforms is characterised by a dearth, a few studies that have been done on the subject indicate that domestic and external factors such as domestic monetary conditions, inflation, Government expenditure, the expected domestic currency depreciation or appreciation and foreign interest rates influence the determination of interest rates (Edwards *et al*., 1985, Gochoco 1991, Ngugi *et al*., 1998, Patnaik *et al*., 1998, Dua *et al*., 2001).

In the Zambian case, however, it is noteworthy that although more than a decade has elapsed since the implementation of financial sector reforms, no empirical study has been undertaken to investigate the determinants of interest rates. Meanwhile, the post-financial reform period in Zambia has been characterised by high lending rates (nominal and real) and negative real savings rates, thereby raising the question as to what factors have dominated the determination of interest rates in the economy.

The purpose of this paper is to investigate and analyse the factors that have dominated the determination of interest rates following the liberalisation of the financial sector in Zambia. Although economic literature treats the interest rate as a single rate that applies throughout the economy, a multiplicity of interest rates exists in practice. In this paper, the analysis of interest rate determination is limited to the banks' lending rates given the vital role lending

rates play in the promotion of investment and economic growth. However, it should be noted that the paper's focus on lending rates does not mean that deposit rates are less important since they play a critical role in the mobilisation of domestic financial resources, which in turn are channeled to productive sectors of the economy. Rather, the paper's focus on lending rates is motivated by the high lending rates prevailing in Zambia, which have provoked debate among policy makers and private sector agents concerned with the pace of economic growth and development. In this regard, it has been observed that the high lending rates prevailing in the economy are nowhere near levels that can be considered as conducive for investment and economic growth (Chembe 2004, Muhanga 2003).

The paper is organised as follows. Section 2 provides a review of developments in interest rates in Zambia in the pre- and post-financial sector reforms periods. A review of theoretical and empirical literature on the determinants of interest rates is contained in Section 3. An outline of the conceptual framework of the interest rate model used to investigate the determinants of interest rates, including the relevance of the theoretical model to the Zambian situation is also addressed in Section 3. Section 4 presents and discusses the econometric methodology, model estimation and the empirical evidence on the determinants of lending rates in Zambia. The conclusion is contained in Section 5.

2. Developments in Interest Rates in Zambia: Pre and Post-Financial Sector Reforms Period

The financial landscape of the Zambian economy in the 1970s through to the 1980s was shaped by an economic strategy adopted in 1968[1]. At the core of this strategy was state-led import substitution industrialisation and extensive Government controls over resource allocation (Brownbridge, 1996). On the financial front, the strategy was aimed at according the Government greater control over the financial sector in order to influence the allocation of credit in the economy. The Government exercised controls over the allocation of financial resources through interest rate and foreign exchange controls.

However, controls on interest rates in Zambia can be traced to the mid-1960s, when the Bank of Zambia (BOZ) controlled commercial banks deposit and lending rates. These controls were motivated by the Bank's policy of keeping borrowing costs at low levels and ensuring that indigenous Zambian entrepreneurs had access to cheaper credit (Brownbridge, 1996). The Mulungushi Declaration, therefore, strengthened the central bank's control over interest rates for the next two decades, with the commercial banks deposit rates being kept within the range of 3.5% to 8.5% and lending rates remaining within the range of 7% to 13% until 1984 (Musokotwane, 1987).

In the 1970s and early 1980s, the economy was characterised by a relatively low rate of inflation and hence interest rates were rarely adjusted. However, from the mid-1980s inflation started to gather pace, prompting authorities to adjust nominal interest rates upwards. Apart from rising inflation, the increase in interest rates was also necessitated by the Government's decision to adopt and implement an IMF supported economic stabilisation program. In line with the stabilisation program, administered interest rates were adjusted upwards and decontrolled in 1985, the same year in which the Treasury bill auction was introduced. These measures resulted in a sharp increase in lending rates,

[1]In 1968, the Government announced an economic program aimed at putting the state at the center of all economic activities. This program was motivated by the need to accelerate economic development and entailed the establishment of state owned enterprises and the nationalization of a number of privately owned financial and non-financial companies. The economic strategy was contained in the Mulungushi Declaration.

which almost doubled to 30% by the end of 1986 from 15% at the beginning of 1985. Deposit rates also rose to 22.7% from 10% over the same period. Despite the increase in nominal interest rates, they still remained negative in real terms as inflation continued to accelerate.

In May 1987, the Government abandoned the IMF-supported stabilisation program and re-introduced controls on interest rates. However, the economic program put in place by the Government, which emphasised "growth from own resources", was destined to failure given adverse internal and external conditions prevailing at the time of its implementation. In 1989, the Government abandoned the home grown economic program and adopted a new International Monetary Fund (IMF) supported economic recovery program. Interest rates were raised though administrative controls remained. The complete removal of controls on interest rates did not materialise until September 1992 following the ascendance to power of a new Government in November 1991.

The implementation of a comprehensive package of financial sector reforms in Zambia has not yet resulted in the realisation of the full benefits of such reforms in the economy. This situation is not unique to Zambia, and is reflected in a growing body of literature that includes some scepticism about the efficacy of financial sector reforms in developing countries. In this regard, several authors have noted that financial sector reforms have not always brought about the expected benefits and that the experiences of many developing countries with financial sector reforms have been disappointing (Gochoco 1991, Cobbina 1999, Mwega 2002). In particular, it has been argued that the period following financial sector reforms has been characterised by "sharp increases in interest rates, widespread bankruptcies of financial institutions, worsening inflation, widening external deficits and unstable exchange rates" (Alawode *et al*., 2001). In addition, it has been noted that financial sector reforms have brought about few innovations in financial markets, competition has been limited by oligopoly, and there are doubts as to whether higher real interest rates encourage financial savings, and thus deepen the financial system (Chandavarkar 1992, Brownbridge *et al*., 1999). Moreover, it is argued that financial sector reforms may lead to financial crises if they are not preceded by macroeconomic stabilisation and prudential reforms (Alawode *et al*., 1997, McKinnon 1988).

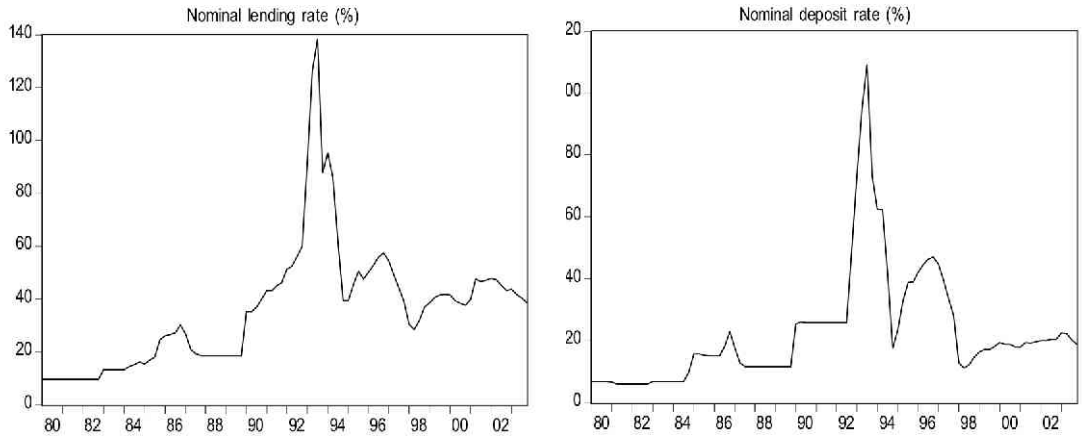
Certainly, the period following financial sector reforms in Zambia has been characterised by high interest rates, high and volatile inflation and a precipitous depreciation of the exchange rate. For instance, the banks' nominal deposit and lending rates rose from 25% and 55% at the close of 1992 to 110% and 140%, respectively at the end of 1993 (Brownbridge, 1996). Furthermore, the exchange rate weakened by 160% while inflation rose to 193% from 93% over the same period. The financial sector in Zambia also experienced some bankruptcies of financial institutions, reflected in the closure of a number of banks in the aftermath of financial sector reforms.

Interest rate developments in the aftermath of financial sector reforms were influenced by the re-introduction of Treasury bill auctions in 1993, which marked the beginning of the move toward market-determined interest rates. However, given the prevailing unstable macroeconomic environment, the short-term effects of interest rate liberalisation may be considered as having been counter-productive as "interest charges on Government debt rose by 25% in real terms as compound interest rates on 91-day bills rose from 64% in December 1992 to 260% in March 1993, reaching a maximum of 347% in July 1993" (Adam, 1995). The effect of this sharp increase in Treasury bill rates was to push up bank deposit and lending rates, with the savings rate rising to over 90% from 25% while lending rates rose to over 130% from 51% between June 1992 and June 1993 (*opt cit*). In the second half of the 1990s, some reductions in nominal interest rates were recorded although the banks' average

lending rate has remained significantly higher for the larger part of the reform period while deposits rates have been set rather too low.

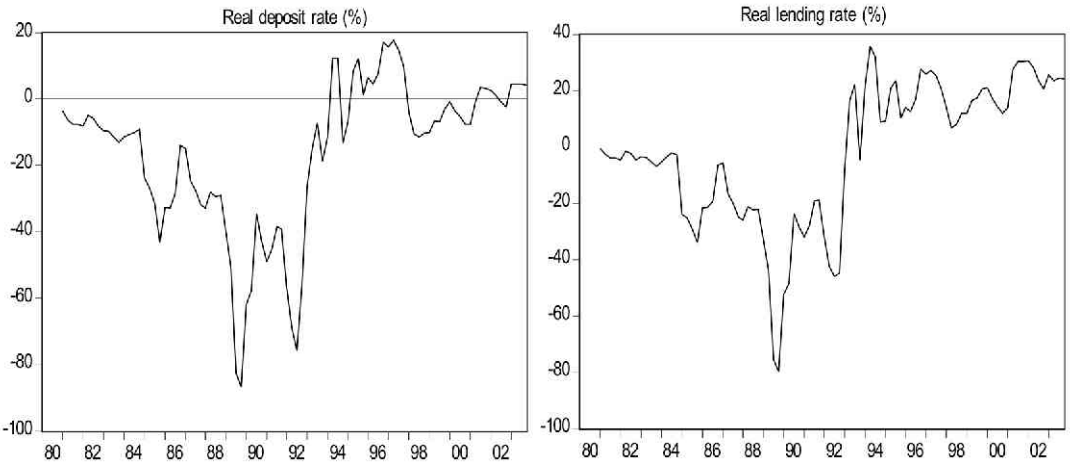
On the whole, it is worth mentioning that between 1992 and 2003, the nominal deposit and lending rates averaged 33.4% and 53.1%, respectively compared to an average of 14.1% and 22% over the 1982 to 1991 period. In real terms, the average for the lending rate was 12.8% while the average for the deposit rate was negative 6.8% between 1992 and 2003. In this regard, deposit rates that are significantly negative in real terms, as has been the case in Zambia, are an impediment to the mobilisation of domestic financial resources while high real lending rates, though they may promote investments in projects with high real returns, equally impede the allocation of financial resources to productive investment of the economy as very few businesses can afford to service loans borrowed at high interest rates (see Figures 1 and 2).

Figure 1: Nominal weighted average lending and deposit rates



Source: Bank of Zambia

Figure 2: Real Deposit and Lending rates



Source: Bank of Zambia, IFS and own calculations

A number of reasons have been advanced in an attempt to explain the interest rate scenario in Zambia, especially with regard to high lending rates.[2] In summary, the reasons include an unstable macroeconomic environment reflected in high and volatile inflation rates, high levels of Government borrowing through issuances of Treasury bills and bonds, the depreciation of the exchange rate (see Appendix A), high levels of currency substitution (dollarisation) and weak policy credibility.

Although a host of reasons have been advanced in an attempt to explain the causes of high lending rates in Zambia, it is important to mention that no empirical analysis of the factors identified has been undertaken hitherto to support the conclusions derived from these hypotheses. This study, therefore, is motivated by the need for an empirical investigation of the determinants of lending rates in Zambia. In doing so, the study endeavors to establish how the interaction between domestic and external factors affect the determination of lending rates and to isolate the factors that have dominated interest rate determination in the post financial sector reform period.

3.0 Determinants of Interest Rates - An Overview of Theoretical and Empirical Literature

3.1 Review of Theoretical Literature

Traditional theories of interest rates can be classified into Classical, Keynesian and Monetarist. The classical theories include the Fisher relationship. Fisher (1930) postulated that the nominal interest rate in any period is equal to the sum of the real interest rate and expected inflation. Fisher claimed a one-to-one relationship between nominal interest rates and expected inflation. This claim is based on the assumption that real interest rates are unrelated to expected inflation and determined entirely by real factors in the economy, such as the productivity of capital and investor time preference. Thus, high inflationary expectations are instantaneously reflected in high nominal interest rates. In this framework, the link between inflation and nominal interest rates stems from the notion that an increase in prices raises the nominal value of domestic trade, which in turn leads to an increase in the demand for money and nominal interest rates (Ngugi *et al*., 1998).

In Keynesian and monetarist frameworks, monetary policy, through its influence on money supply, is considered to play a crucial role in the determination of interest rates. In the Keynesian framework, an inverse relationship between money supply and nominal interest rates is hypothesised. For instance, the central bank's open market operations involving purchases of Government bonds may result in increased bond prices and a subsequent reduction in interest rates while bond sales may lead to a fall in bond prices and an increase in interest rates. Hence, in the Keynesian analysis, an expansion in money supply results in a reduction in nominal interest rates while a contraction in money supply leads to an increase in nominal interest rates (Keynes, 1936). However, in the monetarist framework, the nature of the relationship between a change in the monetary stock and nominal interest rates depends on the speed at which economic agents expectations adjust to new economic policy. The monetarist view is that an expansionary monetary policy will lead to economic agents expecting higher inflation and consequently the nominal interest rate may rise (Friedman, 1970). In the monetarist framework, therefore, increases in money supply are associated with increased inflation and higher nominal interest rates while a reduction in money supply results in a fall in both inflation and interest rates.

[2]Refer to Chembe, R. (2004), Muhanga, I. (2003) and Zyuulu, I. (2003) for details.

Tobin (1965, 1967) advances another theoretical model of interest rate determination. In the model, which is a non-monetary neo-classical growth model, Tobin notes that the degree of capital intensity and correspondingly the equilibrium marginal productivity of capital and the interest rate are determined by "productivity and thrift", that is, by technology and saving behaviour. In non-monetary growth models, the only asset that exists is reproducible capital, which wealth owners use as a store of value. In such models, savings necessarily takes the form of real investment and increased investment, which leads to increased capital accumulation, lowers the yield on savings and therefore increases the propensity to consume (Tobin, 1965). In the absence of monetary assets, the financial system that will prevail will be a repressed one since there are no competing channels for the placement of savings other than in real investment. However, the introduction of monetary assets introduces another channel for placement of savings. In this case, the resultant portfolio allocation behaviour affects the return on capital and if the yield on money is higher relative to the return on capital, the proportion of savings held in money will be higher relative to that held in real investment. In such a situation, the equilibrium interest rate and the degree of capital intensity will in general be affected by the portfolio allocation behaviour of wealth owners as well as by technology and thrift.

Determinants of interest rates have also been explained on the basis of the assumptions made regarding the degree of openness of the economy's capital and current accounts. In closed economies, domestic nominal interest rates are assumed to be determined solely by conditions prevailing in domestic money markets and expected inflation. However, in open economies, domestic nominal interest rates are expected to be partly influenced by foreign interest rates and the expected domestic currency depreciation or appreciation as well as domestic factors. The linkage between domestic interest rates and foreign interest rates emanates from increasing global integration in terms of trade, investment and financial flows. Hence, with globalisation, international capital mobility is expected to link domestic and foreign interest rates through the uncovered or covered interest parity condition. Uncovered interest parity (UIP) states that if economic agents are rational and risk neutral, then expectations of a change in the exchange rate over a given period of time are reflected in interest rate differentials while covered interest parity (CIP) states that in an open economy with no impediment to capital flows, no transaction costs and where agents are risk-averse, interest rate differentials equal the forward premium or discount in the foreign exchange market (Honohan 2000, Gupta *et al.*, 1994). According to UIP, a positive relationship between domestic and foreign interest rates is expected to exist in open economies. This is because an increase in foreign interest rates will induce capital outflows, which will imply a fall in the demand for domestic financial assets such as bonds and hence an increase in domestic interest rates. The assumption that domestic and foreign factors affect the determination of interest rates is at the core of a conceptual model of interest rate determination developed by Edwards *et al.*, (1985) for semi-open economies.

Theoretical and empirical literature has also considered the relationship between interest rates and Government spending or fiscal deficits. The issue has been to validate the assumption that larger budget deficits produce higher nominal interest rates in the economy. In theory, the effects of fiscal policy changes on the term structure of interest rates are ambiguous. This ambiguity is contained in the *Ricardian equivalence theorem,* which "states that, for a given path of Government consumption expenditures, individuals view budget deficits as postponed tax liabilities. Therefore, budget deficits do not alter wealth, desired consumption paths or interest rates…" (Linde, 2001). Although this view regards budget deficits as having a neutral effect on interest rates, some studies have shown that budget deficits, which are financed through the issuance of domestic debt add to private sector wealth, thereby influencing desired consumption paths and thus interest rates (Allen 1990, Cebula *et al.*, 1993, Miller *et al.*, 1996, Linde 2001).

3.2 Review of Empirical Literature

The relationship between nominal interest rates and expected inflation has been the subject of numerous empirical studies. However, these studies have yielded mixed results with some studies supporting the existence of the Fisher effect and other studies finding the absence of such an effect. In practice, the problem encountered when testing for the Fisher effect is the lack of any direct measure of inflationary expectations. Hence, empirical studies have tended to use some proxies for inflationary expectations, which include some form of distributed lag on past inflation and assuming rational expectations. Empirically, Fisher examined his hypothesis using UK and US annual data over the period 1820 - 1924 for the former and 1890 1927 for the latter. He assumed inflationary expectations as being formed in accordance with a distributed lag structure. Using simple correlation coefficients, he found that inflationary expectations were not instantaneously reflected in interest rates given coefficients of 0.86 for the US and 0.98 for the UK when price changes were lagged for over 20 years and 28 years, respectively. His conclusion was that there was general and specific evidence that price changes affect interest rates, but that since foresight is imperfect, the effects are smaller than the theory requires and lag behind price changes (Fisher, 1930).

Since then, numerous studies have found the magnitude of the coefficient on expected inflation to be less than one, suggesting that nominal interest rates adjust slowly to inflation and that there may be other variables that affect nominal interest rates. Tanzi (1980) augmented the Fisherian model by including the influence of business cycle fluctuations. He found that the explanatory power of the inflationary variable increased with the addition of a real output variable in the model. However, in another empirical study by Elliot (1977), the findings were contrary to Tanzi's. Elliot found no significant relationship between interest rates and real output, but instead found a significant negative relationship between interest rates and the current actual inflation rate.

In more advanced studies, which incorporate rational expectations and employ modern econometric techniques, evidence of a strong Fisher effect has been found to exist for some and not for other periods. For instance, Mishkin (1992) found a Fisher effect to only appear in samples when inflation and interest rates displayed stochastic trends. Mishkin's approach was based on the reasoning that when two series exhibit trends, they tend to move together, resulting in a strong correlation between them. Hence, there was a need to determine the univariate statistical properties of the time series before making conclusions about their relationship. Mishkin established the existence of unit roots in both levels of inflation and interest rates while cointegration tests for a common trend in inflation and interest rates revealed the existence of a long-run Fisher effect, and the absence of a short-run relationship. Wallace *et al.*, (1993), using the Johansen *et al.*, (1990) procedure, provided further support for the Fisher effect in both the short- and long-term. Empirically, they found that the point-for-point relationship between interest rates and inflation could not be rejected as postulated by the Fisher hypothesis. However, in a study by Pelaez (1995), which used both the Engle-Granger two-step procedure and Johansen's vector error correction mechanism (VECM), no evidence of a Fisher relationship was found.

In general, empirical studies of the Fisher effect based on US data have tended to provide evidence that seem to be broadly consistent with the Fisher hypothesis. However, these studies have not established a one-to-one relationship between interest and inflation rates while results for other developed economies have not been clear-cut (see Mishkin 1984, MacDonald *et al.*, 1989, Peng 1995). With regard to developing countries, empirical studies broadly provide evidence that lend support to the Fisher hypothesis. In particular, studies that have examined the Fisher effect in high inflation countries, such as Argentina, Brazil

and Mexico in the 1970s and 1980s, have found the existence of a long-run unit proportional relationship between nominal interest rates and inflation (Phylaktis *et al.*, 1993, Garcia 1993, Thornton 1996). With regard to African economies, it should be noted that though we could not access empirical studies that examine the Fisher effect in an individual African economy, a cross-sectional study of the Fisher effect for nine developing countries, which included Niger, found no evidence for Niger (Payne *et al.*, 1997). Nevertheless, we would expect the Fisher effect to exist in a number of African countries, particularly in those economies with a history of high inflation.

With regard to the influence of money supply on interest rates, empirical evidence in support of the Keynesian argument has been provided by Angeloni *et al.*, (1993) for Italy, where a monetary expansion was associated with lower interest rates while a monetary contraction resulted into higher interest rates. To rationalise the result, the authors argued that, initially, liquidity shocks and short-term interest rates are negatively related, but that in the long-run the effect tends to be more controversial because interest rates are presumably more affected by expectations about future growth and inflation, with the exchange rate forming a key link. The negative relationship between money supply and interest rates was also confirmed in the studies by Ngugi *et al.*, (1998) and Dua *et al.*, (2001) for developing economies. In particular, Dua *et al.*, (2001) estimated cointegrating equations based on Johansen's procedure and found money supply to exert a statistically significant strong negative influence on interest rates in both the error correction form of the model and in the long-run cointegrating relation.

Edwards *et al.*, (1985) employed their model to empirically analyse the determinants of interest rates in Columbia and Singapore in which the former was considered to have a relatively closed economy and the latter a relatively open economy. The model incorporated both closed and open economy factors such as money supply, expected inflation, foreign interest rates and expected domestic currency depreciation. The empirical findings indicated that domestic interest rates in Singapore were mainly influenced by foreign factors, particularly foreign interest rates, given the high degree of openness of the Singaporean economy. In the case of Columbia, domestic factors were identified as the major determinants of interest rates.

Ngugi *et al.*, (1998) adopted the Edwards and Khan model to analyse financial sector reforms and interest rate liberalisation in Kenya. They estimated a reduced form of the model and found that domestic interest rates were influenced by both domestic economic conditions and open economy factors. In particular, inflationary conditions, foreign interest rates, expected domestic currency depreciation, monetary conditions and output levels were all found to play significant roles in the determination of interest rates. In the long-run, they found that foreign factors and inflation had a positive effect on interest rates while an income variable and money supply had a negative effect on interest rates. In similar studies by Gochoco (1991) for the Phillipines and Patnaik *et al.*, (1998) for India, both domestic and external factors were found to be important determinants of domestic interest rates. Patnaik *et al.*, (1998) employed a single equation approach and estimated an error correction model in which they found the existence of a stable long-run relationship between domestic interest rates, real money supply, output and the expected return by foreign investors. In another study by Ahmed *et al.*, (1990) based on the Edwards and Khan model aimed at analysing the impact of monetary policy on interest rates in Indonesia, it was established that in the period following financial sector reforms, domestic interest rates were largely explained by domestic monetary conditions, lagged foreign interest rates and expected real exchange rate change.

Gupta *et al.*, (1994) undertook a cross sectional study that included developed and

developing countries to test for the importance of international capital integration in relation to domestic factors in the determination of interest rates. They estimated a model of real interest rate differentials across countries which included inflation differentials, current account balances, central bank discount rates, growth in domestic credit and a country risk among explanatory variables. The findings suggested "that although domestic monetary policies play a significant role, real interest parity is a dominant factor, for both industrial and developing countries" (Gupta *et al.*, 1994). In addition, expectations of exchange rate changes were found to significantly influence the determination of interest rates. The other factor that was found to be significant in the determination of the real interest rate differentials for developing countries was country risk, which tended to push domestic interest rates higher than what would be otherwise predicted by macroeconomic imbalances.

On the question of whether fiscal deficits affect interest rates, empirical studies have tended to yield mixed results. Evans (1985, 1987b) employed US data to examine the issue and his findings broadly indicated the absence of a positive association between interest rates and fiscal deficits. However, in another study by Allen (1990) based on US data, a positive and statistically significant relationship between Government debt (used to proxy fiscal deficits) and a tax-adjusted short-term interest rate was found. In related studies based on the "loanable funds" model, in which nominal interest rates are assumed to be linearly related to a set of explanatory variables, including some measures of expected inflation, Government deficits and debts, empirical evidence indicated that nominal interest rates were positively related to fiscal deficits (de Haan *et al.*, 1990, Cebula *et al.*, 1993, Miller *et al.*, 1996).

Linde (2001) investigated the empirical relationship between Government fiscal deficits and interest rates for Sweden and established that larger budget deficits tends to induce higher interest rates in both the short- and long-term. Linde employed the Johansen framework to study the relationship between short- and long-term interest rate differentials and budget deficits, and found that "a one percent increase in the Government deficit as a ratio of GDP leads to an increase in short- and long-term nominal interest rate differential by 0.20 and 0.25 percentage points, respectively" (Linde, 2001). On the whole, it should be noted that models of interest rate determination that include a proxy for expected inflation have tended to yield results that show that budget deficits are positively related to nominal interest rates, mainly because of the understanding that such a proxy precludes the capturing of the indirect effects of budget deficits via expected inflation on interest rates.

From the review of both theoretical and empirical literature on the determinants of interest rates, it can be inferred that domestic interest rates in a liberalised financial system are potentially influenced by domestic and external factors, which include money supply, expected inflation, Government spending (budget deficit), the expected change in the exchange rate and foreign interest rates. It is therefore important that these factors are captured in any model of interest rate determination in any economy that has undergone financial sector reforms.

3.3 The Conceptual Framework of Interest Rate Model

The model of interest rate determination used in this study is a modification of the general model developed by Edwards and Khan (1985). The Edwards and Khan model was developed for the purpose of analysing interest rate determination in semi-open developing countries, and has the following general specification.

$$i_t = \delta_0 + \delta_1(i_t^* + \dot{e}_t) + \delta_2 \log y_t + \delta_3 \log m_{t-1} + \delta_4 \pi_t^e + \delta_5 i_{t-1} + \varepsilon_t \quad (1)$$

Where: i_t is the domestic nominal interest rate, i_t^* is the foreign nominal interest rate, $\dot{e}_t$ is the expected change in the exchange rate, y_t is real income, m_{t-1} is lagged real money supply, π_t^e is expected inflation, i_{t-1} is lagged domestic nominal interest rate and ε_t is the stochastic error term. The subscript *t* refers to time.

The model combines both closed and open economy factors. Closed economy factors include real income, real money supply, expected inflation and domestic nominal interest rates while open economy factors are foreign interest rates and the expected change in the exchange rate. One of the theoretical underpinnings of the model is the Fisher relationship, specified as;

$$i_t = r_t + \pi_t^e \quad (2)$$

where: i_t is nominal interest rate, r_t is real interest rate and π_t^e is the expected inflation.

Equation (2) relates the nominal interest rate to the real interest rate and expected inflation. The purpose is to bring out the impact of expected inflation on domestic interest rates.

Open economy factors are introduced in the model by assuming that uncovered interest parity (UIP) condition holds, so that domestic nominal interest rates are a sum of foreign interest rates and the expected change in the exchange rate.

$$i_t = i_t^* + \dot{e}_t \quad (3)$$

The UIP specified above is assumed to hold in situations where there are no transactions costs and investors are risk-neutral. In such situations, domestic interest rates respond instantaneously to changes in either foreign interest rates or the expected rate of domestic currency depreciation or appreciation. However, the possibility of transactions costs as well as risk-averse investors or information lags introduces the possibility that domestic interest rates may respond with a lag to changes in foreign interest rates or domestic currency.

In this study, we modify the Edwards and Khan model by using a macroeconomic model of structural equations that capture closed and open economy factors and include equilibrium conditions in the goods and money markets. Following a study of interest rate determination in India by Dua *et al.*, (2001), equilibrium conditions in the goods and money markets are specified as follows:

$$Y = C(Y, r) + I(Y, r) + G \quad (4)$$

Where: Y is real output, C is real consumption, I is real investment expenditure, G is real Government expenditure and r is the real rate of interest.

$$M = M_1(Y, r) + M_2(i) \tag{5}$$

Where: M s real money supply, M_1, M_2 represents the transactions and speculative demand for money, respectively while i is the nominal interest rate. The transactions demand for money is assumed to be positively related to real output and negatively related to the real interest rate while the speculative demand for money is negatively related to the nominal interest rate.

Dua *et al*, (2001) note that in principle, equation (4) can be solved in terms of the real interest rate and real Government spending while equation (5) can be solved in terms of real output and the nominal interest rate. The reason why these two equations can be solved in terms of the identified variables is because of the presence of the Fisher equation in the model, which relates the nominal to the real interest rate. The nominal interest rate features in the money clearing equation while the real interest rate features in the goods market clearing equation. Assuming linear functional forms for equations (4) and (5), and using lower case letters to denote logarithms of the corresponding variables, we specify equilibrium conditions in the goods and money market in stochastic form as follows:

$$y = a_0 + a_1 r + a_2 g + u \tag{4a}$$

$$m = b_0 + b_1 y + b_2 i + v \tag{5a}$$

Where u and v denote standard stochastic components.

Equations (2), (3), (4a) and (5a) forms the system of structural equations used to derive the interest rate model. The system has two stochastic equations (4a) and (5a) and two definitions (2) and (3). In addition, the system contains four endogenous y, m, r variables and i . Exogenous variables include g, π^e, i^* and $\dot{e}$.

To derive the interest rate model, equations (2) and (3) are added and the resultant equation is used to solve for the real interest rate. The solved value of r is substituted into equation (4a). We then substitute the resultant equation of y into equation (5a) and solve for the nominal interest rate. The resultant model of interest rate determination derived is specified as follows (refer to Appendix B for a detailed derivation of the model).

$$i_t = \alpha_0 + \alpha_1 m_t + \alpha_2 \pi_t^e + \alpha_3 i_t^* + \alpha_4 \dot{e}_t + \alpha_5 g_t + \zeta_t \tag{6}$$

Where: g_t is Government spending, financed through domestic debt, and ζ_t is the stochastic error term. α_0 is the constant while α_1 to α_5 are the parameters .

In the model specified in equation (6), *apriori* expectations with regard to the signs of the coefficients of the explanatory variables based on theoretical considerations are as follows: $\alpha_2, \alpha_3, \alpha_4, \alpha_5 > 0$ while $\alpha_1 \neq 0$. In this regard, we hypothesise a negative or positive coefficient on money supply, and positive coefficients on expected inflation, foreign interest rates, the expected change in the exchange rate and Government spending.

3.4 The Relevance of the Interest Rate Model for Zambia

The relevance of the interest rate model presented above is based on the following considerations. The Zambian economy has become more open following financial sector reforms as reflected in liberal capital and current accounts. In this regard, some form of interest rate arbitrage is expected to hold, with domestic interest rates being partly determined by foreign interest rates and the expected depreciation or appreciation of the domestic currency. Consequently, our model would help us to empirically establish the extent to which foreign interest rates are an important factor in the determination of nominal lending rates in Zambia.

The Zambian economy is also characterised by a high degree of currency substitution. In a liberalised financial environment characterised by high and unstable inflation, currency substitution may be a reflection of domestic residents' desire to protect the value of their wealth from the ravages of inflation. Hence, high and volatile inflation rates may trigger a flight to safety through the conversion of domestic currency assets into foreign currency assets. In Zambia, this has been reflected in an upward trend in foreign currency deposits in the banking system (see Appendix C), with the ratio of foreign currency deposits to broad money rising from 0.45% at the beginning of 1994 to 39.5% by the end of 2002 (Zyuulu, 2003). In the model, currency substitution would be captured by either expected inflation or depreciation in the domestic currency. Higher expected domestic currency depreciation may induce a substitution of domestic currency assets for foreign currency assets. In addition, the higher the expected rate of inflation the less attractive the domestic currency assets and the more attractive the foreign currency assets. Thus, the higher the domestic nominal interest rates.

Furthermore, the relevance of the model to the Zambian situation arises from its consideration of the influence of domestic monetary conditions on interest rates. Although changes in money supply, which can arise from the central bank's open market operations or foreign exchange operations or indeed from the monetisation of Government deficits, may result in a reduction in interest rates (Keynesian view) or an increase in interest rates due to inflationary pressures (Monetarist view), the model would help in establishing as to which of the two opposing views is relevant to the Zambian situation.

The model also includes a variable that represents Government spending. This variable is aimed at capturing the impact of fiscal deficits, which are financed by Government borrowing through the issuance of Government securities. Although the net effect of such financing on interest rates may be captured by changes in the monetary stock or inflationary expectations, an explicit inclusion of this variable in the model is warranted for the purpose of validating or invalidating the widely held perception in the Zambian financial sector that Government borrowing has been partly responsible for high nominal lending rates. Indeed, commercial banks, who are the major investors in Government debt instruments, have tended to use the interest rate prevailing on Government securities as a benchmark to price their loans (Muhanga, 2003). Moreover, some empirical models of interest rate determination have also considered the impact of Government spending financed through Government domestic debt alongside variables such as money supply and expected inflation (see Linde 2001, Dua *et al*., 2001).

Overall, the theoretical model of interest rate determination outlined above can be considered as relevant to the analysis of the determinants of interest rates in Zambia in the sense that it captures both domestic and external factors that are considered crucial in the determination of interest rates in developing countries following financial sector reforms.

4.0 Empirical Evidence on Interest Rate Determination

In this section, we provide empirical evidence on interest rate determination in Zambia. This is achieved by presenting data and the variables used in the empirical analysis, conducting preliminary data and time series analysis of the variables, and estimating the interest rate model using Johansen's VECM framework. Preliminary data analysis is aimed at checking for the existence of trends or structural breaks in the data series while time series analysis is aimed at establishing whether the variables are stationary or non-stationary. Having established the time series properties of the data, cointegration tests are conducted and based on these tests, long-run cointegrating relationships are estimated. The empirical results of estimated models are discussed. The econometrics software used for empirical analysis is *Eviews 4.0*.

4.1 Data and Variables

Quarterly data collected over the period 1980 to 2003 is used in this paper. Although the paper's focus is on the period following the implementation of financial sector reforms, that is between 1992 to 2003, it was felt prudent to extend the sample period to 1980 given the small sample size for the post-reform period. Our models were estimated over the period 1980 to 2003 in order to improve the efficiency of the estimated coefficients. Data was collected from the IMF's International Financial Statistics (IFS), various annual reports and fortnightly statistics published by the BOZ. Although the reliability of developing countries data is often questioned, the data used in this study is collected from the most reputable institutions available, and hence represents the most reputable data available.

The variables used in this paper include domestic nominal interest rates, foreign interest rates, money supply, the exchange rate, inflation rate and the Government's domestic debt. The domestic nominal interest rate considered is the commercial banks' weighted average lending rates. The measure of foreign interest rates used is the South African (SA) lending rates. The choice of the SA lending rate is due to the importance of the SA economy to the Zambian economy in terms of trade and investment. The exchange rate measure used is the nominal effective exchange rate, which is captured as an index number. This index is a weighted average of the Kwacha exchange rate against the country's major trading partner currencies such as the US dollar, the British pound, the SA rand and the euro. Changes in this index are computed and used to proxy the expected change in the exchange rate. In estimation, we assume perfect foresight so that expected inflation and change in the exchange rate correspond to actual or realised values. Inflation is computed as the annualised rate of change in the economy-wide consumer price index (CPI). The proxy used for domestic debt is the amount of Government securities held by domestic commercial banks, which represents the banking system's claims on Government. The bulk of these claims are Treasury bills and bonds issued by the Government. In the post-financial reform period, Government sales of securities to domestic banks has been one of the principal means used to finance short-run budget deficits in lieu of printing money.[3]

Since the practice in macroeconomic work involving time series data is to use logged variables for econometric modeling, all the variables with an exception of interest rates were transformed using a natural logarithmic transformation.[4] This transformation was aimed at

[3]The domestic debt proxy used in this study is narrowly defined and includes only Treasury bills and bonds denominated in the domestic currency and held by domestic banks. It excludes public foreign debt denominated in foreign currency and any domestic currency denominated Treasury bills and bonds held by foreign investors (banks).

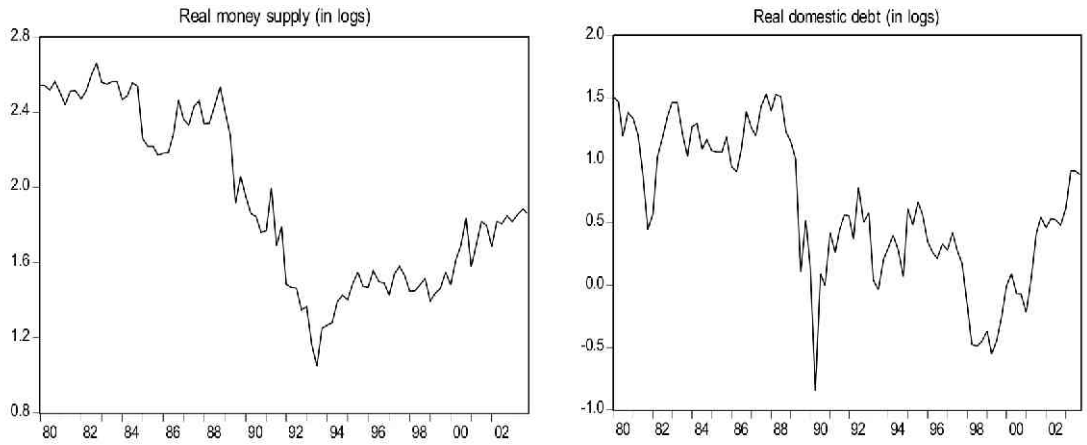
[4]The logarithmic transformation was found to be appropriate based on the Schwarz Bayesian criterion (SBC) test. The test gave larger SBC statistics for the log transformed data than for non-transformed data.

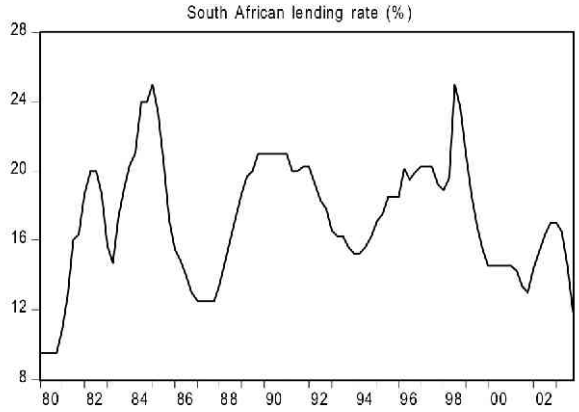
linearising exponential trends which may be present in individual data series. In addition, nominal values of broad money and domestic debt were converted to real values by deflating them using the CPI (refer to Appendix D for the description and derivation of the variables).

4.2 Preliminary Data Analysis

In Figure 3 below, we illustrate graphical plots of some of the variables that have not been graphically presented in the earlier sections of the paper. A plot of money supply shows a consistent decline in real balances from 1980 to 1993. Thereafter, real money balances show a slowly rising trend. Domestic debt appears to be high in real terms during the 1980s mainly due to a relatively low rate of inflation. As inflation gathered pace in the latter part of the 1980s real domestic debt fell sharply reaching the lowest level in 1990 before increasing in the latter part of the 1990s. A notable feature of domestic debt in the closing stages of the sample period is its rapid increase, implying increased Government reliance on domestic debt to finance short-term budget deficits. This is also confirmed by the rising ratio of domestic debt to GDP in the latter part of the 1990s (see Appendix A). For most of the domestic variables (inflation, money supply and the lending rate), a change in the data series is notable toward the end of 1993. Sgherri (2001) identified the third quarter of 1993 as the period in which a structural break in data seem to have taken place. This break has been attributed to the Government's introduction of a cash budget, which committed the Government to only spend if it had revenue in its accounts. The purpose of the cash budget was to discourage the Government from monetising fiscal deficits in order to reduce inflation and inflationary expectations.

Figure 3: Money supply, Domestic debt and foreign interest rates (1980 - 2003)





Sources: IFS, BOZ and own calculations. Money supply is an aggregate of currency outside the banking system and demand, savings, time and foreign currency deposits.

In the estimations, we consider two dummy variables. D92 captures the period following financial sector reforms and has values of zero from 1980Q1 to 1992Q2 and one from 1992Q3 to 2003Q4 while D93 captures the period following the structural break in the data and takes the value of zero prior to 1993Q2 and the value of one thereafter.

4.3.0 Econometric Methodology

The econometric methodology employed in analysing the determinants of interest rates in Zambia is dictated by the time series properties of the data. Since many macroeconomic variables tend to exhibit non-stationary properties, cointegration techniques are required to empirically analyse the behaviour of interest rates and their determinants. Cointegration techniques have become standard in empirical studies that attempt to capture equilibrium structures of economies and their process of dynamic adjustment to disequilibria.

In this paper, we employ cointegration techniques using the VAR framework (Johansen 1988). Although the use of the VAR methodology to analyse cointegrating relationships among the variables tends to suffer from the "curse of dimensionality", that is only a limited number of variables can feasibly be included in the model, its major advantage is that it does not impose any *a priori* theoretical restrictions on the variables entering the various equations; all variables are considered as being endogenously determined (Wakeford, 2004). The Johansen methodology is also considered to be superior to the Engle-Granger approach in that in a system with more than two variables, there may be more than one cointegrating vector among the variables. However, for cointegration techniques to be employed in empirical analysis, the following conditions must be satisfied: (1) the variables must be generated by unit root processes and integrated of order one; and, (2) if a cointegrating relationship(s) exists among the variables, an error correction mechanism can be estimated that captures short- and long-run equilibrium relationships among the variables.

4.3.1 Time Series Properties of the Variables

To avoid the problem of spurious regressions associated with time series data, we begin by checking for the presence of unit roots in the data using both the Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) tests. The results of unit root tests on the levels of the variables are shown in Appendix E. The results indicate that since the test statistics (DF and

ADF) are less negative than corresponding critical values at 5% level of significance, the null hypothesis of a unit root cannot be rejected, indicating that the variables are non-stationary. Unit root tests conducted on first differences of the variables indicate that the null hypothesis of a unit root is rejected, indicating that the first differences of the variables are stationary (refer to Appendix E). Thus, all the variables are integrated of order one.

4.3.2 Tests of Cointegration

Having established that the variables are non-stationary and integrated of order 1, we proceed to test for cointegrating or long-run equilibrium relationships among the variables. If cointegration is established, the Johansen's maximum likelihood estimator that corrects for autocorrelation and endogeneity parametrically, using a VECM specification, will be employed to estimate the model.

For a brief description of the Johansen methodology[5], we consider a general vector autoregression (VAR) model, specified as:

$$z_t = A_1 z_{t-1} + \ldots + A_m z_{t-m} + \mu + \delta_t \tag{8}$$

Where: z_t is a $(n \times 1)$ matrix of endogenously determined variables, m is the lag length, μ consist of deterministic terms and δ is a Gaussian error term.

The VAR representation in equation (9) can be reparameterised to obtain the VECM specification:

$$\Delta z_t = \sum_{i=1}^{k-1} \Gamma \Delta z_{t-i} + \Pi z_{t-k+1} + \mu + \delta_t \tag{9}$$

Where: Δ denotes the first difference operator and $\Pi = \alpha\beta'$; α is interpreted as the adjustment matrix that indicates the speed at which the system responds to previous periods deviations from long run equilibrium relationships while β is the matrix that contains long-run equilibrium relationships (Fedderke *et al.*, 2004, Johansen *et. al.*, 1990). According to Johansen *et al.*, (1990), the hypothesis of cointegration can be formulated as the hypothesis of the reduced rank of the long-run impact of the matrix, Π, and the presence of cointegration is indicated by the rank of Π. Hence, cointegration tests in a multivariate framework are aimed at investigating whether the coefficient matrix Π contains information about long-run relationships between the variables in the data matrix (Johansen *et al.*, 1990).

If cointegration among the variables is established, then the model specified in equation (10) will be used to analyse the determinants of domestic nominal lending rates. *A priori*, we expect the existence of at least one cointergrating vector among the variables.

[5]Refer to Johansen (1988) and Johansen and Juselius (1990) for detailed discussion of the methodology.

$$\Pi z_{t-1+k} = \begin{bmatrix} \alpha_{11} \\ \alpha_{21} \\ \alpha_{31} \\ \alpha_{41} \\ \alpha_{51} \\ \alpha_{61} \end{bmatrix} \begin{bmatrix} 1 & -\beta_{12} & -\beta_{13} & -\beta_{14} & -\beta_{15} & -\beta_{16} \end{bmatrix} \begin{bmatrix} LEDR \\ RMS \\ INFL \\ DEBT \\ CNEER \\ SLDR \end{bmatrix}_{t-k+1} \quad \textbf{(10)}$$

Where: *LEDR* is the weighted average lending rate, *RMS* is real money supply, *INFL* is the expected inflation, *DEBT* is real Government domestic debt, *CNEER* is the expected change in the nominal effective exchange rate and *SLDR i*s the South African lending rate.

4.3.3 Empirical Results and Discussion

The order of the VAR used to test for cointegration among the variables is 2. The selection of a VAR 2 is based on the need to preserve some degrees of freedom given the small sample size. Cointegration tests are conducted using the "unrestricted intercept, no trends in the cointegration equation and test VAR" option on the assumption that there are no discernible deterministic trends in any of the variables under consideration, as shown in graphical illustrations. To address the potential small sample bias in the estimates, a 1% significance level is used instead of the conventional 5 % level. The cointegration test results of the variables in the model are tabulated in Table 1 below.

Table 1: Cointegration Tests Results

Sample Period: 1980 - 2003

	Trace Test		**Critical values**	
Null	Alternative	Trace statistic	5 %	1 %
r = 0	r ≥ 1	122.34*	94.15	103.18
r <= 1	r ≥ 2	75.69	68.52	76.07
r <= 2	r ≥ 3	44.02	47.21	54.46
r <= 3	r ≥ 4	24.95	29.68	35.65
r <= 4	r ≥ 5	10.79	15.41	20.04
r <= 5	r ≥ 6	3.65	3.76	6.65
	Max Eigen value Test			
Null	Alternative	Max-Eigen statistic	5 %	1 %
r = 0	r = 1	46.65*	39.37	45.10
r <= 1	r = 2	31.67	33.46	38.77
r <= 2	r = 3	19.07	27.07	32.24
r <= 3	r = 4	14.15	20.97	25.52
r <= 4	r = 5	7.14	14.07	18.63
r <= 5	r = 6	3.65	3.76	6.63

*denotes rejection of the null hypothesis at 1 % level.

From these results, we can deduce that domestic variables and the proxy used for foreign interest rates seem to be cointegrated. Furthermore, our prior expectation of one cointegrating vector is confirmed at the 1% level of significance. Hence, estimates of cointegrating relationships are obtained on the assumption of 1 cointegrating relationship among the variables at the 1% level of significance.

Estimates of long-run coefficients are obtained under the following scenarios. First, we estimate a baseline model over the entire sample period without explicitly controlling for financial sector reforms and structural breaks in the data. Second, the baseline model is re-estimated by including a dummy variable that accounts for the period of financial sector reforms. This is followed by an estimate of the model that includes both financial sector reforms and structural break dummies. In addition, we estimate a model that includes a variable representing the interaction between financial liberalisation and foreign interest rates. The reason for including such a variable is that prior to financial liberalisation, foreign interest rates may not have had a significant impact on domestic interest rates due to capital controls. However, with the removal of capital controls that came with financial sector reforms, foreign interest rates may have become important factors in the determination of domestic nominal interest rates.

Table 2 presents VECM estimates of the long-run relationships among the variables. The results obtained in the baseline model (column 1) indicate that all the regressors have the anticipated signs and are statistically significant with the sole exception of the SA lending rate. The coefficients of the baseline model indicate that money supply, expected inflation, domestic debt and the expected change in the exchange rate are economically and statistically important factors in the determination of the lending rate. Since the left hand side variable is in percent while some right hand side variables are in logs, percent or growth rates[6], we had to compute the implied elasticities from the estimated coefficients of the changes in the lending rate associated with the changes in the regressors. Implied elasticities of the nominal lending rate with regard to logged variables were computed using the formula given in equation (11) while the elasticities of the lending rate with regard to variables expressed in percent were computed using equation (12).

$$\varepsilon_{i,x} = \frac{di}{dx} * \frac{x}{i} = \frac{\hat{b}}{i} \tag{11}$$

where $\varepsilon_{i,x}$ denotes the implied elasticity, d denotes the change in the variable, i denotes the domestic nominal lending rate, x denotes the regressor and $\hat{b}$ represents the estimated coefficient.

$$\varepsilon_{i,x} = \frac{di}{dr} * \frac{r}{i} = \hat{b} * \frac{r}{i} \tag{12}$$

Where r denotes percent or growth rate while other parameters are as defined in equation (11).

Table 3 shows the computed elasticities of the baseline model. These results indicate that a 1% increase in money supply leads to a reduction of 0.02% in the nominal lending rate while an increase of 1% in expected inflation results in an increase of 0.43% in nominal lending rates when evaluated at mean values of the lending rate, money supply and

[6]Logged variables are money supply and domestic debt while inflation and the expected change in the exchange rate are expressed in terms of growth rates. Domestic and foreign interest rates are in percent.

expected inflation (see column 3 in Table 3). The economic importance of domestic debt is small, with the implied elasticity of 0.005% for a 1% change in domestic debt. However, the expected change in the exchange rate seems to exert a sizable impact on nominal lending rates given the implied elasticity of 0.16% for a 1% change in the exchange rate. This result may be a reflection of currency substitution or increased conversion of domestic investments into off-shore investments. Furthermore, a 1% change in the SA lending rate leads to a small change of 0.03% in the domestic nominal lending rate.

Table 2: VECM Estimates of the Lending rate with the SA Lending rate

Variables	1	1a	1b	1c	1d
LEDR(-1)	1.00	1.00	1.00	1.00	1.00
RMS(-1)	0.5462* (0.0603) [9.0572]	0.1653*** (0.1207) [1.3694]	0.4557** (0.1491) [3.0570]	-0.2053 (0.1475) [-1.1358]	-0.0424 (0.1319) [-0.3212]
INFL_A(-1)	-0.3931* (0.0809) [-4.8549]	-0.5916* (0.0919) [-6.4389]	-0.4183** (0.1219) [-3.4326]	-0.8176* (0.1291) [-6.3318]	-0.7782* (0.1109) [-7.0121]
DEBT(-1)	-0.1968* (0.0469) [-4.1996]	-0.1238** (0.0446) [-2.7761]	-0.1803** (0.0514) [-3.5114]	-0.0606 (0.0534) [-1.1358]	-0.1312** (0.0466) [-2.8099]
CNEER(-1)	-0.1772** (0.0622) [-2.8479]	-0.0823*** (0.0583) [-1.4121]	-0.1984** (0.0683) [-2.8961]	0.1091 (0.0709) [1.5391]	0.0834 (0.0604) [1.3819]
SLDR(-1)	-0.0703 (0.5332) [-0.1318]	-0.8107*** (0.5096) [-1.5905]	-0.2386 (0.5967) [-0.4019]	0.7959 (0.6264) [1.2707]	0.5950 (0.8870) [0.6708]
DSLDR(-1)				-4.0979* (0.6417 [-6.3863]	-3.8284** (1.2599) [-3.0386]
SPREAD(-1)					0.2288 (1.5476) [0.2847]
DSPREAD(-1)					0.5610 (1.5476) [0.3625]
Constant	-118.49	-26.33	-98.98	62.44	29.62
ECM (-1)	-0.3013 (0.0794) [-3.7956]	-0.4086 (0.0757) [-5.3932]	-0.2272 (0.0777) [-2.9231]	-0.2247 (0.0775) [-2.8969]	-0.4009 (0.0575) [-6.9747]
Adj-R^2	0.17	0.28	0.33	0.34	0.40
D92		1992:3 – 2003:4	1992:3 – 2003:4		
D93			1993:3 – 2003:4	1993:3 – 2003:4	1993:3 – 2003:4

Note: *denotes significance at 1 % level, ** denotes significance at 5 % level and ***denotes significance at 10 % level. Standard errors are in ( ) while t-statistics are in [ ]. D92 is not included in models 1c and d due to the sensitivity of the estimates in terms of signs and statistical significance when both dummies and interaction variables are included.

Table 3: Implied Elasticities of the Baseline model 1, $\varepsilon_{i,x}^{7}$

Regressor (x)	Minimum value of *i*	Mean value of *i*	Median value of *i*	Maximum value of *i*
RMS (x_1)	-0.056	-0.015	-0.014	-0.004
INFL (x_2)	0.423	0.431	0.302	0.330
DEBT (x_3)	0.021	0.005	0.005	0.001
CNEER (x_4)	2.332	0.156	0.112	0.038
SLDR (x_5)	0.070	0.033	0.032	0.013

Source: Own computations.

Controlling for financial sector reforms by means of an intercept dummy, D92 does not alter the substance of the results in terms of anticipated signs though money supply, the expected change in the exchange rate and the SA lending rate are only significant at 10% level (see Model 1a). The difference between model 1a and the baseline model is that expected inflation and the SA lending rate appear to play economically dominant roles in the determination of lending rates. This is confirmed by the increase in the size of the implied elasticities of the two regressors shown in Table 4. Model 1b augments model 1a by including the dummy to account for the 1993Q3 structural break in the data. Again, all regressors have the anticipated signs. However, the SA lending rate is not statistically significant. The implied elasticities of model 1b suggest that the expected inflation and change in the exchange rate as well as the SA lending rate are economically important determinants of nominal lending rates (see Table 4).

The interaction between financial sector reforms and foreign interest rates was investigated by estimating model 1c. The results show that expected inflation, domestic debt and the interaction variable have the anticipated signs while the sign on money supply becomes positive. However, the sign on the expected change in the exchange rate is contrary to expectation. When compared to models 1a and b, model 1c shows that the SA lending rate, when interacted with the financial sector reforms dummy, assumes an economically and statistically dominate role in the determination of domestic nominal lending rates. In this regard, a 1% change in the SA lending rate results in a change of between 0.59 and 0.63% in the domestic nominal lending rate.[8] This result indicates that in the post-reform period, foreign interest rates have become important factors in the determination of domestic nominal interest rates. This is because following the removal of capital controls, capital movements and foreign interest rates are expected to influence the determination of domestic interest rates as predicted by the interest parity condition. In this regard, an increase in foreign interest rates which induces capital outflows is expected to impact positively on domestic nominal interest rates.

[7]The minimum, mean, median and maximum values of i used to compute these elasticities are 9.5, 36.1, 37.9 and 138.5 percent, respectively. For in r Equation (13), the values are 10.2 % (minimum), 29.1 % (median), 39.6 %(mean) and 116.3 % (maximum) for the inflation rate while for the expected change in the exchange rate, we used -125.0 % (minimum), -23.9 % (median), -31.7 % (mean) and 29.8 % (maximum). For the SA lending rate, the minimum, median, mean and maximum are 9.5 %, 17.1 %, 17.2 % and 25.0 %, respectively.

[8]To compute the overall elasticity of the SA lending rate, we use the formula: $\frac{di}{dr} * \frac{r}{i} = (\hat{b}_1 + \hat{b}_2 D) \frac{r}{i}$

where $\hat{b}_1$ is the estimated coefficient on SLDR and $\hat{b}_2$ is the estimated coefficient on DSLDR. Hence, the implied elasticities of the nominal lending rate associated with the change in the SLDR after financial liberalizationliberalisation are computed as sum of the elasticities, that is, -0.379 + 0.976 = 0.597 and -0.287 + 0.912 = 0.625, for model 1c and d, respectively.

Table 4: Implied Elasticities of Estimated Models

Regressor	Model 1a	Model 1b	Model 1c	Model 1d
RMS (x_1)	-0.005	-0.013	0.006	0.001
INFL (x_2)	0.649	0.459	0.896	0.854
DEBT (x_3)	0.003	0.005	0.002	0.004
CNEER (x_4)	0.072	0.204	-0.096	-0.073
SLDR (x_5)	0.386	0.114	-0.379	-0.283
DSLDR(x_6)			0.976	0.912

Note: These elasticties were evaluated at the mean values of the variables. The mean values were 39.6%, 36.1%, 31.7%, 17.2%, 8.2%, 1.93 and 0.60 for the inflation rate, domestic nominal lending rate, expected change in the exchange rate, SA lending rate, interaction variable (*DSLDR*), real money supply and domestic debt, respectively.

The sign on the coefficient on money supply in model 1c (Table 2) may be an indication of the monetarist interpretation regarding the influence of money supply on nominal interest rates where an increase in money supply results in an increase in nominal lending rates. However, we cannot be certain about this monetarist interpretation nor can we conclusively say that the Keynesian interpretation is more relevant in the Zambian situation given the conflicting empirical results obtained in the models.

To investigate whether the economically large impact of the SA lending rate on the domestic nominal lending rate when interacted with the financial sector reforms dummy may be a reflection of a regional risk premium, we estimated model 1d that included the spread between the SA and US lending rates.[9] The spread was also interacted with the financial sector reforms dummy. The results in model 1d are not that different from those in model 1c, with the elasticities on the SA lending rate and expected inflation remaining almost unchanged. However, the coefficient on domestic debt becomes statistically significant and a third economically important factor in the determination of nominal lending rates. The signs on the spread proxies are contrary to expectation and are statistically insignificant. We interpret the results as indicating that a regional risk premium does not seem to matter in the determination of nominal lending rates in Zambia. However, since the change in the domestic nominal lending rate is less than 1% for a 1% change in the SA lending rate, we may interpret the impact of the SA lending rate on the domestic lending rate as reflecting the mark-up on Zambian interest rates relative to SA interest rates.

In general, the estimates from our models seem to be consistent with the theoretical framework outlined in the preceding section. In this regard, an expansion in money supply appear to result in a reduction in domestic nominal lending rates while an increase in expected inflation, domestic debt and foreign interest rates lead to an increase in domestic nominal lending rates. However, the results show some lack of robustness particularly with regard to the expected change in the exchange rate. The lack of robustness is also reflected in parameter instability in models. Parameter instability may be an indication of data limitations in terms of sample size and the quality of data, which precludes the capturing of the full impact on domestic nominal lending rates of the expected change in the exchange rate and foreign interest rates. Notice, however, that in all the estimated models the error

[9]In another model (not reported here), the US lending rate was used as a proxy for foreign interest rates. However, despite evidence of a long-run cointegration relationship between domestic variables and the US lending rate, the estimated coefficients on the US lending rate were found to be consistently statistically insignificant in all the models.

correction terms are statistically significant and with the expected sign, indicating the existence of stable cointegrating relationships among the variables.

On the whole, the central findings of the study are therefore that:

1. Although there is some uncertainty on the sign of the money supply parameter, the estimated relationships seem to generally indicate a negative association between money supply and lending rates, with mean elasticities ranging from 0.005 to 0.016.
2. Expected inflation was consistently found to be economically[10] and statistically significant and the mean elasticity ranged from 0.431 to 0.896. In this regard, a positive relationship between expected inflation and nominal lending rates was established in all our models.
3. Despite the economically small impact of domestic debt on nominal lending rates, our empirical results indicate a fairly consistent significant positive relationship between domestic debt and nominal lending rates. The mean elasticity ranged from 0.002 to 0.006.
4. Foreign interest rates are found to be important determinants of domestic nominal lending rates only after financial liberalisation. After liberalisation, the impact is found to be economically strong, with implied mean elasticities ranging from 0.597 to 0.625.
5. With regard to the expected change in the exchange rate, conflicting results were obtained from the estimated relationships, with some models indicating a positive association between the expected change in the exchange rate and nominal lending rate while other models indicated otherwise. Given the conflicting result regarding the sign on the expected change in the exchange rate parameter, we are unable to ascertain the direction of the influence of the expected change in the exchange rate on nominal lending rates in Zambia.

In the estimated relationships, expected inflation was found to be an economically and statistically important factor in the determination of nominal lending rates in Zambia. The implication of this result may be that as long as inflationary expectations remain high, they may continue to influence the determination of interest rates. High inflationary expectations in Zambia may perhaps be a reflection of the Government's weak policy credibility arising from the failure to meet some of its pre-set economic targets. More often than not, the market has been disappointed with the Government's commitment to its own policy pronouncements (Muhanga, 2003). Thus, any policy announcements aimed at achieving certain goals such as set inflation targets or a reduction in domestic debt may not be considered credible enough by the private sector and may consequently be reflected in high inflationary expectations. Hence, as long as the Government's commitment to its own policy announcements remains weak, inflationary expectations may continue to influence the determination of interest rates in the economy. However, caution should be taken in attributing the impact of expected inflation on interest rates to inflationary expectations as this interpretation is premised on the assumption that actual and expected inflation are the same. If this assumption does not hold, then perhaps the strong impact of expected inflation on interest rates may be a reflection of inflationary pressures in the economy, which induces

[10]A variable is considered to be economically significant if its coefficient is big relative to the coefficient of other variables, implying that the economic impact of that variable is big compared to other variables. For instance, a variable with a coefficient of 0.4 is economically more significant compared to a variable with a coefficient of 0.1.

domestic banks to raise nominal lending rates in order to protect the value of their loans against inflation.

The empirical results also indicate the violation of the *Ricardian equivalence theorem* and show that fiscal deficits, financed through issuances of Government securities, may result in increased interest rates. Although the issue of domestic debt and interest rates in Zambia has been the subject of much debate, the empirical findings suggest that the economic impact of domestic debt on interest rates is rather small. This result may be a reflection of the relatively low ratio of domestic debt to GDP, which stood at less than 12 percent in 2003.

Finally, it should be noted that though we are fairly confident in the results obtained in this paper, the following limitations are worth mentioning. Firstly, we recognise the short sample period and admit that the interactions among the variables in the model may not be adequately captured. This limitation may be reflected in the insignificance of foreign interest rates in some of the estimated models when the intercept dummy is used and some unexpected signs on some regressors such as the expected change in the exchange rate. It is also important to note the limitations in the data. In this regard, it may be important to consider other measures of domestic interest rates such as the Treasury bill or deposit rates to investigate whether these rates are also influenced by the factors identified in the paper. In addition, alternative measures of the exchange rate may have to be considered in order ascertain the sign and magnitude of the exchange rate parameter. Therefore, given the sensitivity and instability of some of the empirical results to different model specifications, the results may be considered as tentative rather than conclusive.

5.0 Conclusion

This paper has empirically established the determinants of lending rates in the Zambian economy in the post financial liberalisation period of 1992 to 2003. Empirical evidence indicates the existence of long-run cointegrating relationships between the domestic lending rate, money supply, expected inflation, expected domestic currency depreciation or appreciation, domestic debt and foreign interest rates. Furthermore, empirical evidence identified both domestic and foreign factors as important determinants of lending rates in Zambia. However, foreign interest rates are only found to be important factors in the determination of nominal lending rates after financial liberalisation. In this regard, the SA lending rate is found to play an economically and statistically significant role in the determination of nominal lending rates in Zambia. The strong response of the Zambian lending rate to the SA lending rate may reflect both the importance of South Africa to Zambia in trade and capital flows terms, as well as the possibility of a mark-up on Zambian interest rates relative to SA interest rates.

On the policy front, these results indicate that for lending rates to decline to reasonable levels in both nominal and real terms there is a need to create a stable macroeconomic environment in order to reduce inflationary expectations. For inflationary expectations to decline, there is a need for the Government to establish a stable macroeconomic environment by pursuing prudent macroeconomic management which entails the co-ordination of fiscal and monetary policies. It is also important to note the role of foreign interest rates in the determination of interest rates in Zambia. The opening up of the domestic economy to the global economy allowed capital flows to take place and thereby influence the determination of interest rates. However, in an environment characterised by macroeconomic instability, the impact of foreign interest rates on domestic interest rates may be a reflection of a mark-up on domestic interest rates relative to foreign interest rates to account for the unstable macroeconomic environment.

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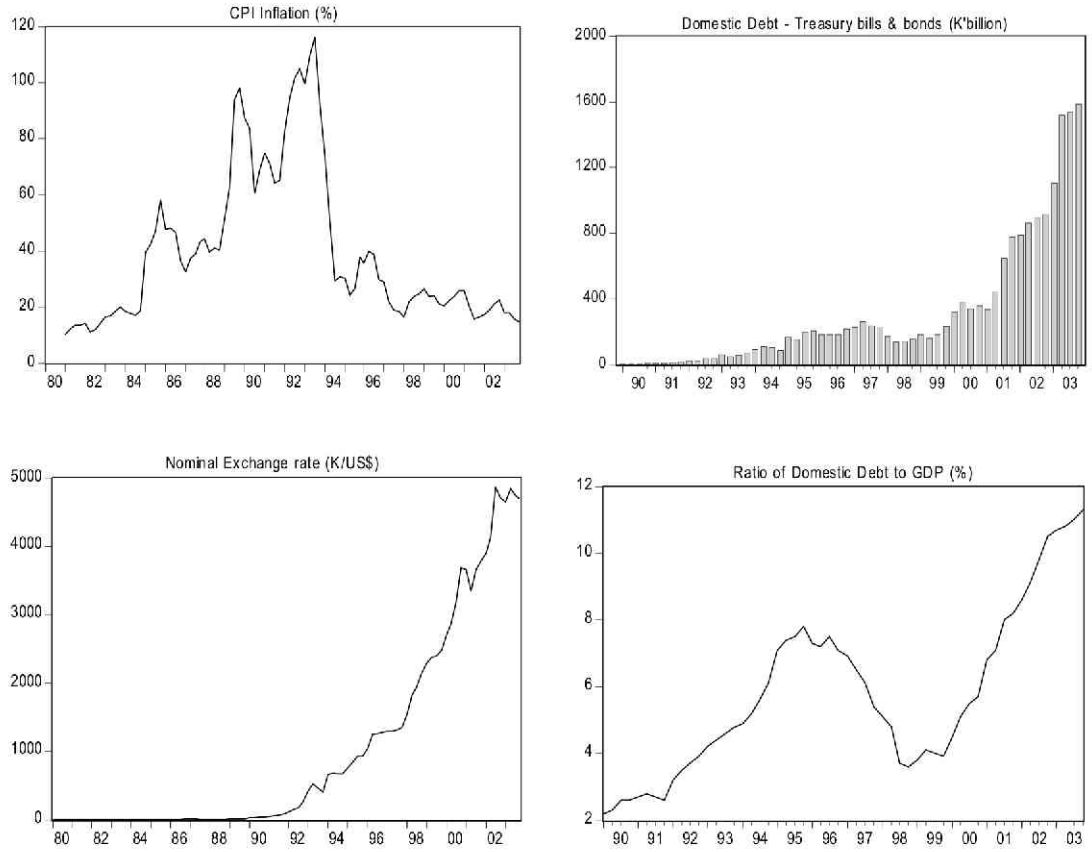
Appendices

Appendix A: CPI Inflation, Exchange Rate and Domestic Debt



Source: Bank of Zambia, IFS and own computations

Appendix B: The Derivation of the Interest Rate Model

$$i_t = r_t + \pi_t^e \quad (2)$$

$$i_t = i_t^* + \dot{e}_t \quad (3)$$

$$y = a_0 + a_1 r + a_2 g + u \quad (4a)$$

$$m = b_0 + b_1 y + b_2 i + v \quad (5a)$$

Where: a_0, b_0, a_2, $b_1 > 0$ and a_1, $b_2 < 0$.

We begin by adding (2) and (3) and solve for r_t.

$$2i_t = r_t + \pi_t^e + i_t^* + \dot{e}_t$$

$$r_t = 2i_t - \pi_t^e - i_t^* - \dot{e}_t \quad (i)$$

Substituting (i) into (4a) yields,

$$y = a_0 + a_1(2i_t - \pi_t^e - i_t^* - \dot{e}_t) + a_2 g + u \quad (ii)$$

Substituting (ii) into (5a) results in the following expression

$$m = b_0 + b_1[a_0 + a_1(2i_t - \pi_t^e - i_t^* - e_t) + a_2 \dot{g} + u] + b_2 i + v \quad (iii)$$

$$m = b_0 + b_1 a_0 + a_1 b_1 2i_t - a_1 b_1 \pi_t^e - a_1 b_1 i_t^* - a_1 b_1 \dot{e}_t + a_2 b_1 g_t + b_1 u + b_2 i + v \quad (iv)$$

$$m_t = b_0 + b_1 a_0 + (2a_1 b_1 + b_2) i_t - a_1 b_1 \pi_t^e - a_1 b_1 i_t^* - a_1 b_1 \dot{e}_t + a_2 b_1 g_t + (b_1 u_t + v_t) \quad (v)$$

Solving for i_t from (v) yields the following

$$i_t = \frac{(b_0 + a_0 b_1)}{(2a_1 b_1 + b_2)} + \frac{1}{(2a_1 b_1 + b_2)} m_t + \frac{a_1 b_1}{(2a_1 b_1 + b_2)} \pi_t^e + \frac{a_1 b_1}{(2a_1 b_1 + b_2)} i_t^* + \frac{a_1 b_1}{(2a_1 b_1 + b_2)} \dot{e}_t + \frac{a_2 b_1}{(2a_1 b_1 + b_2)_1} g_t + \frac{b_1}{(2a_1 b_1 + b_2)} (u_t + v_t)$$

The foregoing equation can be written in the following reduced form

$$i_t = \alpha_0 + \alpha_1 m_t + \alpha_2 \pi_t^e + \alpha_3 i_t^* + \alpha_4 \dot{e}_t + \alpha_5 g_t + \zeta_t \quad (6)$$

Where the composite parameters in equation (6) are:

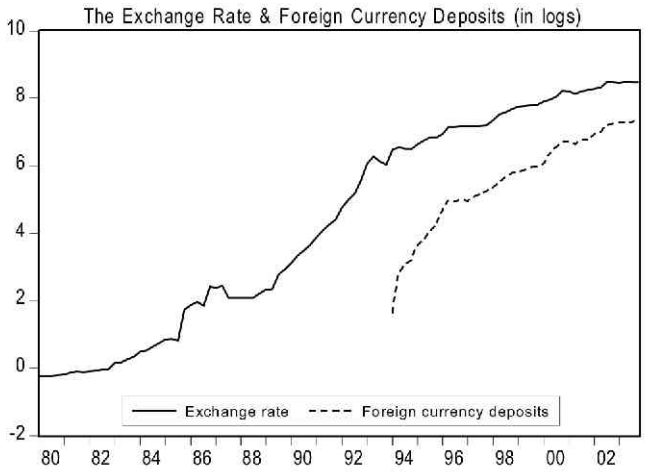
$$\alpha_0 = \frac{(b_0 + a_0 b_1)}{(2a_1 b_1 + b_2)}, \ \alpha_1 = \frac{1}{(2a_1 b_1 + b_2)}, \ \alpha_2, \alpha_3, \alpha_4 = \frac{a_1 b_1}{(2a_1 b_1 + b_2)}, \ \alpha_5 = \frac{b_1}{(2a_1 b_1 + b_2)} \text{ and}$$

$$\xi_t = \frac{b_1}{(2a_1 b_1 + b_2)} (u_t + v_t)$$

The following restrictions are imposed on the reduced-form parameters:

$\alpha_0, \alpha_1 \neq 0$ while $\alpha_2, \alpha_3, \alpha_4, \alpha_5 > 0$

Appendix C: Foreign Currency Deposits and the Exchange Rate



Source: Bank of Zambia, IFS and own computations

Appendix D: Summary Description and Derivation of The Variables

Variable name	Variable description	Variable derivation
LEDR	Weighted average lending rate	Not derived
SLDR	South African (SA) lending rate	Not derived
USLR	United States (US) lending rate	Not derived
DSLDR	SA lending rate interacted with dummy, D92	D92*SLDR
INFL_A	Annualized rate of inflation	Log(CPI/CPI(-4))/.01
CNEER	Change in the nominal effective exchange rate	Log(NEER/NEER(-4))/.01
RMS	Real money supply	Log(Broad Money/CPI)
DEBT	Real domestic debt (TBs and bonds)	Log(Nominal Domestic Debt/CPI)
SPREAD	Spread between SA and United States lending rates	SLDR - USLR
DSPREAD	Spread interacted with dummy, D92	D92*SPREAD

Source: Bank of Zambia and IFS. Note that CPI is the consumer price index, NEER is the nominal effective exchange rate and D92 is the financial sector reforms period dummy variable.

Appendix E

Unit Root Test Results (on levels)

Series	DF Statistic	ADF Statistic	Critical Values*	Lag length
Lending rate	-1.9674	-2.5481	-2.8932	4
Inflation rate	-1.4879	-2.1522	-2.8943	3
Exchange rate	-2.7936	-2.8410	-2.8936	4
Money supply	-0.7139	-0.9733	-1.9437	4
Domestic debt	-0.7333	-2.1131	-2.8932	4
SA lending rate	-1.4565	-1.5607	-2.9228	4
US lending rate	-1.2098	-1.3581	-2.9228	4

*Critical values are at 5% level of significance. The lending, exchange and inflation rates as well as domestic debt and foreign interest rates include significant drift terms; money supply contains no deterministic terms. The Exchange rate refers to the change in the exchange rate.

Unit Root Test Results (First differences)

Series	ADF Statistics	Critical values (5 %)	Order of integration
Δ(Lending rate)	-5.0194*	-2.5481	I(1)
Δ(Inflation rate)	-5.5797*	-2.8947	I(1)
Δ(Exchange rate)	-4.8007*	-2.8951	I(1)
Δ(Money supply)	-3.4164*	-1.9437	I(1)
Δ(Domestic debt)	-4.5897*	-1.9437	I(1)
Δ(SA lending rate)	-4.3975*	-2.9084	I(1)
Δ(US lending rate)	-3.0942*	-2.9084	I(1)

Note: Δ preceding each variable or series indicates the first difference. *denotes rejection of null hypothesis of unit root at 5 % level of significance.

Statistical Analysis of Emerging Trends in the Exchange Rate Behaviour Since 26th November 2005 to March 2006

By

Maxwell C. Musongole

Abstract

In this paper, simple techniques of time series analysis have been applied to investigate the emerging trends in the Kwacha/Dollar exchange rate since 26th November 2005 to March 2005. The paper investigates whether there are patterns that may enable us forecast the future values and movements of the mid exchange rate. A time series of the Bank of Zambia mid exchange rate observed from 26th November2005 is used. The study shows that the BoZ mid rates have seasonal effects over the period under investigation. This also implies that the exchange rate over the same period is deterministic rather than random. The study also shows that there has been an appreciation of the Kwacha in the period under review. The seasonal indexes have been computed and used in the prediction of the future mid rates.

1.0 Introduction

Most exchange rates are known to have fractal dimensions between 1 and 2 implying that exchange rates are persistent rather than random processes and have underlying fractal structures (Peters 1994, 1991, 1989). The fractal dimension characterises how an object or process fills its space. It has been shown that the Kwacha/Dollar exchange rate is also not random but a trend-reinforcing process with the Hurst exponent H = 0.6849 implying a fractal dimension equal to 1.46 (Musongole, 2004). Thus the Kwacha/Dollar rate is a biased random walk and is influenced by past events. The impact of past events on the future of the Kwacha/Dollar exchange rate is measured by the correlation (29.22%) derived from the Hurst exponent (Musongole 2004). The correlation gauges the interdependence between the time periods of the rate.

In this paper however, simple techniques of time series analysis will be applied to investigate the emerging trends in the Kwacha/Dollar exchange rate. A time series of the Bank of Zambia mid exchange rate observed from 26th November to March 2006. The objective of the analysis is to investigate whether there are patterns that may enable us forecast the future values and movements of the mid exchange rate.

This paper is arranged as follows: section one gives the introduction. Section two briefly describes time series analysis while in section three the data used in the analysis is discussed. Trend analysis of the weekly average BoZ mid rates is carried out in section four whereas the seasonal effects on the data are illustrated in section five. In section six, an attempt to predict the exchange rate is made. The findings and the conclusion of the paper are specified in section seven.

2.0 Time Series

In this section, the basic descriptions of a time series are given. A variable that is measured sequentially over time is called a time series. A time series can consist of four components namely:

- Long-term trend (*T*)
- Cyclical effect (*C*)
- Seasonal effect (*S*) and
- Random variation (*R*)

where a trend also known as secular trend is a long term, relatively smooth pattern of direction exhibited by a time series with a duration of more than 1 year. A cycle is a wave like pattern describing a long term trend that is generally apparent over a number of years, resulting in a cyclical effect and has a duration of more than 1 year. Seasonal variations are like cycles, but they occur over short repetitive calendar periods and have a duration of less than one year. Random variation comprises the irregular changes in a time series that are not caused by any other component.

The time series model is generally expressed either as an additive model i.e.

$$y_t = T_t + C_t + S_t + R_t \tag{1}$$

or as a multiplicative model i.e.

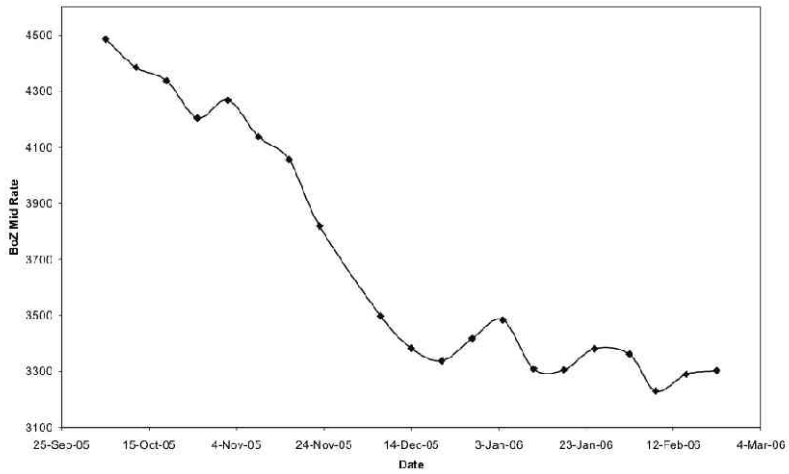
$$y_t = T_t \times C_t \times S_t \times R_t \tag{2}$$

where *T, C, S, R* and *t* are long-term trend, cyclical effect, seasonal effect, random variation and time period, respectively.

3.0 Data Analysis

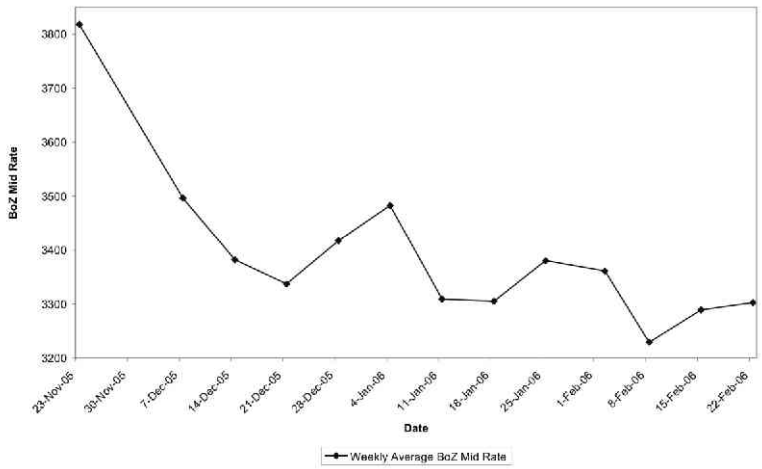
In this section, the BoZ mid exchange rate data are analysed. To investigate the patterns in the exchange rate, the weekly average BoZ mid rates are used. The movement of the weekly average BoZ Mid rates are provided in Chart 1 which graphs the average mid rates for the period 3rd October 2005 to 1st March 2006.

Chart 1: Weekly BoZ Mid Rate



In this paper, however, the investigations for the patterns is only done for the period 24th November 2005 to 1st March 2006 and the analysis is used to predict the weekly exchange rate up to the week ending 17th March 2006. The following chart presents the weekly average data for the period 24th November 2005 to 1st March 2006.

Chart 2. Weekly Average Nov 2005 - March 2006



The plot in chart 2 shows the weekly BoZ mid exchange rate with gradually decreasing (linear trend), but with seemingly seasonal patterns as well. The seasonal patterns, if identified correctly can be used to identify regular short-term fluctuations in the exchange rate.

3.1 Smoothing Methods of Time Series

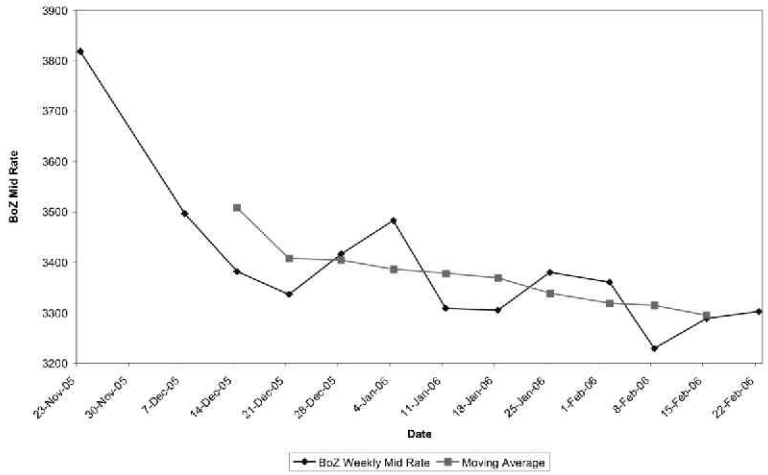
If a time series does not exhibit a significant trend, cyclical or seasonal patterns, smoothing techniques such as the moving average and the exponential smoothing are used to smoothen the jagged random or irregular components. The smoothed time series can be used to forecast one or two periods into the future. In this study, although the series under

study exhibits seasonal patterns, the smoothing techniques will be applied to investigate the extent to which the seemingly seasonal patterns will be dampened.

3.2 Moving Averages

The moving averages of the weekly average BoZ mid rates are computed. The original data and the moving averages are plotted in Chart 3. We notice that the moving average series is much smoother than the original series.

Chart 3: Moving Average



Exponential smoothing is a smoothing technique that uses a weighted average of all past time series observations to forecast the value of the series in the next period. The exponential smoothing is given by

$$S_t = (1-\alpha)S_{t-1} + \alpha x_t \quad for \ \ t \geq 2 \tag{3}$$

Where

$S_t =$ exponentially smoothed time series at time t

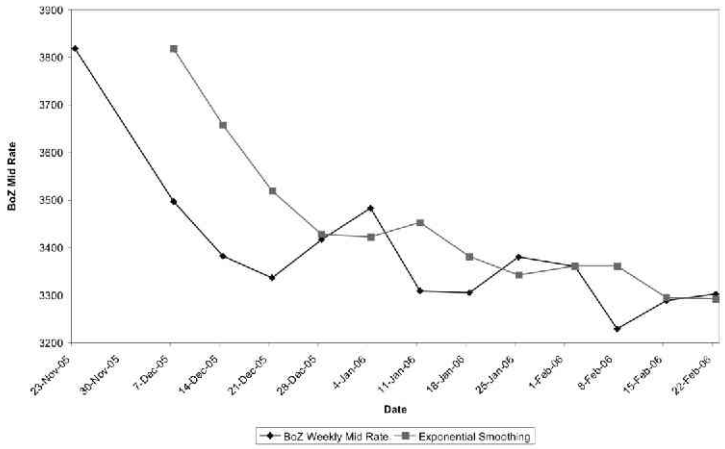
$x_t =$ time series at time t

$S_{t-1} =$ exponentially smoothed time series at time $t-1$

$\alpha =$ smoothing constant, where $0 \leq \alpha \leq 1$

Equation (3) is applied to the weekly average BoZ mid rate taking . Chart 4 gives the plot of the original data and the exponentially smoothed series. The smoothing constant is chosen on the basis of how much smoothing is required. A small value of produces a great deal of smoothing. The choice of in general depends on the variability of the time series. In this exercise $\alpha = 0.5$ is chosen for demonstration purposes only.

Chart 4: Exponential Smoothing



4.0 Trend Analysis of the Weekly Average BoZ Mid Rates

In this section we describe the trend of the weekly average BoZ mid rate. The linear model for long term trend analysis is given by

$$y = \beta_0 + \beta_1 t + \varepsilon \qquad (4)$$

where t is the time period.

B_0, β_1 = parameters

ε - error term

Applying equation (4) to the data, the trend line is obtained as

$\hat{y} = 3582.62 - 27t$ and plotted in Chart 5.

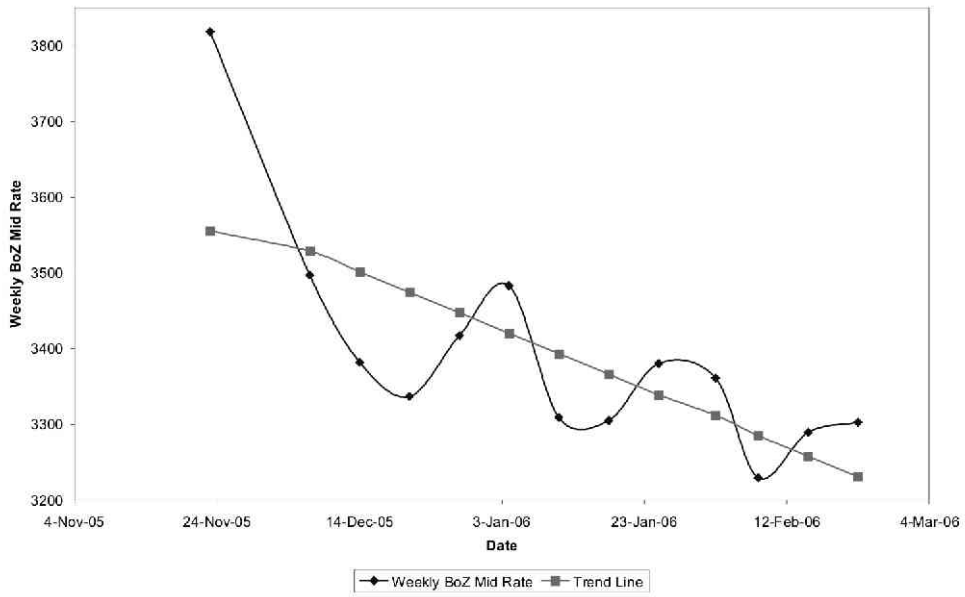
The summary of the trend analysis is given in Table 1 below.

Table 1. Summary Output of the Regression Statistics

Multiple R	0.708472				
R Square	0.501933				
Adjusted R Square	0.456654				
Standard Error	109.6826				
Observations	13				
ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	133360.4	133360.4	11.08539	0.006718
Residual	11	132333.1	12030.28		
Total	12	265693.5			
	Coefficients	Standard Error	t Stat	P-value	Lower 95%
Intercept	3582.62	64.5316	55.5173	7.99E-15	3440.587
X Variable 1	-27.0693	8.130217	-3.32947	0.006718	-44.9638

From the summary table, we find that R^2 is equal to 50.2%. This tell us that time only explains 50.2% of the variation in the exchange rate. The value of R^2 cannot enable us draw conclusions but the higher the value of,R^2 the better the model fits the data. However, from the t - test of, β_1 there is some evidence of linear relationship between time and the exchange rate.

Chart 5: Weekly Mid Rates and Trend Line



5.0 Measuring the Seasonal Effect in the Weekly Average BoZ Mid Rate

In this section we measure the seasonal effect of the weekly average BoZ mid rate data. To do this, we construct the seasonal indexes, which attempt to gauge the degree to which the seasons (in this case the weeks) differ from one another. The seasonal and random variation are isolated from the time series by dividing each original time series values by the predicted values from the trend line, that is by computing . The seasonal variations of the weekly average BoZ mid rate are plotted in Chart 6. The seasonal indexes are computed in Table 2.

Chart 6: Seasonality

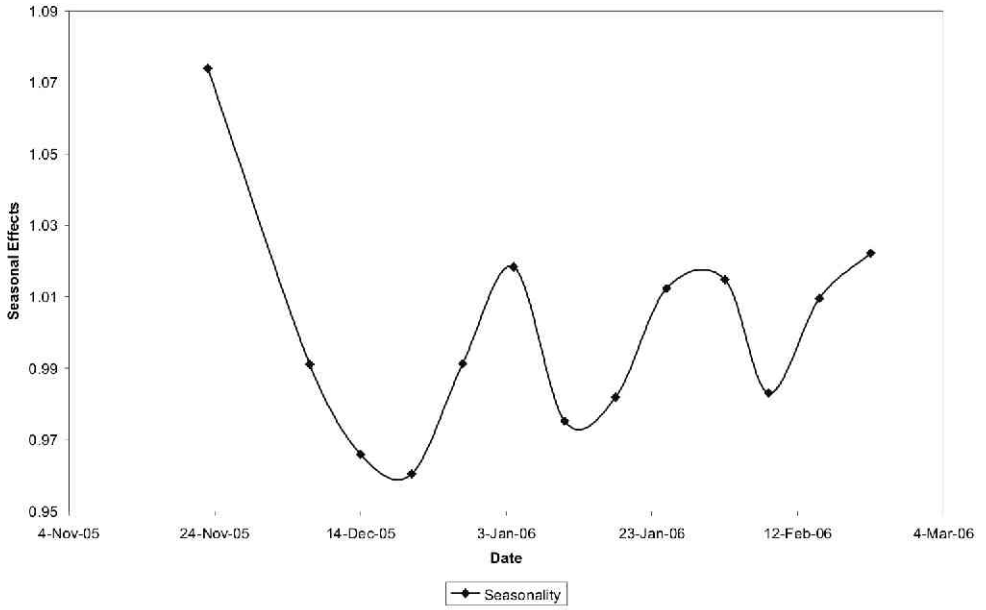


Table 2. Computation of Seasonal Indexes

Month	W1	W2	W3	W4	Total
Nov				1.07	
Dec	0.99	0.97	0.96	0.99	
Jan	1.02	0.98	0.98	1.01	
Feb	1.01	0.98	1.01	1.02	
Average	1.01	0.98	0.98	1.01	3.97
Index	1.01	0.98	0.99	1.01	4.00

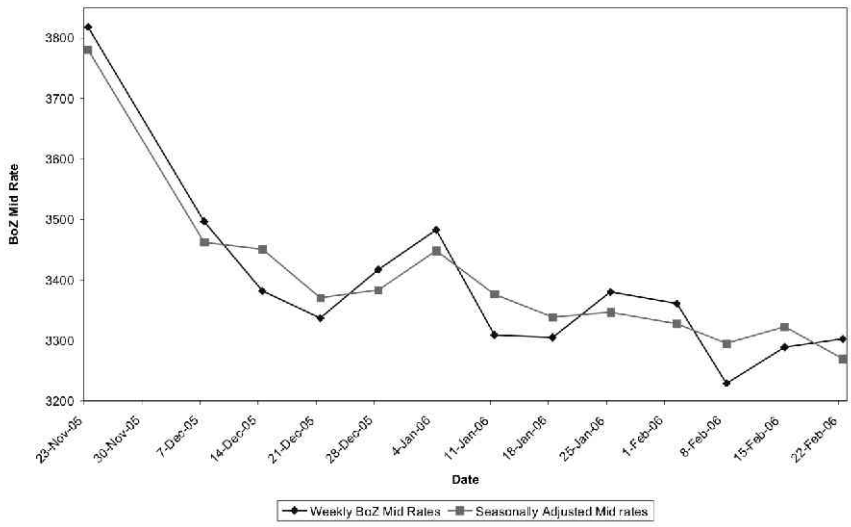
5.1 Deseasonalising a Time Series

One application of seasonal indexes is to remove the seasonal effects of a time series to obtain a seasonally adjusted time series. The seasonally adjusted time series allows an easy comparison of the time series across seasons. The seasonally adjusted times series for the weekly average BoZ mid rates are computed in Table 3 and plotted in Chart 7.

Table 3. Seasonally Adjusted Mid Rates

Month	Week	Date	Index	Weekly BoZ Mid Rates	Seasonally Adjusted Mid Rates
Nov-05	W4	23-Nov-05	1.01	3818.56	3780.76
Dec-05	W1	7-Dec-05	1.01	3497.10	3462.48
	W2	14-Dec-05	0.98	3381.89	3450.91
	W3	21-Dec-05	0.99	3336.85	3370.56
	W4	28-Dec-05	1.01	3417.20	3383.37
Jan-06	W1	4-Jan-06	1.01	3483.06	3448.57
	W2	11-Jan-06	0.98	3309.06	3376.59
	W3	18-Jan-06	0.99	3305.02	3338.40
	W4	25-Jan-06	1.01	3380.17	3346.70
Feb-06	W1	2-Feb-06	1.01	3360.99	3327.71
	W2	8-Feb-06	0.98	3229.22	3295.12
	W3	15-Feb-06	0.99	3289.13	3322.35
	W4	22-Feb-06	1.01	3302.50	3269.80

Chart 7: Seasonally Adjusted



5.2 Interpretation of the Seasonally Adjusted Time Series of the Mid Rates

The seasonal variation has been eliminated in the adjusted series, while the long - run trend and the short - run irregular fluctuations have remained. Removing the seasonality, enables us to see whether there has been a real appreciation or depreciation of the Kwacha. This will make it possible to examine the factors that produced the appreciation or depreciation of the Kwacha. We also can more easily see that there has been an appreciation of the Kwacha over the period under review.

6.0 Forecasting With Seasonal Index

The seasonal indexes measure season to season variation. Combining the indexes with a forecast of the trend, we obtain the following formula.

Forecast of the Trend and Seasonality

$$F_t = \left(\hat{\beta}_0 + \hat{\beta}_1 t\right) SI_t \quad \text{or simply } F_t = \hat{y} SI_t \tag{5}$$

where

F_t = forecast for period t

SI_t = seasonal index for period t

6.1 Forecast for the Next Three Weeks

In this section, the computed seasonal indexes are used in equation (5) to forecast the weekly average BoZ mid rates. The forecasts are given in Table 4.

Table 4. Three Weeks Forecasts for the Weekly Average BoZ Mid Rates

Month	Week	Trend Value $\hat{y}$	Seasonal Index	Forecast $F_t = \hat{y} \cdot SI_t$	Observed
March	W1 (t = 14)	3203.64	1.01	3235.69	3306.17
	W2 (t = 15)	3176.58	0.98	3113.05	3282.42
	W3(t = 16)	3149.51	0.99	3118.02	3285.04

7.0 Conclusion

The study has shown that the BoZ mid rates have seasonal effects over the period under review. This also implies that the exchange rate over the same period is deterministic rather than random. The study also shows that there has been an appreciation of the Kwacha in the period under review. The seasonal indexes have been computed and used in the prediction of the future mid rates. Though the predictions are not accurate, they can be used as guideline in the direction of the exchange rate. The method used for prediction is inclined to predict a more appreciated Kwacha in the future. The method is not reliable in the distant future due to potential uncertainty. The analysis ought to be done over a longer period to establish firm conclusions about the structure of the exchange rate.

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Bank Owneship and Risk in East and Southern African Countries

By

Austin A.K. Mwape

Abstract

This paper examines the extent to which agency theory can explain risk taking behaviour by banks in environments where governance institutions are weak. The paper focuses on conflicts of interest amongst bank shareholders, managers and regulatory authorities. It examines the extent to which these conflicts of interest impact on relative risk differentials between banks that are shareholder controlled and those that are managerially controlled, having regard to the adequacy or inadequacy of the obtaining regulatory framework. More specifically, the paper examines the relationship between ownership structure and risks exhibited by banks operating in the East and Southern African region with a distinction made between managerially controlled banks and shareholder controlled banks. Logistic regression is applied to bank micro data from 12 countries in the ESAF region. Empirical results provide evidence that the managerially controlled and shareholder controlled banks systematically exhibited different risk features between 1991 and 2000. This is a pointer to the fact that the two bank types face different incentives frontier hence rationalising a case for a tiered supervisory architecture that takes into account bank ownership structure.

1.0 Introduction and Purpose

The paper examines the relationship between ownership structure and risks exhibited by banks operating in the East and Southern African Countries (ESAF) between 1991 and 2000. The study is based on the principal hypothesis that owner/manager agency problems affect a bank's choice of risk frontier. More specifically, agency problems between owners and managers of banks result into conflicts of interest that effectively translate into distinct differences in risk features of banks based on control (Saunders, Strock and Travlos 1990). The paper draws intuition from agency theory that posit that agency problems in corporations arise because limits on managerial wealth force a separation of ownership and control that make managers pursue their own objectives at the expense of shareholders (Berle and Means, 1932; Jensen and Meckling 1976). A number of studies have linked risks exhibited by banks to owner/manager agency problems. Such studies have for example attributed the increased risks exhibited at banks in the 1980's to this type of agency problems (Gorton and Rosen, 1995; Kane, Edward 1983; and White 1999). Some other studies have presented statistical evidence that *confirm* the existence of owner/manager agency problems in banks (Saunders, Strock and Travlos 1990; Gorton and Rosen 1995). The agency literature on the relationship between ownership structure and risk however lacks consensus on the exact state of this relationship. What appears to be clear however is the position that the degree of managerial insider ownership does have an effect on the risks exhibited by corporations.

In this paper, a distinction is made between banks in which the owners have a significant stake/influence in the management of a bank and those banks in which ownership is relatively widely dispersed with no or insignificant influence in management. The paper categorises the former banks as shareholder controlled and the latter as managerially controlled. Based on agency theory, the principal hypothesis that the risk levels exhibited by shareholder controlled banks as against managerially controlled banks will systematically be different is tested.

2.0 Problem Statement

The problem that this paper is concerned with relates to some key elements of corporate governance that are of interest to bank regulatory authorities focussing on relative risk levels in banks and the possible incentive features that facilitate or constrain such risk levels. The concerns in the paper relate to the implications of ownership structure on the incentives frontier of a manager. Focus is on relative risk features exhibited by banks in which management has significant ownership stake as against those banks in which management has no or negligible ownership stake. The paper takes the ex-ante view that risk levels in banks will be affected by such structures subject to the constraints/incentives given by the appropriateness and effectiveness of the regulatory framework.

Banks, like any other organisation, can be distinguished by the different relationships between managers and various other stakeholders of the bank.[1] In view of these inherent different relationships, banks are also subject to agency problems that arise because there is a cost to the writing and enforcement of contracts (Demsetz 1983). It is because of this that contractual relations between principals and agents are important in that they impact on a bank's value depending on how such contracts interface with available opportunities for value-added risk management. Because of prevailing asymmetries in information concerning bank investment choices and the lack of contracting opportunities on specific risk choices that banks make, it is not possible to have completely enforceable contracts in place (Fama 1980). The incompleteness of contracts concerning investment policies of banks creates risk-shifting incentives for management. These could sometimes lead to excessive risk taking in banks thus threatening the bank's financial state should such projects fail. Such a situation is not desirable given the high level of leverage in banks' financial structures and therefore it is a problem of concern to the bank regulator. Because the manager plays an important role in the bank's risk-taking process, the manager's incentives frontier remains an important or ultimate target for regulatory policy.

The importance of the bank risk management objective, in this regard, matters because of the fact that the interests of all the stakeholders in a bank are rarely, if ever aligned. Thus the paper focuses on possible conflicts of interest between managers, shareholders and regulators. Theories of delegation suggest that banks and bank regulators perform delegated functions that make them creditor, including depositor, representatives though in different contexts. Banks perform the delegated function of monitoring borrowers whilst the regulatory authorities perform the delegated function of monitoring the banks (Diamond 1984; Dewatripont and Tirole 1994). Amongst all these interest groups, a bank management is considered to be key to the prudent operations of any bank. The choice of a bank's investments and the effort type that management applies to the risk-management process

[1]Fama and Jensen (1983) identify four types of such organizations: (1) open corporations characterized by almost complete specialization of decision management and residual risk bearing; (2) closed corporations or proprietorships in which management and ownership overlap significantly; (3) financial mutuals in which the residual claimants are also the customers/creditors of the organization; and (4) nonprofits in which primary objective is not cash-flow generation and as such they have no residual claimants in the traditional corporate finance sense.

will therefore have a bearing on the long term financial viability of a bank. To the extent that differences in ownership type affect management's utility function differently, it follows that the effort type that management applies to the risk management process will be different given different ownership types. In turn, a banks long term solvency is likely to have different probabilities of being sustainable under different bank ownership types.

This paper identifies and treats the manager as central to the success or failure of a bank in view of the manager's advantage relating to the knowledge of *insider* information required in the bank's choice of an optimal investment policy. The paper therefore tries to answer the following question and the two attendant hypotheses.

Question: Did bank ownership structures and the adequacy of legal frameworks have any systematic impact on relative risk levels exhibited by banks operating in the ESAF region between 1991 and 2000?

H_1: Shareholder controlled and managerially controlled banks systematically exhibited different risk features between 1991 and 2000;

H_2: Due to weak governance institutions, the adequacy or inadequacy of legal frameworks in the ESAF region did not significantly impact on risk levels exhibited by banks between 1991 and 2000.

The relevant theoretical base primarily relate to agency theory, regulatory theory and risk theory.

3.0 Problem Specification

The study uses a proxy for risk that captures developments in a bank's capital account. Most regulatory frameworks consider capital as the "first pillar" guarding banks against financial distress[2]. Any development that impact on a bank's capital and reserves account is, therefore, linked to that bank's relative financial health. Given that capital primarily acts as a buffer against losses, variations in the capital and reserve accounts more accurately reflect the inherent risk of failure in a particular bank to the extent that such variations are calculated based on accurate information. The model is based on the derived relative risk status based on a banks obtaining risk weighted capital state ex-post. On this basis, relatively high or low risk features can be inferred at that particular time and the status of a bank's relative risk state thus determined (also see Santomero et al 1977).

As an indicator of problem (high risk) banks, the model is not, and does not claim to be, a predictor of bank failure. This is because not all problem banks fail. In fact, under normal circumstances very few problem banks fail because of both internal and external interventions to their possible failure states. The spirit and intent of the model is to discriminate between relative risks exhibited by banks using developments in the capital account. This is with a view to assess possible correlation between the relative risks that banks exhibit and the ownership structures obtaining in these banks. The model is developed on the premise that the movement of the total bank capital account assumes a stochastic time series process that has to be specified.

Having regard to the discussions above, the problem can be stated as follows:

[2]This position is reaffirmed by the current ranking of capital adequacy as "pillar number one" under the New Basle Capital Accord Proposals.

Bank A has capital and reserves on risky assets of C_0 at time t_0. The capital and reserves are available to meet adverse fluctuations of the business and consequently minimize the probability of failure or ruin of the bank. A regulatory capital constraint obtains in that regulators have set a specified risk weighted capital adequacy ratio, ϕ, as a trigger point for regulatory intervention.[3] Such intervention may comprise either discretionary or mandatory measures or indeed a combination of both depending on the obtaining country specific regulatory framework. In each operating period, the bank chooses an investment portfolio. The returns on these investments are stochastic with positive expectation. If at the end of the period the bank's risk-adjusted capital ratio falls below ϕ, such a bank would have failed to satisfy the regulatory minimum capital requirements and will thus fall under the category of problem bank that is considered to be relatively high risk in the context of this paper. As the bank conducts its business, the capital and reserve account will be subject to variation over time on account of changes in the values of liabilities and assets of the bank. This is because the net effects of such changes are always captured in the capital account. Generally, because both the quantum and pattern of these changes are not known and therefore random, determining the state of the capital account at any given point in time is problematic. Because of this, the state of the capital account C_t at some time t would be subject to a stochastic process involving random additions and deletions to the capital account. The study relies on the ex-post capital state whose derivation, nevertheless, follows a similar stochastic process.

As envisioned under the classical theory of risk, the ruin or bankruptcy of a bank would ultimately mark the end of the game (Karl 1969). Given this reasoning, it logically follows that amongst the issues that stakeholders in the bank will be interested in is the probability of this event and the steps that could be taken to bring this probability to levels that are acceptable. For regulators this would imply an intervention policy that will impact on the expectations of ruin probability negatively. Models of this nature have now been extended to the extent that financial ruin of a bank does not necessarily end the game. Several forms of rescue extending to refinancing and mergers have now become a common feature in these models.

The methodology bases its estimation of relative risk using capital and reserve positions obtaining in a bank at a particular point in time that is effectively a product of the stochastic process generating variations in the capital account from some past time period, say t_{t-1} up to that particular point in time, say t_0. The objective is to determine, ex-post, the relative risks exhibited by banks at some time t, arising from developments in the capital and reserve account. For reasons explained in Section 4 below, the study takes 10% of risk-adjusted capital as the cut-off point between banks that are relatively high risk and those that are relatively low risk. In this regard, high risk is defined as $C_t < \phi$ and relatively low risk as $C_t \geq \phi$, where C_t is capital and reserves obtaining in a bank at time t adjusted against the risk profile of a bank's asset composition.[4] The model defines the total capital and reserves account obtaining at the initial state as C_0, with the change in capital and reserves over time-period 1 as a_1. The total changes in the capital and reserve account, M, in the time $(0, t)$, given that k changes have occurred, is given by

[3] ϕ is assumed to be time invariant in the short to medium term, but time variant over the longer term on account of regulatory review.
[4] The risk weighting is based on the 1988 Basle capital adequacy framework which was the applicable framework in the region over the period of interest to this paper..

$$M = a_1 + a_2 + ... + a_k. \quad (1)$$

The distribution function of the total change in the capital account, M, is given by the k-fold convolution of $f(a)$. It follows, therefore, that
=

$$M = \sum_{i=1}^{k(t)} a_i \quad (2)$$

Where M is as earlier defined and k (t) is the number of changes which occur in the capital and reserve account in the period (0,t). Thus the level of the capital and reserve account, C_t, at any point t, will have been determined by the starting capital and reserves stock, C_0, plus the sequence of random changes, M, from 1 to t, i.e.

$$C_t = C_0 + \sum_{i=1}^{k(t)} a_i \quad (3)$$

Using the definition of high risk/problem bank previously developed, relative risks in banks will be determined by the deviation of a bank from the regulatory risk-adjusted capital and reserves benchmark ratio ϕ or 10% for countries comprising the ESAF region.

4.0 Discriminant between Low and High Risk Banks

The risk-adjusted capital ratio calculated based on the 1988 Basle Committee for Banking Supervision (BCBS), Capital Accord is used to discriminate between relatively high and low risk banks. The BCBS internationally recommended minimum risk-adjusted capital ratio level for internationally active banks is 8 percent. However, most regulatory authorities will subject banks to some regulatory review should a bank's ratio decline to an ex-ante determined level, for example 10% under the US Prompt Corrective Action (PCA) rules, with the intent of correcting a possible bad state before the ratio degenerate to the prescribed minimum and beyond. Further, with a view to avoid such 'corrective' interactions with regulators, most banks ensure that they operate with a capital level well above such predetermined ratio levels. [Wall and Peterson (1987) and Furlong, F.T. (1992), Aggarwal (1998), Kane, E 1989]

Given this background and the fact that the primary interest of this paper is to establish whether or not ownership structure impacts on the *relative* risk exhibited by banks, a bank's failure probability becomes irrelevant and as such the approach is to *discriminate* banks on the basis of *relative risk*. In determining the appropriate *cut-off* point for purposes of discriminating between relatively high and relatively low risk banks, the paper took into account the formal capital adequacy requirements obtaining in the ESAF region between 1991 and 2000. The most current information available at the time of making this determination indicated that formal regulatory capital requirements were generally higher than the BCBS prescribed minimum with approximately 75 percent, (9 from 12), of the countries covered from this region, having a risk-adjusted capital adequacy ratio

requirement above 8 percent. The requirements range from 8 percent, the minimum prescribed by BCBS, to 15 percent with a regional average of 10 percent[5]. On this basis therefore this paper uses the obtaining average formal ratio requirement of 10 percent as the discriminant level between 'relatively' high risk banks and 'relatively' low risk banks. A bank is therefore modelled to be relatively high risk if that bank's risk-adjusted capital adequacy ratio is less than 10 percent. The 10% cut-off point between relatively high and low risk banks is also consistent with international regulatory architecture. For example, in the USA, under PCA rules as designed under the Structured Early Intervention and Resolution (SEIR), regulatory framework, a bank with a 10% risk based capital ratio is categorised as well capitalised. A bank with a risk based capital ratio below 10% would attract mandatory and possibly additional discretionary sanctions that are graduated based on level of the capital deviation from the well capitalised level.(Benston et al. 1998). Otherwise a bank is considered to be adequately capitalised and hence relatively low risk. This variable is modelled as varying across both time and banks.

5.0 Methodology

Two stages were adopted for investigating the problem. The first involved the finding of a proxy for capturing risk levels in banks. A bank's capital and reserves account variable was found suitable for this purpose. The rationale for this is explained in Section 7 below. The second stage involved establishing the extent to which different ownership/control structures relate to the relative risks exhibited by banks. The study classified banks' risk states based on the adequacy of regulatory capital as prescribed by the BASLE framework. The idea was to establish whether or not a systematic pattern exists between risk features exhibited by banks based on ownership/control types as defined by this paper. Using the same process, an attempt is made to establish the extent to which the risk states exhibited by banks are related to the adequacy or inadequacy of the regulatory and supervisory frameworks as depicted by statutes and regulations. To facilitate this, the logit regression model is specified since the dependant variable is modelled to assume a dichotomous binary format as explained in Section 8 below.

In this paper *classification* is emphasised. For this reason, the paper does not place emphasis on causal effects and hence does not dwell on the determination of the significance of the variables found theoretically relevant in influencing relative risk between shareholder controlled and managerially controlled banks. The paper primarily tries to confirm the extent to which relative risk levels exhibited by banks operating in the ESAF region between 1991 and 2000 were systematically different based on ownership/control structure. However, for purposes of discussing the effect of the adequacy or inadequacy of laws on bank risk taking behaviour, the statistical significance of the explanatory variable for the regulatory environment is discussed. The assessment framework for the adequacy of the regions regulatory frameworks was based on Rossi (1999).

[5]Botswana had the highest minimum risk-weighted-capital adequacy ratio requirement over this period after having adjusted it upwards from 8% to 15% in 1998 as a precaution against risks associated with the full liberalisation of exchange controls as well as the Y2K problem. [Mwape 2005]

6.0 Data

All commercial banks operating in the ESAF region between 1991 and 2000 that had data available were included in the sample[6]. Thus the paper covers a period of ten years. The sample was sub-divided into ownership/control types stratified based on a banks corporate organisation type. This served as an indicator of managerial or shareholder control. Managerially controlled banks are defined as those banks that are organised, or are subsidiaries of banks that are organised as open corporations characterised by almost complete specialisation of decision management and residual risk bearing. Shareholder controlled banks are those banks that are organised, or are subsidiaries of banks that are organised as closed corporations or proprietorships in which management and ownership overlap significantly (also see Fama, 1980).

Based on questionnaire responses and actual interviews with supervisory authorities from the ESAF region, it was confirmed that small domestic/local and a majority of the small regional banks fall in the category of shareholder controlled banks. In these bank types, the owners have significant influence, directly or indirectly, on the executive functions. Because of this, these bank types were all classified as shareholder controlled in all the ESAF countries captured in the study. In the same vein all banks operating in the region that are subsidiaries of large internationally active banks have diverse ownership and hence have been classified as managerially controlled. Bank specific data relevant for this study was sourced from the BankScope Dataset[7].

A number of expected problems with the data can be highlighted; first, given the high inflation levels obtaining in a majority of the covered countries over this period, accounting profits for banks are likely to be overstated whilst the balance sheet assets and hence equity/capital often understated. The two multiplicative errors will impact on the calculated return on average assets ratio that has been used in the regression model to proxy managerial efficiency. Second, banks in a majority of the covered countries have different financial year ends. The resultant variations in reporting periods imply that inter-bank comparisons will effectively be based on accounting reports covering different periods. Third, variations in accounting practices and policies between banks and countries will affect the comparability of the resultant ratios and the quality of bank specific financial data such as that relating to asset quality. For this reason, distortions in data relating to variables such as earnings are likely, particularly with the domestic and a majority of the regional banks given the weak regulatory and supervisory enforcement state in the region with regard to provisioning rules over this period (Mwape 2000, Maimbo 2002, Brownbridge 1998, Mwape 2005).

7.0 Variable Selection

The study has five principal variables of interest from a theoretical perspective. First, a response variable to proxy bank risk level, banks' *risk-adjusted capital adequacy ratio (categorical)*, was found to be appropriate for this purpose. This is a capital adequacy ratio that captures the inherent risks of assets comprising the balance sheet and is used to judge the adequacy of a bank's tangible capital having regard to the risks inherent in that bank's balance sheet; second, a bank's *ownership/control structure (categorical)* with the extent of insider ownership determining the discrimination between shareholder controlled banks

[6]The study does exclude government owned banks except for those that are subject to private sector management contracts as was the case with some banks in Uganda over this period (Brownbridge 2002).
[7]Bankscope is a comprehensive global database containing information on public and private banks.

and managerially controlled banks; third, the *adequacy of the regulatory framework (categorical)* under which a bank operates with the Basle minimum standards being used as the adequacy assessment base; and fourth the *bank size (categorical)* variable using the US dollar equivalent of the value of a bank's total asset base. One additional control variable, *return on average assets*, was co-opted into the model on the basis of its importance in assessing management performance. There is need to restate, however, that the statistical significance of these variables are not of critical interest given the primary context of this paper which is *classification* or *discrimination* between managerially and shareholder controlled banks based on relative risk. However, logit results showing the estimated coefficients are examined with a view to comment on the significance of the adequacy of regulatory framework variable in explaining the relative risks exhibited by the two bank types.

These variables are discussed in detail below:

7.1 Bank Risk-Adjusted Capital Adequacy Ratio

The risk adjusted capital adequacy ratio expresses the ratio of capital as a percentage of total risk adjusted assets. This ratio assesses the adequacy of capital in a bank based on the level of assets that have been adjusted for risk. The framework on the basis of which risk adjusted assets are calculated as well as the tangibleness of capital is determined is explained in the BCBS Capital Accord of 1988. From a regulatory perspective, this ratio is a key indicator of a bank's financial condition.

In this paper the capital condition obtaining in a bank is considered to be an adequate primary basis upon which to discriminate between relatively high and low risk banks. The paper does acknowledge a liquidity crisis as a problem to the extent that where a bank that is faced with such a financial state has an overall solvent financial condition, such a bank would normally be able to access temporal external funding from, for example, the market or the lender of last resort[8]. For this reason, this ratio when prudently calculated should work as the most adequate failure mitigant effectively implying that the higher the ratio the lower the probability of ruin for a bank. It is necessary to be weary of the fact that the prudence with which banks have come to be regulated worldwide has implied speedy implementation of corrective measures to deterioration in bank risk-adjusted capital ratio levels[9]. This situation has meant that banks satisfying the problem bank category on the basis of low risk-adjusted capital ratios have become a relatively rare event compared to the situation obtaining in the 1980's for example. (Benston and Kaufman, 1998, and Aggarwal, et al., 1998). The appropriateness of the risk-adjusted capital adequacy ratio proxy lies in the fact that the derivation of this ratio follows a process that weights a bank's on and off-balance sheet exposures with a risk factor before relating such exposures to a banks underlying capital. In this regard, it offers a relatively good risk proxy given that we are dealing with banks operating in a region where share price is not an option due to absence of efficient capital markets in a majority of the countries comprising the ESAF region.

[8]Under prudent lender of last resort frameworks, accessing central bank loans may require more than a bank merely being solvent. The need to assist such a bank will have to be evaluated in the broader context of other monetary and financial sector policy considerations that are pertinent at the time.
[9]The actual process of classifying banks into problem and non-problem banks involves more than just a review of the capital adequacy position of a bank. However, capital adequacy is emphasised as it is considered to be the principal "pillar" to a bank's viable existence.

7.2 Control (Ownership Structure)

It has been noted that due to monitoring costs, owners of corporations, particularly when widely dispersed, will individually have incentives to shirk if they work as a team. Further, the placement of ownership and control in different parties creates possibilities for conflict between such parties (Fama and Miller, 1972). Consequently, the two parties may end up pursuing different objective functions. This paper has made a distinction regarding the extent of this conflict between banks that the paper refers to as a managerially controlled and those referred to as shareholder controlled. Because of this separation between ownership and control, it has been argued that a bank management may, in certain instances, have reasonable latitude over the shareholder in making decisions that relate to the utilisation of a corporation's resources.[ibid] Conflicts of objectives may therefore arise between a bank's management and its shareholders. For this reason, the paper acknowledges shirking and non-pecuniary income as being part and parcel of a manager's utility function whose scale is greatly influenced by the ownership structure, particularly the extent to which managers are also owners.

The ownership structure variable enters the model as a dummy explanatory variable that varies across banks but is assumed to be time invariant in the short-term and hence for this purpose. Shareholder controlled banks are categorised as 1 as they are hypothesised to have a relatively riskier investment frontier. Managerially controlled banks are categorized 0 as their investment frontier is hypothesised to be relatively low risk. The main thrust of this paper however remains that of classification. Emphasis remains that of establishing that risks exhibited by the two ownership types in banks are different.

7.3 Adequacy of Regulatory Framework

An adequate and effective regulatory framework will act as a disincentive to excessive risk taking by banks as well as encourage the prudent management of the risks that banks are exposed to. On the basis of the BCBS minimum standards, countries captured by the sample are subjected to an assessment of the adequacy of the obtaining regulatory frameworks on the basis of compliance to minimum standards as portrayed by these countries statutes, complemented by IMF assessments as captured by the country specific reports only. Based on Rossi's 1999 framework, a country is classified as having a regulatory framework that is either adequate or inadequate. The variable enters the model as a dummy with inadequate regulatory frameworks modelled as 1 and hence receiving prominence in the model. This prominence of regulatory frameworks that are inadequate is necessary as we attempt to confirm the odds of relatively high risk banks obtaining in environments where regulatory statutes are inadequate as against environments in which regulatory statutes are adequate.

7.4 Total Assets (size)

Size tends to impact on a banks risk profile should one take into account the economies of scope and scale that come with it. In this regard, large banks are relatively more able to diversify their portfolio and are therefore, through this avenue, better able to manage risk. It is also an established phenomenon that shareholder/manager agency problems are less pronounced in small banks as they generally are able to return classical type ownership structures in which the owner is also the manager or has significant influence on the management of the bank (Demsetz, 1983). On this basis, this paper proceeds on the premise that relatively small banks are likely to have higher risk features on account of

diversification constraints as well as on account of having classical or near classical ownership structure features. Shareholder utility maximization incentives will prevail in such banks since ownership and control will be by the same agent.

The nature of the economies of the ESAF region is such that (dis)economies of scale are quite a common feature, and there is a prevalence of market imperfections [Mwape 2005] . For this reason, small domestic/regional banks operating in the ESAF region environment are likely to bear considerably more risk of financial failure than the relatively large banks making size an important explanatory variable in studies looking at bank risk. For purposes of comparability, we use the US$ converted asset bases of the banks in the covered countries. Banks that have an asset base above the equivalent of US $40, 000 are classified as large banks, and banks that have an asset base of the equivalent of US $40, 000 and below have been classified as small banks for the purpose of this study.

7.5 Return on Average Assets

This ratio relates operating profits to total resources under management and consequently provides one critical measure of a bank's management performance. It measures the net income generated from the employment of the total assets of the bank and is thus less subject to distortions than, for example, the return on equity ratio. This is because any inaccuracies in the loan loss provisions will have less of a relative impact on total assets than on the smaller capital figure. The ratio indicates the competence with which a management has been converting the institutions assets into net earnings.

Assuming that appropriate accounting principles are consistently applied, a bank with a higher return on assets ratio will be inherently sounder than one with a lower ratio. A consistently positive and relatively high ratio over time will imply a low probability of capital inadequacy and consequently failure for that bank. The ratio will therefore also enter the model with a negative sign given that a higher ratio will impact negatively on a banks relative risk and therefore on banks overall risk given this paper's perspective. There is some evidence to suggest that the return on assets performs better than the return on equity as an indicator of potential failure (Maimbo S. M., 2002).

8.0 Logistic Model Specification

The response/outcome variable, *bank relative risk*, is discrete taking two possible values, [*relatively high or relatively low risk*]. Given that the outcome variable is binary or dichotomous, this paper found the specification of a logistic model to be most appropriate. The paper classify banks based on *relative risk* and calculate the odds ratio of shareholder banks exhibiting systematically different risk features compared to managerially controlled banks. The paper also examines whether or not the adequacy of regulatory frameworks had any influence on the relative risk features exhibited by the two bank ownership types in the ESAF region between 1991 and 2000. For this purpose only, the significance of the adequacy of regulatory framework variable in the model will come into consideration.

Since risk, R_i, is a binary dependent variable assumes values of 1 for a relatively high risk and 0 otherwise, we let p_i be the probability that $R_i = 1$ and hence $(1 - p_i)$ is the probability that $R_i = 0$. The 'odds ratio'[10] that a bank will be a relatively high risk bank, will therefore be

[10]The odds ratio represents the ratio of the number of observations that fall in the relatively high risk/problem bank category to the number of banks that are relatively low risk/safe banks.

$$\frac{p_i}{1-p_i} \tag{4}$$

Taking the logarithms of the 'odds' we obtain the relevant logit transformation that will represent the dependent variable 'risk':

$$R_i = \log p_i/(1-p_i) \tag{5}$$

Or

$$R_i = \log p_i - \log(1-p_i) \tag{6}$$

Where R_i is a dichotomous binary category depicting the probability of a bank being relatively high risk given the total sample of banks; p_i is the probability that a bank is a relatively high risk and $(1-p_i)$ is the probability that a bank is relatively low risk.

Even though the primary purpose of this study emphasises classification between bank ownership types, the paper assigns the value 1 (one) to a bank that is high risk (relatively) because this is the state that is of primary interest to most regulatory authorities. By so doing, we are giving prominence to relatively high risk banks in the model. The logistic model used assumes the following general form;

$$R_{it} = \beta' X_{it} + \upsilon_i \quad \text{if } R<10$$

$$R_{it} = 0 \quad \text{if } R=10 \tag{7}$$

Where:

R_{it} is a binary response variable used as a proxy for relative risk. Each banks risk-adjusted capital adequacy ratio is used as the proxy;

β is a $k \times 1$ vector of unknown parameters;

X_{it} is a $k \times 1$ vector of independent variables (covariates); and

υ_i are the residuals.

The logistic distribution is assumed, hence:

$$\Pr(R=1|x)=\int_{-\beta' x}^{\infty}\frac{e^{(v)}}{(1+e^{v})^{2}}dv_i=\frac{e^{\beta' x}}{1+e^{\beta' x}} \quad (8)$$

The expression above gives the predicted conditional probability of a bank being relatively high risk.

The paper considers financial portfolios to be more flexible in the short run than ownership structure[11] and regulatory frameworks. The implication of this is that, in the short term, transaction costs relating to endogenous changes in ownership structure or indeed regulatory frameworks[12] are higher than those relating to changing the financial structure of bank portfolios to alter risk[13]. For this reason, in the short term, risk can be viewed as "an endogenous decision of the bank impacted by its ownership structure, other control variables and the regulatory environment". [Saunders A et al (1990)]. In this context therefore, a bank's risk status will be influenced by, among others, existing ownership structure and regulatory frameworks, that bank's size, quality of assets, in addition to some other factors. Again since the focus is *classification*, less emphasis is placed on the statistical significance of the other explanatory variables other than the adequacy of regulatory framework variable for reasons explained earlier.

The model assumes the following mathematical form:

$$totcapD10_{it} = f(control, aregfrwk, totassD, Lroaa) \quad (9)$$

A full definition of the variables is given in *Table 1* below.

The model has predominantly qualitative explanatory variables with one quantitative one. For this reason we include *dummy variables* in the specified model below. The dummy variables will specifically capture the effects of ownership structure (shareholder controlled or managerially controlled), the state of the obtaining regulatory and supervisory framework (adequate or inadequate), and size (large bank or small bank).

The stochastic form of the logit regression model is specified below:

$$R_{it} = \alpha + \beta_1 D_i^{os} + \beta_2 D_j^{RES} + \beta_3 D_i^{SIZE} + \beta_4 lroaa_{1t} + \upsilon \quad (10)$$

where: R_{it} is as defined in (7) which is the binary dependent variable capturing the adequacy or inadequacy of each bank's risk weighted capital ratio hence depicting the relative risk level of a bank;

[11]For example, changes through the market for corporate control.
[12]For example revising/amending the existing banking laws.
[13]For example, changing the composition of bank deposits, loans and securities.

D_i^{OS} = 1 if a bank is classified as shareholder controlled
0 otherwise (i.e. if a bank is classified as managerially controlled);
D_j^{RES} = 1 if a country's regulatory and supervisory framework is inadequate
0 otherwise (i.e. if regulatory and supervisory framework is adequate);
D_i^{SIZE} = 1 if total average assets equal to or less than US $40,000
0 if total average assets are more than US $40,000;
$lroaa_{1t}$ = a bank's return on average assets ratio;
α = the intercept term;
β 's = the coefficients for the independent explanatory variables;
υ = the error term.

The ownership structure and adequacy of the regulatory framework covariates are expected to remain time invariant over the sample period for the majority of the banks. This is because these variables are normally relatively stable over short time horizons. There are a number of reasons that rationalises the treatment of these two variables as being *time invariant* between 1991 and 2000 for the ESAF region in spite of significant changes to particularly laws and regulations in the earlier part of the period of interest. Firstly, changes to the laws and regulations in a majority of the ESAF countries did not affect ownership structures that were obtaining in banks prior to these changes. This was because ownership structures obtaining in banks prior to the legal reforms were *grandfathered* and only new entrants into the banking sector were affected by the new laws.

To this extent therefore, ownership structures remained time invariant. Secondly, with regard to the applicable regulatory framework, the majority of the countries in the region had already had their laws and regulations amended to co-opt the BCBS recommended framework by 1993.[14] In fact, in some instances such as that obtaining in Zambia, key guidelines on large credit exposures, capital adequacy, insider lending and ownership concentration were already in place by 1993 prior to the appropriate legal provisions being firmed up in statute form in 1995 and 1996. For countries like Tanzania, private sector banking which is the subject matter of this paper only commenced in 1991 after the Banking Act came into force.

The relevant banking legislations for Namibia, Swaziland, and Lesotho closely replicated what was obtaining in South Africa and hence the South African Deposit Taking Institutions Act of 1990 also known as the Bank Act of 1993 was the more relevant banking legislation for these jurisdictions. It has always been a key objective of the obtaining Common Monetary Area protocol between South Africa, Namibia, Swaziland and Lesotho to include bank regulation and supervision in its goals of convergent monetary, fiscal and exchange rate policies (Bossone et al.,2002). Given this background, the regulatory frameworks for a majority of the ESAF countries also remained time invariant to a large extent over the period of interest.

Consistent with the apriori expectation regarding weak governance institutions in a majority of countries comprising the ESAF region, the dummy for the covariate on the adequacy of regulatory and supervisory framework was not expected to exert any significant impact on the risk states obtaining in banks operating in a majority of the countries

[14]Kenya and Malawi (1989); Tanzania (1991); South Africa (1990/93); Uganda and Zambia (1993); and Botswana 1995 even though the 1975 Act was generally considered to be adequate.

comprising this region. For this reason, even though we expect this variable to have a positive sign, effectively implying a positive impact on a bank's relative risk in jurisdictions with inadequate regulatory and supervisory frameworks, the significance of this variables impact on risk is hypothesised to be negligible.

With regard to shareholder controlled banks that have been modelled as a dummy assuming the value 1 (one), it is also a-priori expected that the sign will be positive implying that shareholder controlled banks will exhibit relatively high risk features and consequently positively contribute to a banks high relative risk.

With regard to the size variable, theory suggests that bank size does, on average, matter. The model gives prominence to small banks that are modelled as a dummy assuming the value 1 (one). This is because small banks in the ESAF region tend to be shareholder controlled with ownership and control normally coinciding in one agent in such banks (Brownbridge et al., 1998; Maimbo, 2002]. Further, the shallowness of the financial markets in this region acts as a constraint to wide ownership of particularly small local banks that fail or opt not to be listed on the equally shallow local stock exchanges where they exist. Contrary to this state, all the banks that meet the definition of managerially controlled are widely owned by virtue of their parent companies being publicly listed in their respective jurisdictions of incorporation. Consistent with this, the 'size' variable is expected to enter the model with a positive sign implying that the smaller the size of a bank the more vulnerable it is to risk.

9.0 Empirical Results

The model was estimated as a logistic model using STATA software. Given that the primary purpose of this paper is *classification* between ownership types, the estimation only included those explanatory variables that are theoretically relevant to this study. This is because the objective is not to necessarily explain the extent to which each variable explains developments in a banks capital account, but rather to systematically *discriminate* the effect of different ownership structures on the relative risks exhibited by banks. However, for elaboration purposes only, the statistical significance of the explanatory variables is discussed in brief in this section. Table 1 below defines the variables:

Table 1 - Definition of Variables

Variable	**Definition**
TotcapD10	Risk adjusted capital ratio modelled as a qualitative dependant variable, = 1 if bank risk-adjusted capital adequacy ratio is less than 10%, = 0 if bank risk-adjusted capital adequacy ratio is greater than or equal to 10%. "Gives weight to relatively high risk banks in model."
Icontrol2	Shareholder controlled bank modelled as the dummy assuming the value 1.
Iregfrwk1	Inadequate regulatory framework modelled as the dummy assuming the value 1.
ItotassDM21	Small banks with asset base equal to or less than US$40,000. These have been modelled as the dummy assuming the value 1 for the size variable.
Lroaa	log of the ratio of return on average assets.

A logit/logistic regression model based on the variables captured in Table 1 was run with the following results:

Logit Econometric Estimates.

logit totcapD10 _Icontrol_2 _Iaregfrwk_1 _ItotassDM2_1 Lroaa, level(90)

Table 2 - Logit Econometric Estimation Results

Iteration 0:	log likelihood	=	-85.560204
Iteration 1:	log likelihood	=	-75.976684
Iteration 2:	log likelihood	=	-75.390631
Iteration 3:	log likelihood	=	-75.383371
Iteration 4:	log likelihood	=	-75.383369
Logit estimates	Number of obs	=	161
	LR chi2(4)	=	20.35
Log likelihood = -75.383369	Prob > chi2	=	0.0004

totcapD10 |	***Coef.***	***Std. Err.***	***z***	***P>|z|***	***[90% Conf.***	***Interval]***
_Icontrol_2 |	-.9182142	.5102399	-1.80	0.072	-1.757484	-.0789442
_Iaregfrwk_1 |	.0080701	.5286701	0.02	0.988	-.8615148	.8776549
_ItotassDM~1 |	-.1402335	.4119815	-0.34	0.734	-.8178827	.5374157
Lroaa |	-1.10961	.3314306	-3.35	0.001	-1.654764	-.5644547
_cons |	-.3674127	.3224009	-1.14	0.254	-.897715	.1628897

The logit iterative estimation procedure maximizes the logarithm of the likelihood function. This function is shown at the top of Table 2 above. At iteration 0, the likelihood describes the fit of the model with the constant as the only explanatory variable. The last log likelihood describes the fit of the final estimated model.

$$L = 0.3674127 + (-0.9182142 Icontrol2) + 0.0080701 Iaregfrwk1 + (-0.1402335 ItotassDM) + (-1.10961 Lroaa)$$

Where L represents the predicted logit, or log odds, of a shareholder controlled bank being relatively high risk i.e. with capital adequacy ratio < 10

$$L = \ell n\left[p(totcap10 = 1)/\ p(totcap10 = 0)\right]$$

An overall χ^2 test at the upper right evaluates the H_o that all coefficients in the model, except the constant, equal zero;

Where $\ell n\varsigma_0$ is the initial or iteration 0 (model with constant only) log likelihood, and $\ell n\varsigma_1$ is the final iterations log likelihood. Hence,

$$\chi^2 = -2\left[-85.56024 - (-75.383369)\right] = 20.3537$$

The probability of a greater, χ^2 with 1 degree of freedom (the difference in complexity between initial and final model), is low enough at 0.0004 to enable us reject H_0. Following from this therefore it can be inferred that one or more of the included independent explanatory variables do have a significant effect on relative risk exhibited by banks given the defined risk criteria.[15]

Logistic Econometric Estimates

logistic totcapD10 _Icontrol_2 _Iaregfrwk_1 _ItotassDM2_1 Lroaa, level(90)

Table 3 - Logistic Estimation Results

Logit estimates	Number of obs	=	161
	LR chi2(4)	=	20.35
Log likelihood = -75.383369	Prob > chi2	=	0.0004

totcapD10 |	*Odds Ratio*	*Std. Err.*	*z*	*P>|z|*	*[90%*	*Conf. Interval]*
_Icontrol_2 |	.3992314	.2037038	-1.80	0.072	.1724782	.9240915
_Iaregfrwk_1 |	1.008103	.5329537	0.02	0.988	.4225216	2.405253
_ItotassDM~1 |	.8691553	.3580758	-0.34	0.734	.4413652	1.711578
Lroaa |	.3296877	.1092686	-3.35	0.001	.1911371	.5686701

As is evident from the results presented in Table 2, the only difference between the estimated logit and logistic results is that the logistic default output presented in Table 3 contains *odds ratios* in the place of the *coefficients* shown in the logit default output display in Table 2. The log likelihood and the χ^2 statistics are identical for both logit and logistic estimates.

10.0 Interpretation of Results

The logistic results in Table 3 above show that the main variables of interest, shareholder control, and the control variable, return on average assets are statistically significant at the 90% confidence level. The variables for regulatory framework adequacy dummy and size variable dummy are statistically insignificant at the 90% confidence level. It must be mentioned that given that we are more interested in *classification*, the choice of the 90%

[15]The logistic model estimation results presented in Tables 2 and 3 do not display the pseudo R^2 for the simple reason that this statistic lacks the straight forward explained-variance interpretation of the true R^2 in OLS regression. Because of this, routine publication of R^2 values results from fitted logistic regressions has been avoided. Further, low values of the pseudo R^2 are the norm rather than the exception in logistic regression. [Hosmer, David et al (2000), Hamilton, Laurence (2003)].

confidence level of significance is acceptable. As one will note from the P-values in the results table, all the variables other than the *lroaa* were statistically insignificant at the 95% confidence level.

The statistical insignificance of the regulatory framework adequacy dummy variable is plausible from theoretical inference as we have posited that even though jurisdictions may have statutes that comply to the BCBS regulatory architecture, this compliance would not be replicated by the practice on the ground on account of weak governance institutions. In this paper, it is hypothesised that the adequacy or inadequacy of regulatory statutes would not have any notable impact on the risk profile exhibited by both shareholder and managerially controlled banks operating in the ESAF region between 1991 and 2000 given the criteria used in this paper. The statistical insignificance of this variable is therefore consistent with the expectation.

It should be mentioned though that this result is restricted to the local regulatory environment. It is feasible that the adequacy /inadequacy of the *external* regulatory environment that is dictated by the jurisdictions in which the parent banks of subsidiaries of large internationally active banks are incorporated may have a systematic and significant impact on the risk features exhibited by managerially controlled banks that predominate this category. This matter has not been investigated by this paper and remains an area for possible future research work.

The estimate of the odds ratio for control (shareholder control) is 0.40. The odds of a bank that is shareholder controlled being high risk is 0.40 smaller than the odds for a managerially controlled bank (with respect to the other covariates in the model) being high risk at the 90% confidence level.

These results imply that a shareholder-controlled bank is 0.40 times as likely to be high risk as a managerially controlled bank. As will be noted, the odds ratio is less than one, which implies that the covariate (shareholder control) is 'protective' for the outcome[16] (Hosmer., et al 2000). Because the odds ratio is less than 1, then the shareholder-controlled banks are less likely to carry high risk according to these results.

This result has to be placed in context. First, because of weak governance institutions, creative accounting is quite prevalent amongst banks categorised as shareholder controlled. Supervisory authorities interviewed from the region confirmed that incidences of under providing for bad loans and consequently overstating capital positions are quite high amongst this group. For this reason, it is possible for banks falling under this category to exhibit relatively low risk on paper, given the assessment criteria, even though the underlying financial state of the bank may deviate from what the numbers show. Because the majority of these banks are small and do not have an international dimension to their operations, the only regulatory constraint they face will be the local one. To the extent that the efficacy of enforcement of the regulatory framework is weak, incentives will always exist for such banks to overstate their capital positions and hence portray low risk features for the benefit of the local regulatory authorities.

Second, this paper has chosen a bank risk adjusted capital ratio level of 10 percent as the discriminating level for relatively low risk against relatively high risk banks. Well run banks will normally operate with a level of capital that is relevant from an economic perspective. For this reason, the deviation from the capital level that these banks hold from that which is determined by regulation will be dictated by the economics of having such a

[16]"Protective" in the sense that the odds ratio is less than 1(one) implying that the shareholder banks are, by inference, unlikely to be high risk relative to managerially controlled banks.

deviation. In other words, to the extent that a bank's economic capital falls below that dictated by regulation, the holding of capital in excess of the one prescribed by regulation would be costly.[17] Because of this, the holding of capital by such banks will revolve close to the one prescribed by regulation. What this implies is that in those jurisdictions where the risk adjusted capital ratio requirement is 8%, prudent banks will maintain their risk adjusted capital ratio levels at 8% or slightly above this with a view to keeping their capital levels as close as possible to the economic capital. Economic capital will normally always be less than the capital requirement dictated by regulation. Well run banks in these jurisdictions may therefore actually exhibit relatively high risk features given the criteria articulated in this paper.[18]

Third, the incentive features that are currently in place in some advanced market financial systems that encourage banks to maintain relatively higher risk adjusted capital ratios than those prescribed by regulation remain absent in a majority of the ESAF countries[19]. For example, the absence of legally binding Prompt Corrective Action (PCA) Rules and Regulations create incentives for banks to deviate from the prescribed capital requirements. Given that there exist no legal segmentation of banks capital adequacy states, for example, 'well capitalised'; 'adequately capitalised'; 'problem bank' etc, as the case is in some advanced market economies such as the USA, (Aggarwal, 1998), the regulatory costs attracted by deviations from the prescribed minimum capital ratios are dealt with informally, for example through moral suasion, or are totally ignored in jurisdictions where regulatory enforcement on the ground is weak. Thus, the incentives that caused banks to upgrade their capital adequacy levels in, for example, the United States of America, following the introduction of the prompt corrective action rules that had legal backing remain absent in the ESAF region. Further, because regulatory capital will exceed a banks economic capital in most instances, it is prudent for "good banks" to only maintain capital that minimally deviates from the prescribed minimum regulatory capital requirements. This state, compounded by the incentive to overstate the solvency status by the small shareholder controlled banks particularly, makes it possible to have results that may not necessarily fall in tandem with the expectations posited in this paper.

For this reason, therefore, it becomes feasible for managerially controlled banks to exhibit relatively low capital features and hence qualify as relatively high risk banks even though such levels are logical and prudent from a risk management and profit maximisation perspective. Further, because the majority of managerially controlled banks operating in the ESAF region are large, with their parent banks publicly listed with an international dimension to their operations, they are subjected to relatively more elaborate regulatory and prudential oversight. This is partly because they are also subject to the regulatory dictates of the authorities in the jurisdiction where their parent banks are situated. This basically implies that these bank types are less likely to present positions that markedly deviate from what their actual financial states are. In other words, they will more accurately reflect their true financial positions than shareholder controlled banks whose only regulatory constraint remain the local regulatory authorities that may be subject to weak governance institutions.

Fourth, "*signalling*" incentives may come to play given that, even though we infer that shareholder controlled banks might have incentives to misrepresent their financial status, it

[17]Economic capital is that capital set aside by a bank for risk i.e. to cover unexpected losses arising from risk exposure. It is therefore the amount of capital that a bank requires to protect itself with a certain level of certainty against insolvency due to unexpected losses over a given time period. Regulatory capital on the other hand will be that capital that a bank is required to set aside by the supervisory authority based on the supervisory authorities' perception of risk in a supervised bank or banks.

[18]For example, the minimum capital adequacy ratio requirement for South African banks was only raised to 10% from 8% in 1998.

[19]As a matter of prudence, BCBS encourages supervisory authorities, particularly in developing countries to require banks to maintain capital levels that are higher than the prescribed minimum requirements.

is also correct to state that there are shareholder controlled banks that are prudently run. However, because of the "*lemons problem*" ala Akerlof (1970), some shareholder banks may opt to keep capital adequacy levels that are significantly higher than those prescribed by regulation as a means of "*signalling*" to the market their relative financial strength. Such high capital levels may create the necessary *noise* that may positively impact on these banks relationship with the market. In such instances, shareholder controlled banks will correctly exhibit relatively low risk features compared to managerially controlled banks under the criteria defined by this study.

11.0 Conclusion

The results attained in this paper remain consistent with the two principal hypotheses. First, that the relative risk levels exhibited by shareholder controlled banks as against managerially controlled banks will be systematically different. Second, that the adequacy or inadequacy of banking laws and regulations as captured by statutes in the ESAF region had no significant impact on risk levels exhibited by banks operating in ESAF between 1991 and 2000. The results also confirm that ownership type or structure was a factor in explaining the relative risk differentials that banks in the region exhibited between 1991 and 2000. Ownership structure and control is, therefore, an important policy variable in the design of an effective regulatory framework on the ground and it is the conclusion of this paper that there is a need to formally acknowledge this difference by regulatory authorities in the ESAF region.

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What is the Appropriate Nominal Anchor for Inflation in Zambia?

By

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Abstract

This paper seeks to determine the financial variables that have the highest information content in explaining inflation in Zambia. Using monthly data from 1994 to 2005, the results from Cointegration, Variance Decomposition and Granger Causality tests suggest that reserve money and all measures of broad money, do not explain inflation dynamics in Zambia. The results also suggest that the nominal exchange rate explains an insignificant proportion of changes in inflation. However, the results suggest a strong relationship between inflation and currency in circulation with the direction of causality running from inflation to currency in circulation. The latter suggests that currency demand is affected by inflation dynamics. These results are in contrast with the orthodox or monetarist view that the primary cause of inflation in developing countries is the recourse to money creation by governments faced with limited borrowing options and thus set a platform for future research on the significance of structural factors related to food bottlenecks and income distribution.

1.0 Introduction

High inflation distorts resource allocation and complicates economic management. Further, it undermines the incentives for productive investment and reduces productivity growth. High inflation exerts a disproportionate effect on the welfare of the poor. Across the world, as a result of the policies aimed at controlling inflation, inflation has displayed a declining trend since the mid 1990s, for both developing and industrial countries. According to the recent African Economic Outlook 2004/2005, annual inflation had fallen to 7.9 percent in 2004. In Zambia, inflation in 2004 was 17.5 percent, above the average for Africa.

In order to determine the appropriate policy response to this high inflation in Zambia, it is important to establish the nominal aggregates to which inflation is most responsive. In this paper, we seek to determine the relative significance of monetary aggregates in determining inflation in Zambia using a broad set of econometric techniques. Specifically, we will determine the significance of Reserve Money, M1, M2 and M3 in explaining inflation developments. In addition, we will compare the impact of these aggregates on inflation with the effect of the exchange rate and determine whether money or exchange rate based stabilization is most appropriate for Zambia. The paper is organized as follows, in section two we present a brief review of the most recent literature on inflation dynamics for a limited number of developing countries, section three presents the results of empirical tests, section four presents the results of empirical tests based the decomposed CPI while section five concludes.

2.0 Literature Review

Most of the literature on the dynamics of inflation that has been reviewed seems to conform with the orthodox monetarist view of inflation with an exception of results from Zimbabwe.

For instance, Gary Moser (1995) analysed the dominant factors influencing inflation in Nigeria using an error correction model of the inflation process based on money market equilibrium conditions. The results of this study confirm the results of earlier studies which suggest that monetary expansion, driven mainly by expansionary fiscal policies, explains to a large extent the inflationary process in Nigeria. Other important factors are the devaluation of the Naira and agro climatic conditions. It was found that concurrent fiscal and monetary policies had a major influence on the impact of the depreciation of the Naira on inflation.

Loungani and Swagel (2001) analysed the sources of inflation in developing countries and found that money growth and exchange rates- factors typically related to fiscal influences- are far more important in countries with floating exchange rates than those with fixed exchange rates. Inertia factors dominate the inflation process in developing countries with fixed exchange rate regimes in explaining the inflation process. In African and Asian countries with low to moderate rates of inflation, the most important factor was the inertia component which is measured by past realizations of inflation. In contrast, in countries with higher average rates of inflation, the fiscal variables of money growth and the exchange rate changes are predominant.

Rodolphe (2004) analysed the dynamics of inflation in Guinea, during 1992-2003 applying the cointegration and error correction modeling to a bivariate model that includes consumer price and monetary variables. The results confirm the existence of a long run relationship between money supply and consumer prices. Williams and Adedeji (2004) investigated the determinants of inflation in the Dominican Republic during 1991-2002. They found that inflation is explained by changes in monetary aggregates, real output, foreign inflation, and the exchange rate. Long run relationships in the money and traded goods markets are found to exist, but only the disequilibrium from the money market exerts a significant impact on inflation.

Kovanen (2004) in the study on the quest for a nominal anchor for Zimbabwe found a well-defined long run relation between currency in circulation and inflation but not for other monetary aggregates. The conclusion of this study was that currency in circulation has a strong information content for predicting inflation. The results of bi-variate and multivariate causality tests showed that currency in circulation is a strong predictor of the price level whereas other financial variables were generally not. The results found in this paper for Zambia are similar to the results of Kovanen (2004) for Zimbabwe.

3.0 Empirical Analysis

We examine the significance of each financial variable for determining the price level using bivariate cointegration, vector auto-regressions (VAR) and Granger causality tests. In the VAR models, structural shocks are identified using the Choleski decomposition. This is implemented by selecting the appropriate ordering of the variables in the VAR with the most exogenous variables appearing at the end. The results of cointegration tests suggest a significant long run equilibrium relationship between currency in circulation and the price level whereas other financial variables, except the broadest measure of money supply (M3), have insignificant information content in explaining inflation in Zambia. Bivariate causality from the price level to financial variables is also observed in the data. This is counterintuintive as one would expect changes in financial variables to lead to changes in the price level. In the subsections that follow, we describe the results of all bi-variate tests.

3.1 Reserve Money and Inflation

We begin by testing for the existence of a long run equilibrium relationship between reserve money and the price level (measured by the consumer price index) using the Johansen cointegration procedure. Using the Augmented Dickey Fuller testing procedure for unit roots, we found that both reserve money and the price level are integrated of order one. The sample covers 110 monthly observations from April 1994 to May 2003. We use the Akaike Information Criteria (AIC) and the Schwarz Bayesian Criteria (SBC) to determine the order (3) of the cointegrated vector autoregression (VAR) model. The results of cointegration tests are presented in Table 1.

Table 1: Cointegration Analysis of Reserve Money and the Consumer Price Index

NULL	ALTERNATIVE	STATISTIC	95%C.V	90%C.V
r = 0	r = 1	13	19	17
r <= 1	r = 2	9	12	10

The cointegration results suggest that we cannot reject the null hypothesis of no cointegration between reserve money and the consumer price index.

The existence of a cointegrating vector between variables implies the existence of a statistically significant speed of adjustment coefficient in the equilibrium correction model. This in turn implies the existence of Granger causality between the variables. Therefore, to ensure this result is robust, we carry out Granger causality tests and variance decomposition analysis. The results are presented in Tables 2 and 3 respectively.

Table 2: Likelihood Ratio Test of Block Granger Non-Causality in the VAR

Log likelihood	406.2
Log likelihood under the null hypothesis the RM is non causal to inflation	404.7
LR Test of block non-causality	CHSQ(4)=3 (0.55)

The results of Granger causality tests presented above suggest that reserve money does not Granger cause inflation. We also carry out variance decomposition analysis. The results are presented in Table 3.

Table 3: Variance Decomposition Analysis (At 50 months)

Variable	Source of Variation	
	RM	CPI
CPI	0.04	0.96

The results of variance decompositions suggest that reserve money explains an insignificant proportion of the variance in the consumer price index.

3.2 Broad Money and Inflation

In order to determine the relationship between broad money and inflation, we carry out cointegration tests of the consumer price index and various measures of broad money which

are M1, M2 and M3. All these measures are tested for unit roots and are found to be non-stationary in levels but stationary in first differences. We begin by carrying out cointegration tests between M1 and the CPI. The results of cointegration tests are summarized in Table 4 below.

Table 4: Cointegration Analysis of M1 and the Consumer Price Index

Null	Alternative	Statistic	95%C.V	90%C.V
r = 0	r = 1	6.66	19	17
r <= 1	r = 2	3	12	10

The results presented in the table above suggest that we cannot reject the null of rank zero implying that there is no cointegration between M1 and inflation. In order to assure ourselves of the robustness of the results, we carry out Granger causality tests. The results are presented in Table 5;

Table 5: LR Test of Block Granger Non-Causality in the VAR

Log likelihood	505.4492
Log likelihood under the null hypothesis the M1 is non causal to inflation	505.3658
LR Test of block non-causality	CHSQ(1)=3 (0.68)

The above results suggest that M1 does not Granger cause inflation. Variance decomposition results of the consumer price index in a vector auto-regression involving the CPI and M1 are presented in Table 6 below.

Table 6: Variance Decomposition Analysis (At 50 months)

Variable	Source of Variation	
	M1	CPI
CPI	0.01	0.99

The results of variance decompositions suggest that M1 explains an insignificant proportion, one percent, of the variance in the consumer price index.

We now analyse the relationship between M2 and inflation. The results of cointegration tests between M2 and the consumer price index are presented in Table 7.

Table 7: Cointegration Analysis of M2 and the Consumer Price Index

Null	Alternative	Statistic	95%C.V	90%C.V
r = 0	r = 1	9.8	19	17
r <= 1	r = 2	4.2	12	10

The results presented in Table 7 show that we cannot reject the null hypothesis of no cointegration between M2 and the consumer price index. Since there is no cointegration between these variables, we should expect that there is no Granger causality between them

as none of the speed of adjustment coefficients are expected to be significant. The results of Granger causality tests are presented in Table 8.

Table 8: LR Test of Block Granger Non-Causality in the VAR

Log likelihood	502.7
Log likelihood under the null hypothesis the M2is non causal to inflation	501.2
LR Test of block non-causality	CHSQ(2)=2.94 (0.23)

With a p-value of 0.23, we accept the null hypothesis that M2 does not Granger cause the CPI.

We now use the broadest measure of money supply, M3. We begin by carrying out cointegration tests of the CPI and M3. The results are presented in Table 9.

Table 9: Cointegration Analysis of M3 and the Consumer Price Index

Null	Alternative	Statistic	95%C.V	90%C.V
r =0	r=1	19.7	19	17
r<=1	r=2	5	12	10

The results of econometric tests suggest that there exists one cointegrating relationship between M3 and the CPI i.e. there exists a linear combination between M3 and the CPI, which is stationary. In order to test the strength of the cointegrating relationship, we use an equilibrium correction model to test for the significance of the speed of adjustment coefficient. The results from the model are presented in Table 10.

Table 10: Equilibrium Correction Model for the CPI and M3

ECM Equation	ECM Coefficient	T-Ratio(Prob)
M3	-0.0012	-0.03
CPI	-0.047	-4.6

The above results suggest that the CPI responds to deviations from the long run equilibrium relationship between M3 and the CPI. These results imply that M3 is weakly exogenous and that M3 Granger causes the consumer price index. However, to assure ourselves that this is the case, we also carry out Granger causality tests. The results of these tests are presented in Table 11.

Table 11: LR Test of Block Granger Non-Causality in the VAR

Log likelihood	370.2
Log likelihood under the null hypothesis the M3 is non causal to inflation	368.9
LR Test of block non-causality	CHSQ(2)=2.4090 (0.30)

Contrary to the results suggested by cointegration tests, the above results suggest that M3 does not Granger cause inflation in Zambia. However, since we have already found that

there is a cointegrating relationship between the CPI and M3, we go further to test for Granger causality from CPI to M3.

Table 12: LR Test of Block Granger Non-Causality in the VAR (order 2)

Log likelihood	-1179.1
Log likelihood under the null hypothesis the CPI is non causal to m3	-1184.3
LR Test of block non-causality	CHSQ(2)=10 (0.005)

The results of Granger causality tests presented above suggest that we reject the null hypothesis that inflation does not Granger cause M3. These results are counterintuintive as we should expect the direction of causality to run from M3 to inflation. We, therefore, proceed to carry out variance decomposition tests.

Table 13: Orthogonalized Forecast Error Variance Decomposition for CPI.Cointegration with Unrestricted Intercepts and no Trends

	Source of Variation	
Horizon	M3	Own Shock
50	0.03	0.97

Despite the existence of an equilibrium relationship between M3 and the CPI, the results of variance decomposition tests suggest that only 3 percent of the variation in the CPI is explained by the variation in M3. These results suggest that we cannot draw any firm conclusions regarding the appropriateness of M3 as the appropriate nominal anchor for inflation in Zambia. This is despite the fact that M3 is used as the intermediate target in controlling inflation in Zambia.

Given that the results of our tests do not provide sufficient evidence to suggest that any of the monetary aggregates tested above is an appropriate nominal anchor for inflation, we resort to analysing the relationship between inflation and the nominal exchange rate in the next section.

3.3 The Exchange Rate and Inflation

In determining the relationship between inflation and the exchange rate we begin by carrying out cointegraton tests between inflation and the exchange rate. The results of cointegration tests are presented in Table 14.

Table 14: Cointegration Analysis of M3 and the Consumer Price Index

Null	Alternative	Statistic	95%C.V	90%C.V
r =0	r = 1	14	19	17
r <= 1	r = 2	4	12	10

The results presented in Table 14 suggest that we should accept the null hypothesis of no cointegration between the exchange rate and the consumer price index. We proceed to carry out Granger causality test between these variables. We should therefore expect no Granger causality between these variables in either direction.

Table 15: Pairwise Granger Causality Tests of the CPI and the Exchange Rate. Lag 2

Null Hypothesis	Observations	F-Statistics	Probability
DLCPI does not Granger Cause DLEXRATE	110	0.09142	0.91271
DLEXRATE does not Granger Cause DLCP	110	1.18846	0.30876

As expected, the above results suggest that there is no Granger causality between the exchange rate and the CPI in either direction. We also carry out variance decomposition tests. The results are summarized in Table 16.

Table 16: Orthogonalized Forecast Error Variance Decomposition for CPI

	Source of Variation	
Horizon	Exchange Rate	Own Shock
50	0.09	0.91

The exchange rate only explains an insignificant fraction, 9 percent, of the variation in the CPI. The results presented above suggest that there is insufficient evidence to suggest that the nominal exchange rate is an appropriate nominal anchor for inflation in Zambia. However, the results show that the exchange rate explains a higher fraction of the variation in the CPI compared with reserve money and all the measures of broad money.

3.4 Currency in Circulation

We carry out cointegration analysis between currency in circulation and the consumer price index. The results of our cointegration tests are summarized in Table 17. We also carry out tests of an equilibrium correction model.

Table 17: Cointegration Analysis of Currency in Circulation and the Consumer Price Index. Order of the VAR is 3

Null	Alternative	Statistic	95%C.V	90%C.V
r = 0	r = 1	33	15	13
r <= 1	r = 2	1.5	8	7

The results presented in Table 17 suggest strong cointegration between currency in circulation and the consumer price index. In order to determine which variable responds to the long run disequilibrium relationship between the CPI and currency in circulation, we use an equilibrium correction model. The results of the equilibrium correction model are presented in Table 18.

Table 18: Equilibrium Correction Model for the CPI and Currency in Circulation using 87 observations from March 1996 to May 2003

ECM Equation	ECM Coefficient	T-Ratio(Prob)
Currency	-0.277	-6.46
CPI	0.013	1.10

The equilibrium correction model presented above shows that currency responds strongly to disequilibrium with the correct negative sign for the speed of adjustment coefficient. The significance of the speed of adjustment coefficient in the currency equation suggests that currency in circulation is not weakly exogenous with respect to the consumer price index. Results of Granger causality tests are presented in Table 19

Table 19: Block Granger Non-Causality in the VAR of the CPI and Currency

Variables Assumed Non-Causal	LR Test of Block Non Causality, CHSQ (3)
Currency	0.79 (0.85)
CPI	15.7 (0.001)

The results presented above suggest strong Granger causality from inflation to currency in circulation and no Granger causality from currency in circulation to the consumer price index. These results may suggest that currency in circulation may be the appropriate nominal anchor for inflation in Zambia but causal relationship between inflation and currency in circulation is counterintuintive, as one would expect changes in financial variables to lead changes in the price level.

3.5 Orthogonolized Impulse Response Analysis

Results of orthogonalised impulse response of the consumer price index to a one standard error shock to the log of currency in circulation suggest that the CPI increases as a result of a shock to currency in circulation, with an initial overshooting of its long run equilibrium level.

The impulse response results suggest that currency in circulation responds to a shock in the consumer price index by more than the CPI response to a shock in currency in circulation. To augment the results, we present results of orthogonalised variance decomposition tests in Tables 20 and 21.

3.6 Forecast Error Variance Decomposition

Table 20: Orthogonalized Forecast Error Variance Decomposition for CPI

	Source of Variation	
Horizon	Currency	Own Shock
50	24	76

Table 21: Orthogonalized Forecast Error Variance Decomposition for Currency Cointegration with Unrestricted Intercepts and noTrends.

	Source of Variation	
Horizon	CPI	Own Shock
50	57	43

Apart from the CPI responding to correct deviations from the long run equilibrium relationship between inflation and the currency in circulation, the variance decomposition analysis suggests that more of the variation in currency in circulation is explained by the

variation in prices. The results show that 24 percent of the variation in the consumer price index is explained by the variation in currency in circulation while 57 percent of the variation in the currency in circulation is explained by the variation in the consumer price index. This result is in conformity with the view that the appropriate opportunity cost in the demand for currency in Zambia is inflation. However, conventional wisdom suggests that the demand for currency decreases with inflation. Higher inflation reduces the demand for domestic currency.

4.0 Analysis based on Non- food and Food Inflation

In this section we analyse the effect of various monetary aggregates on non-food inflation and food inflation separately.

4.1 Non Food Inflation

We begin by analyzing the relationship between non-food CPI and reserve money. The results presented in Table 22 suggest that there is no long run equilibrium relationship between reserve money and non-food CPI.

Table 22: Cointegration Analysis of Reserve Money and Non-Good CPI Consumer Price Index. Order of the VAR is 2

Null	Alternative	Statistic	95%C.V	90%C.V
r =0	r = 1	13.8	19.2	17.2
r <=1	r = 2	5.7	12.4	10.6

We also carry out variance decomposition analysis of the non food CPI and reserve money in the context of a cointegrated Vector Autoregressive model and the results presented in Table 23 show that reserve money only explains 11 percent of the variation in non-food inflation. In Table 24 we also show that there is no cointegration between currency in circulation and non-food CPI.

Table 23: Orthogonalized Forecast Error Variance Decomposition for Non-Food CPI

	Source of Variation	
Horizon	Reserve Money	Own Shock
150	11	89

Table 24: Cointegration Analysis of Currency in Circulation and Non-Food Consumer Price

Null	Alternative	Statistic	95%C.V	90%C.V
r =0	r = 1	13.8	19.2	17.2
r<=1	r = 2	5.7	12.4	10.6

In Table 25, the results of cointegration test suggest that there exists a cointegrating relationship between the exchange rate and the non-food CPI at a lag length of 5. However, the equilibrium correction model shows significant positive speed of adjustment coefficients in both the non-food CPI and the exchange rate equations as shown in Table 26. No cointegrating relationship is found at other lag lengths. The variance decompositions results summarized in Table 27 suggest that the exchange rate explains an insignificant fraction (2 percent) of the variation in the non-food CPI.

Table 25: Cointegration Analysis of the Exchange Rate and Non-Food CPI Consumer Price Index. Order of the VAR is 5

Null	Alternative	Statistic	95%C.V	90%C.V
r =0	r = 1	31	26	23
r<=1	r = 2	9	12	10

Table 26: Equilibrium Correction Model for the non-food CPI and the Exchange rate using 52 observations from May 2001 to August 2005

ECM Equation	ECM Coefficient	T-Ratio(Prob)
Exchange Rate	0.10	4.4
Non-food CPI	0.02	2.45

Table 27: Orthogonalized Forecast Error Variance Decomposition for Non-Food CPI

	Source of Variation	
Horizon	Exchange Rate	Own Shock
50	2	98

In Table 28, we show that there is a cointegrating relationship between broad money as measured by M3 and the non-food CPI at a lag length of 1 and the equilibrium correction model presented in Table 29 show that M3 responds to the disequilibrium with a significant negative speed of adjustment coefficient. Results of Granger Causality tests presented in Table 31 show that we reject the null of non causality in both directions However, despite the existence of a long run equilibrium relationship, variance decomposition results show that M3 explains only 23 percent of the variation in non-food CPI.

Table 28: Cointegration Analysis of M3 and Non-Food CPI Consumer Price Index. Order of the VAR is 1

Null	Alternative	Statistic	95%C.V	90%C.V
r = 0	r>=1	32	26	23
r <= 1	r =2	9	12	10

Table 29: Equilibrium Correction Model for the Non-food CPI and Broad Money (M3) Observations from January 2001 to August 2005

ECM Equation	ECM Coefficient	T-Ratio(Prob)
Broad Money (M3)	-0.14	-4.8
Non-food CPI	0.01	1.7

Table 30: Orthogonalized Forecast Error Variance Decomposition for Non-Food CPI

	Source of Variation	
Horizon	M3	Own Shock
50	23	77

Table 31: Block Granger Non-Causality in the VAR of the non-food CPI and M3

Variables Assumed Non-Causal	LR Test of Block Non Causality, CHSQ (3)
M3	9.4 (0.002)
Non Food CPI	7.4 (0.007)

4.2 Food Inflation

We now measure the relationship between the food CPI and the monetary aggregates. We first determine the relationship between food CPI and currency in circulation. The results of cointegration tests are presented in Table 32.

Table 32: Cointegration Analysis of Currency in Circulation and the Food Consumer Price Index. Order of the VAR is 3

Null	Alternative	Statistic	95%C.V	90%C.V
r = 0	r = 1	24.7	19.2	17.2
r <=1	r = 2	10.9	12.4	10.6

The results show that there exists at least one long run equilibrium relationship between the food CPI and currency in circulation. The results presented in Table 32 are based on the maximal eigenvalue. The trace statistic and the Schwarz Bayesian Criteria (not reported here) also suggest the existence of a cointegrating relationship. The equilibrium correction model in Table 33 shows significant response of currency in circulation to disequilibrium.

Table 33: Equilibrium Correction Model for the Food Currency in Circulation

ECM Equation	ECM Coefficient	T-Ratio(Prob)
Currency in Circulation	-0.13	-3.62(0.001)
Food CPI	0.13	4.63(0.00)

In Zambia currency in circulation constitutes a significant proportion of reserve money. While the maximal eigenvalue shows that we reject the null of no cointegration, the trace statistic accepts the null hypothesis.

The results of cointegration tests of food CPI and broad money M3 presented in Table 34 suggest that there is cointegrating relationship between food CPI and M3.

Table 34: Cointegration Analysis of M3 and the Food Consumer Price Index. Order of the VAR is 1

Null	Alternative	Statistic	95%C.V	90%C.V
r =0	r >= 1	29	26	23
r<= 1	r = 2	9	12	10

The equilibrium correction model presented in Table 35 shows a significant speed of adjustment coefficient in the food inflation equation. This result is however not robust as the cointegration relationship disappears as soon as we have more than one lag and is consistent with our earlier characterization of the relationship between the overall CPI and M3. Granger causality tests suggest M3 Granger causes non-food CPI while variance decomposition results suggest no strong relationship between these variables. These results are consistent with the relationship between the overall CPI and M3. In the earlier result however, the speed of adjustment coefficient was significant in the M3 equation rather than CPI equation.

Table 35: Equilibrium Correction Model for the Food CPI and M3 Currency in Circulation

ECM Equation	ECM Coefficient	T-Ratio(Prob)
M3	0.13	4.32(0.00)
Food CPI	-0.8	-2.4(0.022)

With regard to the relationship between food inflation and the exchange rate, an equilibrium relationship is established after including four lags as shown in Table 36. However, these results also suggest full rank implying that all the variables are stationary. Since we know this is not the case, we cannot draw firm conclusions from this result.

Table 36: Cointegration Analysis of the Exchange Rate and the Food Consumer Price Index. Order of the VAR is 4

Null	Alternative	Statistic	95%C.V	90%C.V
r = 0	r>=1	38	26	23
r <=1	r = 2	14	12	10

When the lag length is reduced to three, results shown in Table 37 suggest that there is no long run equilibrium relationship using the trace statistics.

Table 37: Cointegration Analysis of the Exchange Rate and the Food Consumer Price Index. Order of the VAR is 3

Null	Alternative	Statistic	95%C.V	90%C.V
r = 0	r >= 1	23	26	23
r <= 1	r = 2	3	12	10

The analysis based on the decomposed CPI suggests that the observed relationship between currency in circulation and the overall CPI works mainly on food inflation while the observed weak relationship between M3 and the overall CPI works through non-food inflation.

5.0 Conclusion

The results of econometric tests suggest that most of the financial variables have little information content in explaining inflation dynamics in Zambia. The results also suggest that there is no strong relationship between inflation and the nominal exchange rate. However, there is a strong relationship between inflation and currency in circulation and a weak long run equilibrium relationship between inflation and broad money (M3). These results suggest the importance of other structural, supply side factors in explaining inflation dynamics in Zambia.

The analysis based on the decomposed CPI suggests that the observed relationship between currency in circulation and the overall CPI works mainly with food inflation while the observed weak relationship between M3 and the overall CPI works through non-food inflation. Despite the existence of a long run equilibrium relationship between broad money and non-food inflation, the variance decomposition suggests the importance of other factors apart from monetary variables. The analysis also suggests that currency in circulation responds to increased demand for money as food prices rise.

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Non-Traditional Exports: The Importance of Key Cash Crop Exports for Zambia's Economy

By

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Abstract

Zambia's Non-traditional exports have trended upwards, with increased importance of cash crop exports. This paper will analyse the growth trend of Zambia's tobacco, coffee, cotton, horticulture, floriculture, and sugar exports for the period 1993 to 2003. In addition, the paper highlights the importance of cash crop exports as a means of improving the rural economic environment in Zambia. The analysis was primarily carried out by compiling non-traditional export trade data over the stated period as well as analysing survey data. Research indicates augmented cash crop export receipts due to factors such as favourable international market prices for crops, such as tobacco, in addition to increased participation of commercial and small-scale farmers largely due to the emergence of out-grower schemes across the country. Moreover, growth in cash crop exports have been facilitated by trade agreements, which have provided Zambian cash crop exports with access to regional and international markets.

1.0 Introduction

Zambia has a wide variety of exports, which can be divided into traditional exports such as copper and cobalt, and non-traditional exports such as burley tobacco and cement. Among the non-traditional exports, cash crop production is a fast growing sector in Zambia (National Budget Address, 2004). However this sector is riskier to invest in as compared to that of the established traditional exports. Investment in crop production requires much attention, know-how and a market. In addition, the risk of crop loss depends on weather patterns and other uncontrollable externalities. Despite falling prices and other exogenous and endogenous shocks, traditional exports continue to account for the principle amount of revenue and volume of total annual exports (Commodity Price Data Pinksheet April 2004, BoZ 2004). Historically, Zambia has continually relied on the mining sector for much of its revenue. However, the liberalization of the Zambian economy has led to the divergence of investment away from the norm into other areas with potential for profits.

The paper analyses the export trend of tobacco, coffee, cotton, horticulture, floriculture, and sugar, six major cash crop exports in Zambia and identifies the impact of global and regional trade agreements, namely the Cotonou Agreement, African Growth Opportunity Act (AGOA), Common Market of Eastern and Southern Africa (COMESA), and Southern African Development Community (SADC). In addition, the paper provides a discussion of how best to enhance the economic viability and overall success of the cash crop sector in Zambia.

The recent mushrooming in the number of small-scale local cash crop farmers can be attributed to the realisation by the general public of the potentially attractive returns of investing in cash crops. Out-growing provides a sure market for produce and at a predetermined price. Unfortunately out-growers do not have any influence over the set price (Singh, 2002).

Historical factors leading to the increase in cash crop farming include the privatisation of parastatal companies and concurrent job losses throughout much of the nineties as Zambia evolved from a planned economy to a free market economy. During this period, individuals began to take advantage of open markets and started to invest in horticulture and floriculture ventures, which produced attractive . Additional benefits of cash crop production are (i) improved human development for rural and peri-urban workers at cash crop producing farms, and (ii) increased country revenue. Other social implications of augmented cash crop profitability include reduced levels of unemployment in rural and peri-urban areas, and the reduction in demographic shifts to urban areas as the productive age group in rural areas will be provided with employment opportunities.

Marketing campaigns for cash crop exports in Zambia have been strongly encouraged by institutions that provide information, technical support, extension services, a bridge to international markets for produce, and general out-grower opportunities to rural and peri-urban small-scale farmers, as well as commercial farmers. The Tobacco Association of Zambia (TAZ), the Cotton Development Trust (CDT), and the Zambia Coffee Growers Association (ZCGA) run examples of some successful programmes that cater for small-scale and commercial tobacco, cotton, and coffee growers in Zambia, respectively. Meanwhile, the Zambia Export Growers Association (ZEGA) is presently the sole marketing institution of horticultural/floricultural products to international buyers. ZEGA primarily deals with providing refrigerated air freight services for produce en route to European markets. Additional support provided by ZEGA includes the promotion of horticulture training via the NRDC-ZEGA Training Trust (NZTT) (ZEGA Literature).

2.0 Literature Review

Balat and Porto, (2004) discuss the evolution of the Zambian economy with respect to the following key areas: trade, poverty and human development, reforms in the agricultural sector, and the effects of agricultural policy on the areas on income and expenditure. However, this paper focuses on their findings on the development of the agricultural sector in Zambia, and its impact on rural households. Surveys conducted indicate that the overall level of poverty in Zambia was 71.5% in 1998, with rural households accounting for the greatest percentage of poverty at 82.1%, and urban areas accounting for 53.4% (Balat and Porto, 2004). Investigations by the authors indicate that rural households largely depend on the production of food crops as opposed to cash crops, which account for 6.3% and 2.5% of total agricultural income respectively. Therefore, small-scale producers of own-food are expected to benefit from access to markets by producing higher return cash crops (Balat and Porto, 2004).

Significant findings by the authors pertaining to income gains from agriculture for rural farmers show that:

a) the gain of switching from subsistence agriculture to cotton for constrained rural farmers would be approximately 19.9% of the total average expenditure of a poor household.

b) the gain per 1.2 hectares (normal size of a cotton field), of switching from subsistence agriculture to cotton for the unconstrained model, would be approximately 67.7% of the total average expenditure of a poor household.

c) the gain per hectare of switching from subsistence agriculture to tobacco for constrained rural farmers would be approximately 88.2% of the average household expenditure.

d) the gain per hectare of switching from subsistence agriculture to tobacco for unconstrained rural farmers would be approximately 130% of the total average expenditure of a poor household.

Given the proven benefits of unconstrained cash crop farming in rural Zambia, the authors advocate for improved market access for agricultural cash crops, the removal of farm subsidies, implementation of complementary policies aimed at promoting development in the agriculture sector, and the provision of extension services particularly to rural communities in order to remove farmer constraints.

Hoekman and Anderso (1999) suggest that the issues of international trade in the agriculture sector primarily revolve around the access of products to international markets via reduced tariffs, quotas, and farm subsidies. However, the authors specifically stress the need for the inclusion of a 'New Trade Agenda' encompassing cross-sectoral issues that are not a part of, but are supportive of international agricultural trade, for example domestic policies pertaining to both local and foreign direct investment (FDI), competition, and product standards. Hoekman and Anderson's (1999) view on farm subsidies in industrialised countries show that the complete elimination of agricultural protection and agricultural subsidies in rich countries will increase global trade in agriculture by 17%, with agriculture and food exports from low and middle-income countries rising by 24%.

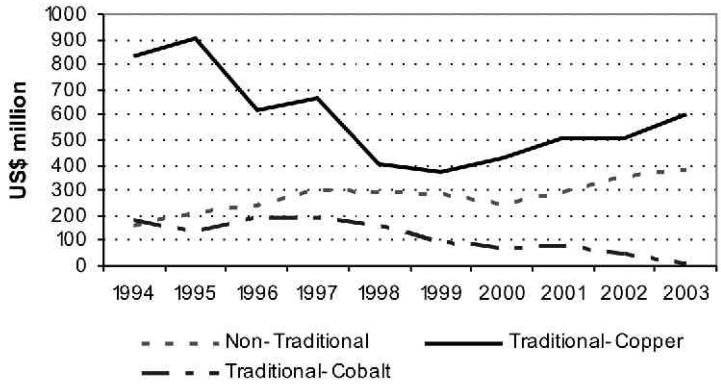
Diao, Dorosh, and Rahman (2003) analyse various models depicting the composition, quantity, and regional production of major imports and exports from sub-Saharan Africa (SSA). The commodities discussed can principally be grouped into the following: meat; cereals and other traditional crops; and other agricultural produce (i.e. non-traditional cash crops). The authors' studies aimed to discover which sectors result in the greatest amount of poverty reduction in the shortest period of time. Studies have shown that between 1995 and 2000, total exports from SSA increased to US$100.17 billion from $95.55 billion, while agricultural exports from SSA declined to US$12.94 billion from $13.21 billion during the same period (Diao et al., 2003). Meanwhile agricultural exports from SSA accounted for only 3.9% of the total GDP for the region during 1998-2000, which was 0.06 percentage points below that recorded during the 1994-1996 period (Diao et al., 2003). The findings imply that growth in the agricultural sector tends to be constricted, and accounting for only a small share of GDP, and world agricultural exports.

3.0 Performance of Non-Traditional Exports[1]

Over the past decade the share of non-traditional exports has increased significantly to 38.4% of total exports in 2003 from 13.3% in 1994. In absolute terms, non-traditional exports rose to US$ 383.0 million in 2003 from US$155.3 million in 1994 (BoZ: 2004). However, traditional exports (copper and cobalt) have faced an overall decline over the same period to 61.6% of total exports in 2003 from 86.7% in 1994. In absolute US dollar values this amounts to US$613.2 million in 2004 from US$ 1,011.7 million in 1994 (BoZ: 2004), (see Chart 1).

[1]Trade Data provided by The Bank of Zambia (BoZ), 2004.

Chart 1: Export Distribution (F.O.B), 1994-2003

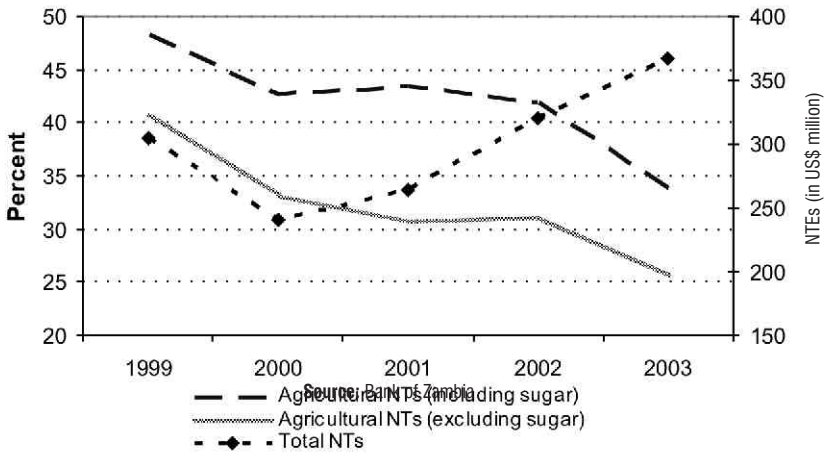


Source: Bank of Zambia

The main agricultural non-traditional exports primarily comprise the following products: cotton lint, soya beans, cane sugar, coffee beans, tobacco, floriculture and horticulture. . Additional cash crops exported from Zambia include beans, groundnuts, mushrooms, paprika, rice sunflower, and tea, (see Appendix 1). Other significant non-traditional exports are cement and electricity (Zambia Investment Centre, 2004).

The share of some principle cash crops (excluding sugar exports)[2] of total non-traditional exports for the period 1999 to 2003 are as follows 40.8% (1999), 33.1% (2000), 30.7% (2001), 31.0% (2002), and 25.6% (2003). However, the share of cash crops (including sugar exports)[3] of total Non-traditional exports for the period 1999 to 2003 are 48.4% (1999), 42.6% (2000), 43.5% (2001), 42.0% (2002), and 33.9% (2003), (see Chart 2). The top cash crop exports for 2003 were burley tobacco, cotton lint, fresh flowers and soya beans at 19.3%, 28.6%, 23.0% and 0.9% respectively, (see Chart 3).

Chart 2: Total Non-traditional Exports (NTEs) and Share of Agricultural NTEs as a percentage of Total NTEs

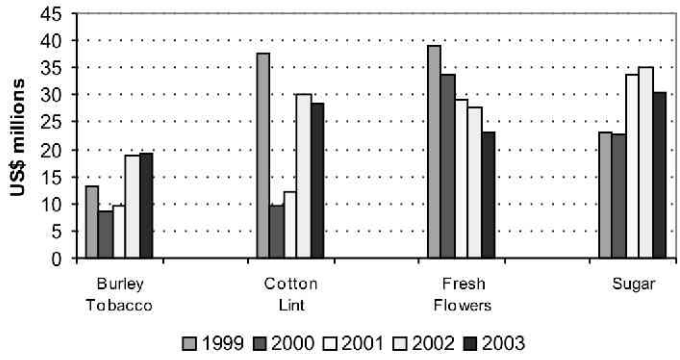


Source: Bank of Zambia

[2]Items included in the agricultural Non-traditional exports are Burley Tobacco, Cotton Yarn, Cotton
[3]Lint, Fresh Flowers, and Soya beans.
Items included in the agricultural Non-traditional exports are Burley Tobacco, Cotton Yarn, Cotton Lint, Fresh Flowers, Soya beans, and Spoon Sugar.

Non-traditional cash crop exports from Zambia have experienced a steady rise *over the period 1993 to 2003.* Exports of fresh vegetables from sub-Saharan Africa to industrialized countries climbed by 150% between 1989 and 1997 (Eurostat 1998a,b). This increase can be attributed to a number of factors. Due to a suitable climate, lower labour and other production costs, European markets now appreciate the importance of African economies in producing perishable foodstuffs such as fresh fruits and vegetables and other exotic produce (Singh, 2002).

Chart 3: Annual Cash Crop Exports, 1999 - 2003



Source: Bank of Zambia

Meanwhile, the most successful agro-processing industry in Zambia is presently the sugar production sector. However, there have been fluctuations in the volume of sugar exports. Exports were US$30.6 million, US$35.1 million, US$33.8 million, US$22.8 million, and US$23.1 million in 2003, 2002, 2001, 2000, and 1999, respectively (BoZ, 2004). Zambia Sugar Plc. (located in the Southern Province) is the incumbent sugar producer in Zambia. New entrants to the sector are Kalungwishi Sugar Estate (situated in the Kasama District of the Northern Province) and the Kafue Sugar Company (located in the Nampundwe Area on the Kafue Flats, in the Lusaka Province). Zambia Sugar Plc. is currently the dominant supplier of locally consumed sugar however it has experienced increased exports of the commodity to the EU market. Kalungwishi Sugar Estate on the other hand, primarily exports the commodity to other countries in the region. The newest entrant, the Kafue Sugar Company was launched in 2004, and is likely to increase its share in the local market, and promote competition within the sector in Zambia.

Selected Cash Crop Earnings

Total Cotton lint export revenue decreased to US$28.6 million in 2003, from US$30.2, US$12.2, US$9.5, and US$37.8 million in 2002, 2001, 2000, and 1999 respectively (BoZ, 2004). The increase in the 2002-2003 period can be attributed to rising international cotton prices, which increased to 163$/kg during the first quarter of 2004 from 139.9 $/kg in 2003, and 101.9$/kg in 2002 (Commodity Price Data Pinksheet, April 2004). Meanwhile, the fall in cotton lint export receipts in 2001 and 2002 is on account of disruption of supply due to structural changes in the sector, as well as low international cotton prices.

The move towards a private run cotton sector in Zambia has brought about positive developments such as (i) improvements in research (ii) expansion of out-grower activities (iii) improved livelihood for farmers and the rural community (iv) more efficient delivery of

commodities (v) the spread of cotton production over various geographical areas with cotton producers specialised on a particular area of Zambia and (vi) improved competition in the sector from international buyers (Balat and Porto, 2004).

Arguments by Badiane, Ghura, Goreaux, and Masson (2002), attribute the decline and volatility of cotton prices to the agricultural policies of dominant cotton producers, primarily high farm subsidies provided to their cotton farmers. Further studies by the International Cotton Advisory Committee tracking data from 1999 to 2000 have shown that dominant producers of the sector provide the greatest subsidies to farmers, while many developing countries provide the least amount of subsidies (Badiane O., Ghura D., Goreaux L., and Masson P., 2002). The drop in Zambian export revenues to US$28.6 million in 2003 from a high of US$37.8 million in 1999, indicate that production levels are were below their full potential.

Burley tobacco export revenue increased significantly to US$19.3 million, from US$18.7 million, US$9.5 million, US$8.5 million, and US$13.2 million in 2003, 2002, 2001, 2000, and 1999, respectively (BoZ, 2004). The increased tobacco export revenues and production can be attributed to increasing international prices, as well as an increasing number of farmers in the sector. The number of small-scale and commercial tobacco farmers in Zambia increased by over 280% and 50% to 9,554 and 231 in 2003 from 1996, similarly output by small-scale and commercial farmers increased by almost 500% and 168% to 12,917 mt and 12,890 mt respectively during the same period, *(Survey conducted by Author, 2005)*.

Soya bean export earnings were US$ 0.9 million, US$ 1.4 million, US$ 0.0 million, US$1.6 million, and US$0.6 million, in 2003, 2002, 2001, 2000, and 1999, respectively (BoZ, 2004). Soya bean international prices increased to 377.0$/mt in the first quarter of 2004, from 264.0$/mt in 2003, and 212.7$/mt in 2002 (Commodity Price Data Pinksheet, 2004). However, the increasing price trend lead to excessive exports, resulting in an indefinite ban on all Soya bean exports from Zambia in 2004.

Total non-traditional export earnings increased by 13.4% to US$405.6 million by end-December 2003 from US$357.6 million at end-2002 (BoZ, 2004). Significant contributors to this increase were non-cash crop items. However, burley tobacco notably increased by 0.6 percentage points from US$18.7 million to US$19.3 million during this period (BoZ, 2004). Burley tobacco and cotton lint were the main cash crop contributors to the increase in Non-traditional export earnings.

4.0 Survey Results

The results of a Cash Crop Survey of Zambia carried out for the period spanning 1995-2003 identified the following key points:

1. There are a total of 48 tobacco out-grower schemes presently located in the Central, Copperbelt, Lusaka, Northern, Western, and Southern provinces of Zambia. The aforementioned schemes have realized significant increases in the number of participating small-scale and commercial farmers within these rural and peri-urban communities, in addition to a steady increase of tobacco output during the period. The number of small-scale participants grew at a rate of over 280% to approximately 9,554 peasant farmers, while their tobacco output increased by almost 500% to approximately 12,917 mt during the surveyed period (1996-2003). Similarly, the number of commercial farmers increased by approximately 50% to 231, while their tobacco production increased by an estimated 168% to 12,890 mt.
2. Cotton out-grower schemes are in operation in the Central, Copperbelt, Eastern, and Southern provinces of the country. The survey, however, focused on the participation of

small-scale cotton farmers. There was significant growth in both the number of participating peasant farmers as well as their production of cotton, which increased by approximately 220% and 140% to 160,000 participating farmers and 118,000 mt, respectively, during the surveyed period (1996-2003).

3. A sugarcane out-grower scheme in the Southern province involved nine commercial farmers was underway in 2003. However, communication problems experienced during the undertaking of the survey restricted further investigations into possible sugar cane out-grower schemes located in other parts of the country.
4. Coffee out-grower schemes, are located in the Central, Copperbelt, Luapula, Lusaka, Northern and Southern provinces, where there was a total 46 registered commercial growers and 8 small holder groups (comprising 20 to 35 participants each). Increased participation in the programme has subsequently resulted in an estimated 280% increase in the production of the commodity to 6,000 mt during the surveyed period.
5. The most significant key factors identified as having the greatest impact on the level and value of cash crop exports were the situation and accessibility of the world market, roads and infrastructure, Zambia's exchange and interest rate, affordability of credit facilities, and regulatory framework.
6. In spite of the favourable participation levels stated above, there is urgent need for product diversification and value added to agricultural products required to realize the potential volume, quality, competitiveness, and resulting sales revenue of Zambia's agricultural exports.

Global and Regional Trade Agreements

Trade agreements play a decisive role in the success of exports to both global and regional destinations. The international trade agreements to be discussed are the Cotonou Agreement and the Africa Growth and Opportunity Act (AGOA). In addition, regional institutions appraised are the Common Market for Eastern and Southern Africa (COMESA) and the Southern African Development Community (SADC).

1 Cotonou Agreement

Zambian non-traditional exports gain easy access to European markets as they are facilitated by Zambia's support of the 2000 Cotonou Agreement and preceding Lomé Conventions, which provide African exports with preferential treatment to the European Union (EU) market. However, the benefits of such agreements may be limited due to a number of factors such as elevated costs associated with non-traditional exports in comparison to competitive advantages of incumbent traditional exports (i.e. copper in the case of Zambia). The main import trading partners of Zambian horticultural and floricultural products are the UK and Holland (Zambia Agricultural Investment Promotion Conference, 2003).

In 2000, total SSA cut flower exports to Europe were divided as follows: Kenya (57%), Zimbabwe (24.6%), Zambia (6.5%), and Uganda (4%) (Diao et al., 2001). According to Eurostat data (Diao et al., 2003), the value of cut flower exports in Zambia rose to US$16.12 million in 2000 from US$4.46 million in 1994. In 2000 Zambia was the third highest earner in cut flower exports from SSA behind Kenya and Zimbabwe (Diao et al., 2003).

The success of Kenyan cut flower exports have been attributed to: the promotion of private sector involvement in this area, the ability of Kenya to acknowledge that the sector now depends on consumer preference and tastes as opposed to supply factors, improved

marketability, and value added to products (Theon et al., 2001). Despite these positive developments in Kenya, Theon et al. (2001) are quick to state the disadvantages of the changing structure and consumer preference of the cut flower industry such as increased quality standards that could disadvantage small suppliers and increase investment costs.

Data shows that despite the increasing volume of floriculture exports from Zambia each successive year, the revenue earned from fresh flowers has consistently declined to US$ 23.0 million in 2003, from US$ 27.9 million in 2002, and US$ 29.0 million in 2001, (Zambia Agricultural Investment Promotion Conference, 2003). Singh (2003) further suggests that commodity prices have faced a falling trend attributed to the increased volume of fresh flowers on the EU markets from already existing producers and new entrants. Evidence from Zambia shows that despite increasing fresh flower exports, export receipts have continued to decline over the past few years due to increasing world supply.

As the floricultural sector becomes more demand driven, account must be taken of the effect of evolving consumer preference towards fair trade and improved production standards on floriculture outputs and revenues. Arguments by Tallontire (updated 2004) suggest that resource poor groups may be excluded from income generating opportunities in export horticulture through the imposition of inappropriate standards and methodologies of ethical trade. Fears have been expressed that restrictions on the production of agricultural exports may erode the benefits of international agreements such as the Lomé Convention (Lecomte, 2001).

2 Africa Growth and Opportunity Act

The Africa Growth and Opportunity Act (AGOA), provides preferential treatment of sub-Saharan African (SSA) products to the US market. The Agreement follows the acceptance of stipulated conditions pertaining to governance issues, bilateral trade and other investment, poverty alleviation and human development strategies, social infrastructural developments in health and education and human rights issues by eligible African states (Nouve and Staatz, 2003). Moreover, the AGOA II Agreement has increased country quotas on stated products. During the 2001-2002 period the average quarterly agricultural exports from Zambia to the US was a total of US$0.2 million (8.3% of Zambia's total exports to the US), a decline from US$0.3 million (4.8% of Zambia's total exports to the US) recorded in the 1998-2000 period. Zambia's average quarterly export figures for 2001-2002 and 1998-2000 represented only 0.11% and 0.15%, respectively of total SSA agricultural exports to the US during the reviewed periods (Nouve and Staatz, 2003).

AGOA provides for preferential treatment of a wide range of SSA exports to the US including textiles and apparel as well as non-apparel items such as tobacco, cut flowers, coffee and other cash crop exports. Zambian cash crop exports have the potential for growth in the US market.

Non-traditional cash crops such as Arabica coffee are exported primarily to US markets, with Zambian exports accounting for approximately 1,700 metric tons (mt) of Arabica coffee per year. This volume is expected to increase significantly by the year 2010 (Zambia Agricultural Investment Promotion Conference, 2003). Arabica coffee prices increased to 166.8 $/kg in the first quarter of 2003, from 141.5 $/kg in 2002, and 135.7 $/kg in 2001 (Commodity Price Data Pinksheet, 2004). This steady price increase is on account of the increased international demand for Arabica coffee, particularly from western countries. The recent influx of new entrants on the international coffee market has led to the increased importance of a quality crop as well as brand names. Once there is investment and value added to coffee production in Zambia, there will be greater recognition for Zambian coffee products. Unfortunately it is difficult to estimate projections of the future growth of coffee

production in Zambia due to its heavy dependence on international prices. This notwithstanding, coffee is a crop with immense potential for growth in Zambia.

3. Common Market for Eastern and Southern Africa - COMESA

Zambia's membership with the Common Market for Eastern and Southern Africa (COMESA) has supported retail inter-regional trade through the removal of tariff barriers within member states. However, this relationship can be further augmented to include increased exports of agricultural produce from Zambia to fellow COMESA member states. The volume of domestic exports (f.o.b) to COMESA member states fluctuated throughout 2003. In January 2003, domestic exports (f.o.b) were K269,450 million. Domestic exports peaked in July 2003 at K429,302 million and later declined to K381,937 million in September 2003 (CSO International Trade Statistics, 2003). The explanation for the rise in exports during the July - August 2003 period is the increased maize exports due to excess maize stocks attributed to the bumper harvest of 2003. The international maize price was 105.4b/$/mt in 2003 (Commodity Price Data Pinksheet, April 2003). By end-January 2004, export earnings (f.o.b.) were K52,749 million, an increase of more than 200% from K16,909 million in January 2003. Similarly, there was an increase of over 100% in export earnings (f.o.b.) to K74,202 million in February 2004 from K28,123 million in February 2003 (CSO International Trade Statistics, 2003). Increased volumes of a number of items including tobacco contributed to the increase in exports during February 2004.

4. Southern African Development Community - SADC

The Southern African Development Community (SADC) aims to create a free trade area among member states by 2012 (National Budget Address, 2004). This effort is expected to augment Zambia's exports (f.o.b.) to SADC member states.

The success of the 2003/2004 crop season for maize and resultant improvements in maize exports indicates that a market exists for maize exports in sub-Saharan Africa. Regional exports of maize can be treated as an additional source of cash crop income. On a regional scale, there is potential for growth of maize exports from Zambia. However, due to the dependence of Zambia's small-scale farmers on rain-fed irrigation methods, one could argue that maize exports would not be a reliable source of income in times of insufficient rain-fall

Limitations of the Analysis

- The importance of additional key factors identified as having an impact on productivity of cash crop farmers is acknowledged by the author however a detailed analysis of these factors are beyond the scope of this paper.
- An empirical study of India by Gulati (1998) proved that the incidence of structural bottlenecks attributed to various policies can restrict competition and the provision of key inputs (credit, and infrastructure such as transport, storage, and communications), all of which are influential to agricultural output.
- Trade Data for the period before 1997 for a number of cash crops was unavailable at the time of writing this paper.
- It is difficult to provide projections for individual growth in the cash crop sector due to their dependence on international prices and other exogenous developments.
- Bank of Zambia trade data is stated in US dollars as a standard measurement for international transactions whilst COMESA trade data for Zambia is stated in Kwacha to

reflect the regional market. For the sake of comparison, data should have one standard measure.

5.0 Conclusion

The growing trend towards non-traditional exports, particularly cash crops, is an indication that a ready market exists within and outside the region for selective cash crops such as tobacco, cotton, horticulture, floriculture. This survey showed evidence of a rapid expansion of out-grower schemes throughout the country for cotton, coffee, tobacco, horticulture and floriculture. The expansion indicates that rural and peri-urban communities have a keen interest in engaging in farming activities.

The aforementioned trade agreements namely the Cotonou Agreement, Africa Growth and Opportunity Act (AGOA), the Common Market for East and Southern Africa (COMESA) and the Southern African Development Community (SADC) have provided the necessary framework for the promotion of cash crop exports to regional and international destinations. However, it is necessary for stakeholders to take further advantage of the available trade opportunities to enhance their participation in the world market.

Growth in cash crop exports provides an opportunity for people of all levels of society to become involved in the development process of Zambia. Focus on rural areas of the country will concurrently provide job opportunities and improve the economic outlook for the productive age group in these areas. Developments in the sector provide practical results however this can only be made possible with supportive regional and global trade relations, supportive economic policies, opportunities, and incentives that promote investment in rural communities.

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Appendix 1
Additional Cash Crop Earnings in US$ million

	1997	1998	1999	2000	2001	2002	2003
Beans	0.032	0.171	0.074	1.076	0.004	0.003	0.309
Groundnuts	1.013	0.802	0.191	0.149	0.085	0.113	0.528
Mushroom	0.118	0.002	0.003	0.00	0.029	-	0.184
Paprika	2.052	0.810	2.846	1.806	2.958	1.628	1.539
Rice	0.433	0.021	0.058	0.070	0.144	0.054	0.033
Soya beans	12.403	1.367	0.657	1.595	-	1.449	0.606
Tea	0.406	0.546	0.840	0.464	0.540	0.695	0.819

Source: Compiled by author from trade data obtained from the Bank of Zambia (BoZ), 2004
Random collection based on availability of data.

Is Zambia Ready for Inflation Targeting?

By

Ivan Zyuulu

Abstract

Inflation targeting has become a preferable monetary policy framework to achieve and maintain price stability encapsulated in low and stable inflation. From the experience of countries that consider themselves inflation targeters, a number of technical and institutional pre-requisites should be met before a central bank can implement the inflation targeting approach to monetary policy formulation and implementation. In this paper the readiness for Bank of Zambia to adopt inflation targeting is assessed. While one of the key pre-requisites of a low inflation rate was achieved since April 2006, following inflation receding to single digit levels, several other preconditions are yet to be achieved.

1.0 Introduction

"Inflation is bad news. Besides distorting prices, it erodes savings, discourages investment, stimulates capital flight (into foreign assets, precious metals, or unproductive real estate), inhibits growth, makes economic planning a nightmare, and, in its extreme form, evokes social and political unrest. Governments consequently regard inflation as a plague and try to squelch it by adopting conservative and sustainable fiscal and monetary policies".[1]

It is noteworthy that since the early 1990s, inflation has had a downward trend in most countries and the World in general. In many cases, there are several factors that explain macroeconomic developments, and the trend to low inflation is no exception. But there is a broad consensus that better monetary policies run by more independent and more open central banks can claim a significant share of the credit for favourable inflation performance. It is certainly true that the 1990s were a period of considerable reform and innovation in central banks across the world; many established central banks were given greater independence from their governments, often in exchange for a clear commitment to meet specific targets for inflation. Inflation targeting works by setting clear limits on the role of governments themselves.[2]

Prior to this, to address the problem of inflation, most countries traditionally relied on intermediate targets such as monetary aggregates and exchange rates. Beginning the 1990s, the trend has been biased towards targeting the inflation rate itself and this approach has come to be referred to as *inflation targeting*. Some countries that regard themselves as inflation targeters have different characteristics and include developed and developing countries. Inflation targeting has been adopted by a number of central banks around the world, including those of Australia, Brazil, Canada, Chile, Colombia, Czech Republic,

[1]International Monetary Fund, **Inflation Targeting as a Framework for Monetary Policy**, Economic Issues 15, International Monetary Fund, 1998.
[2]Rachel Lomax, **"Inflation Targeting Achievement and Challenges,"** Speech to the Bristol Society at University of the West of England, Bristol, 18 February 2004.

Ghana, Hungary, Iceland, Israel and Korea. Others are Mexico, New Zealand, Peru, Philippines, Poland, South Africa, Sweden and Thailand.[3] The increasing number of countries using inflation targeting reflects the recognition it is an important tool that may be used for containing inflationary expectations.

The rationale for inflation targeting is that inflation targets may help provide a clear path for the medium-term inflation outlook, reducing the size of inflationary shocks and their associated costs. Since long-term interest rates fluctuate with movements in inflation expectations, targeting a low rate of inflation would lead to more stable and lower long-term rates of interest.

Inflation targeting relates monetary policy implications on inflation. However, concentrating only on numerical inflation objectives may reduce the flexibility of monetary policy, especially with respect to other policy goals. Since monetary policy actions affect inflation with a lag, inflation targeting would mean that the central bank would need to rely on forecasts of future inflation. Given the uncertainties, an inflexible and undue reliance on inflation forecasts in a country like Zambia can create policy problems. Therefore inflation targets should leave room for a good deal of flexibility and should be adjusted for volatile (supply-side) components. However, a too flexible target reduces the credibility of the central bank.

This paper examines the key pre-requisites for inflation targeting and how Zambia compares in terms of whether these requirements are in place. The paper also shows inflation performance relative to the targets set under the monetary targeting regime the country has been implementing to reduce inflation.

2.0 Technical Requirements for Inflation Targeting

Good macroeconomic data and modelling skills: Some of the key technical requirements for inflation targeting are good macroeconomic data and modelling skills which allow assessment of the current macroeconomic conditions in the economy, and inflation forecasting often seen as a downside compared to exchange rate pegs or monetary targeting which are less reliant on good data availability. In the case of Zambia, like most less developed countries, good quality data, more often than not, comes with a rather long lag. This makes it rather difficult to use this data in monetary policy decision-making. While monetary data has a much shorter lag of up to one month, real sector information lags can be as long as one year.

Need to understand the transmission mechanism: The monetary authorities need to have a good understanding of the variables that have the most significant influence on inflation. Empirically, most central banks have relied on the interest as the nominal anchor for inflation. In this regard, Central banks need to have control over interest rates (influence interest rates) in the money markets. The Bank of Zambia can influence interest rates in the money market using monetary instruments at its disposal. However, the actual extent of this influence is not yet well estimated. In fact there are cases where the financial markets do not respond to efforts by the Bank of Zambia to influence interest rates in either direction. In addition, money markets and instruments are yet to be sufficiently developed to facilitate effectiveness of monetary policy.

[3]Gill Hamond, Inflation targeting; is it an option for Zambia? in Facing the Challenges of the 21st Century, Proceedings of the Bank of Zambia 40th Anniversary Conference held at the Pamodzi Hotel, Lusaka, August 5-6 2004, 2006.

Well functioning financial markets: Money market instruments are not yet well-developed in Zambia, especially in the secondary markets although a lot of achievements have been made to develop the money market through the introduction of various Government securities as well as commercial paper. More still needs to be done for the market to be more responsive to actions of the Bank of Zambia to influence money market prices upwards or downwards. In this regard, the development of the secondary market would contribute to enhancement in the role of financial instruments and increase activity in the money market.

Low Inflation: Experience by most countries show that it is easier to keep inflation low than to bring inflation down. In this regard, it is argued that inflation targeting is more appropriate for countries where inflation is under control than in countries where inflation is very high. However, countries such as Israel and Chile introduced inflation targeting when inflation was around 20% to 25% and successfully used it as a dis-inflationary strategy.[4]

Inflation developments in Zambia over the last decade show that year-on-year inflation rates have been reduced from about 120% in 1993 to 17.5% at end-December 2004. However, it was sticky downwards averaging around 20% between 2000 and 2004. This meant that inflation was still too high in Zambia to be able to meet one of the key pre-requisites of inflation targeting. This notwithstanding, it is noted that some countries have implemented inflation targeting when inflation was high and still achieved the objective of reducing inflation.

However, there are institutional requirements for successful introduction of inflation targeting. It is therefore imperative at this point to highlight what should be done to pave way for possible implementation of inflation targeting in Zambia.

3.0 Institutional requirements

Inflation targeting requires an institutional framework that allows the central bank to determine and implement monetary policy with the sole aim of achieving the inflation target. In section 4, the Bank of Zambia Act of 1996 gives the Bank the role of formulating and implementing monetary and supervisory policies that will ensure the maintenance *of* price and financial systems stability so to promote balanced macro-economic development. It therefore implies that the Act would have to be amended to incorporate provisions empowering the Bank to determine and implement monetary policy with the sole aim of achieving the inflation target.

The absence of fiscal dominance is another important requirement. In Zambia, over the last twenty years, fiscal dominance reflected in high fiscal deficits has been one of the major factors contributing to the high level of inflation in Zambia. However, in the recent past, as pronounced in the 2004 budget speech, the Government is committed to ensure that fiscal deficits are reduced to sustainable levels.

Central bank operational independence is another important requirement. It is not necessary for an inflation targeting central bank to have goal independence, but it is necessary to have instrument (operational) independence, which is the ability to set monetary policy without being constrained by other considerations. The Bank of Zambia does not have goal independence since the Ministry of Finance and National Planning determines economic objectives, which the Bank strives to achieve.

[4]Gill Hamond, Inflation targeting; is it an option for Zambia? in Facing the Challenges of the 21st Century, Proceedings of the Bank of Zambia 40th Anniversary Conference held at the Pamodzi Hotel, Lusaka, August 5-6 2004, 2006.

Whether or not the Bank of Zambia is independent to the extent of being able to commit itself to inflation targeting is a debatable issue. Clearly the Bank can be considered to be operationally (instrument) independent to the extent that it is able to implement monetary policy instruments without Government involvement or approval. This notwithstanding, section 5 of the Bank of Zambia Act of 1996 states that, 'The Minister may convey to the Governor such general or particular Government policies as may affect the conduct of the affairs of the Bank and the Bank shall implement or give effect to such policies.' This implies that if the monetary policy stance is not in tandem with Government position, the Minister is empowered to over-turn the monetary policy position. In this regard, the section providing for the Minister's power would need to be amended if inflation targeting was to be adopted in Zambia.

The other institutional requirement relates to arrangements enshrined in the law, with legislation that provides for the central bank's primary responsibility of maintaining price stability. It also covers other aspects of central bank independence, responsibility for setting interest rate and terms of appointment for the Governor and members of the policy-making committee. The primary responsibility of price stability and appointment of the Governor and Board Members are already provided for in the legislation although the question of independence is not provided for.

Sound financial sector is yet another pre-requisite for successful implementation of inflation targeting. The financial sector is the conduit through which monetary policy transmission mechanism operates. Substantial progress has been made in improving the supervisory capacity of the Bank of Zambia to enhance the soundness of the financial sector, particularly after closure of several banks between 1995 and 2001. More measures are underway through the Financial Sector Development Plan to improve the soundness of the financial sector, especially as it relates to non-bank financial institutions.

Transparency and accountability is also a key pre-requisite. Transparency under inflation targeting requires exposing to public scrutiny the process through which monetary policy decisions are made. In this regard, the central bank is required to announce to the public policy changes and explain the reasons behind the changes. Thus, transparency has the potential of reducing uncertainty about the central bank's preferences. Reduced uncertainty, in turn, may lead to lower inflation expectations while accountability raises the central bank's incentive to achieve the inflation target and enhance the public's confidence in the central bank's ability to achieve the target.

4.0 Inflation Performance in Zambia

Zambia has not yet formally adopted the inflation targeting approach of implementing monetary policy since it has been pursuing monetary aggregate targeting as a way of influencing interest rates, credit, money supply growth and ultimately inflation. By implication the Bank of Zambia indirectly targets inflation, using money growth as a quantitative indicator of its policy. In this regard, when conflicts arise between its money growth targets and inflation targets, the Bank gives greater weight to its inflation targets. This is not peculiar to Zambia. Other central banks have targeted monetary aggregates with a clear objective of achieving a particular rate of inflation. For instance, the Bundesbank, though it conducted short-term policy with reference to targets for money supply growth, derived those targets each year by calculating the rate of money growth estimated to be consistent with the bank's long-run desired rate of inflation, normally 2 percent per year.[5] In

[5]Ben S. Bernanke, "A Perspective on Inflation Targeting," Remarks at the Annual Washington Policy Conference of the National Association of Business Economists, Washington, D.C. March 25, 2003.

schematic form, the monetary policy framework in Zambia is presented as follows:

OMO RM BM Price Stability

Where OMO refers to open market operations, RM is reserve money (operational target), BM is broad money (intermediate target) and price stability (low and stable inflation) is the ultimate goal. Using this framework, monetary policy actions are aimed at achieving a reserve money target which the Bank of Zambia can directly influence through monetary policy instruments.

Over the period 1995 to 2005, inflation in Zambia trended downwards after peaking in the early 1990s. Annual inflation, measured by the consumer price index (CPI) fell from 197% at end-1993 to 15.9% percent at end-2005. Nonetheless, the inflation outcome remained short of the objective set under various economic reform programmes such as the Poverty Reduction Strategy Paper (PRSP) inflation objective of reaching single digit inflation rate by 2004 (see Table 1). It is possible that the inability to rapidly bring down inflation was largely due to excessive money supply growth particularly in 2002 and 2004 when money supply growth was above 30 percent, occasional adverse shocks such as the effects of unfavorable weather, and rising prices of petroleum products arising from increases in oil prices on the world market.

The failure to control money supply growth was in part a result of excessive Government borrowing from the banking system, which was caused by shortfalls in donor budgetary support and also expenditure overruns especially in 2002 and 2003. In 2003, government borrowing reached 5.1 percent of GDP from 2.5 percent in 2002 causing domestic debt to rise to unsustainable levels which threatened fiscal sustainability. Government in 2004 began to take corrective measures to reduce domestic borrowing and thus preserve macroeconomic stability. This resulted in domestic borrowing falling to 1.9 percent of GDP in 2004 and 2005. Apart from fiscal dominance, effective implementation of monetary policy was constrained by the limited scope of effective financial instruments, undeveloped secondary markets, and the lack of market-makers and a well-articulated code of conduct in the securities market.

More recently, the inflation rate has declined to single digit levels for the first time in over thirty years in April 2006 at 9.4%. It remained in low in May, June, July, August and September at 8.6%, 8.5%, 8.7%, 8.0% and 8.2%, respectively. In October, 2006, annual inflation slowed down to 7.9%. This implies that the requirement of low inflation was achieved, particularly if inflation performance is maintained in the single digit on a sustained basis.

Table 1: Monetary Growth and Inflation Targets and Outcomes (%), 2002-2005

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
PRSP Inflation Targets								13.0	8.0	5	-
Inflation Target	-	-	9	9	15	19	17.5	13.0	13.0	20.0	15.0
Inflation Outcome	46	35.2	18.6	30.6	20.6	30.1	18.7	26.7	17.2	17.5	15.9
Broad Money Growth Target	-	-	-	20.3	20	25	12.8	15.0	16.9	18.1	14.8
Broad Money Gowth Outcome	-	34.4	24.0	22.6	29.2	74.1	10.7	31.3	22.6	31.2	0.4

Source: Bank of Zambia

5.0 Conclusions

As a key pre-requisite for inflation targeting, it is imperative that the central bank should not be constrained to finance the Government Budget and must have an effective monetary policy instrument like the short-term interest rate that is fully market determined. Moreover, transparency and accountability of the Central Bank is essential to anchor inflationary expectations. The Bank's current report to the Minister of Finance and National Planning on a monthly basis, to Parliament twice a year through the Monetary Policy Statement, and once per year through the Annual Report allows the Bank to be accountable for its actions. Additionally, via Governor's quarterly brief to the Media and presentations to various fora, the Bank is accountable to the public.

The Bank of Zambia is looking at alternative ways of achieving price stability. There are views that for monetary policy to be transparent and credible, it should have an explicit narrowly defined objective like an inflation target. While technically this appears to be a sound suggestion, there are several constraints in the current Zambian environment in pursuing an inflation target. First, the Government debt management function is linked with the monetary management function while affecting the interest rates. Secondly, in the absence of fully integrated financial markets, which remain still imperfect and segmented, the transmission channel of policy is yet to evolve fully. Thirdly, the legal framework does not provide for the independence of the Bank of Zambia. Finally, macroeconomic modelling is in its infancy stage, if at all it exists.

Bearing the foregoing in mind, while acknowledging the efficacy of inflation targeting, under the current conditions Zambia does not seem to be ready to go inflation targeting, despite having reduced inflation to single digits. In considering the move to inflation targeting, it is necessary to carefully measure and balance between the benefits and ability to implement an inflation targeting framework as well as the need to continue monitoring movements in a variety of monetary, fiscal, external and real sector indicators to arrive at appropriate monetary policy.

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ISBN 9982-870-00-9