

**UNIVERSITY OF CAPE TOWN**

**FINANCIAL SECTOR REFORMS AND INTEREST RATE  
DETERMINATION IN ZAMBIA**

**A THESIS SUBMITTED TO THE FACULTY OF COMMERCE IN PARTIAL  
FULFILLMENT OF THE DEGREE OF MASTERS IN APPLIED ECONOMICS**

**BY**

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## DEDICATION

*To my lovely daughter Musaba – for your love and endurance during the long hours I had to spend away from you, working of this paper.*

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## **Abstract**

This thesis is concerned with an empirical investigation of the determinants of lending rates in Zambia in the aftermath of financial sector reforms. Cointegration techniques in a multivariate framework are employed to investigate the issue. 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 interest rates in the economy following financial sector reforms. In particular, the expected inflation and South African lending rate were found to be the major determinants the lending rate in Zambia. The importance of the expected inflation on the determination of nominal lending rates suggests the presence of a Fisher effect. However, this effect was found to be weak since we could not empirically establish a one-to-one relationship between nominal lending rates and expected inflation. The importance of foreign interest rates is only evident in the post-reform period. This reflects the fact that uncovered interest parity seems to hold after financial liberalization. The impact of the South African lending rate on the domestic nominal lending rate may be an indication of the magnitude of the mark-up on the domestic lending rate over the South African lending rate. Other factors that were found to influence the determination of domestic nominal lending rates include real money supply, real domestic debt and the expected change in the exchange rate. However, the muted effects of these factors may be due to the fact that inflationary expectations were controlled for. Policy prescriptions following from these 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.

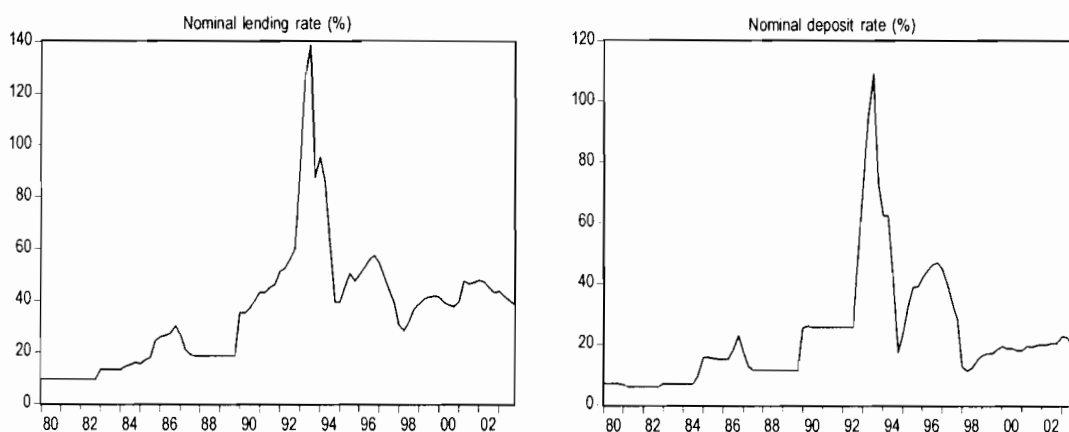


## Chapter 1: Introduction

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 are, among other objectives, aimed at interest rate liberalisation 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 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 and foreign interest rates influence the determination of interest rates (Edwards and Khan, 1985; Gochoco, 1991; Ngugi and Kabubo, 1998; Patnaik and Vasudevan, 1998; Dua and Pandit, 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 formal study has been undertaken to analyse the determinants of interest rates. Moreover, the post-reform period in Zambia has been characterised by high interest rates, thereby raising the question as to what factors have dominated the determination of interest rates in the economy (see Figure 1).

Many developing countries undertook financial sector reforms with the primary objective of building more efficient, robust and deeper financial systems, which could support private sector-led economic growth. These reforms involved the liberalization of financial sectors in order to promote and enhance efficient mobilisation and allocation of domestic financial resources. Efficiency of financial systems entails two components: (1) improved credit allocation, by channelling credit to borrowers with higher expected returns; and, (2) the provision of more, higher quality financial services (Brownbridge and Gayi, 1999). The improved allocation of credit is expected to result from a reduction in government intervention in the allocation of credit or the removal of controls on interest rates while an improvement in the quality of financial services is expected to result from increased competition due to liberalised entry into the financial system.

Figure 1: Nominal weighted average lending and deposit rates



Source: Bank of Zambia

However, there is a growing body of literature on financial sector reforms that includes some scepticism about the efficacy of financial sector reforms in developing countries. 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 (see for instance, 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 and Ikhide, 2001, pg 3). 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 and Gayi, 1999). Furthermore, it is argued that financial sector reforms may lead to financial crises if they are not preceded by macroeconomic stabilisation and prudential reforms (Alawode and Ikhide, 1997; McKinnon, 1988).

Certainly, the period following financial sector reforms in Zambia has been one of high interest rates, high and volatile inflation and a precipitous depreciation in 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. 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. Hence, in recent times, the anticipated benefits of financial sector reforms in Zambia are being increasingly questioned. For instance, Muhanga (2003) argues that financial liberalisation has failed to contain the high interest rate levels prevailing in the economy and the large interest rate spread between the banks deposit and lending rates (see Figures 1 and 2).

This study is aimed at identifying and understanding the main factors that have dominated the determination of interest rates following the liberalization of the financial sector in Zambia. During the pre-reform period, interest rates were generally immune to both domestic and external factors that influence the market determination of interest rates. With the implementation of financial sector reforms, the introduction of a market mechanism coupled with new institutional arrangements and financial instruments clearly changed the way in which interest rates were determined in the economy. Whereas before the reforms, interest rates were set with the aim of minimizing the cost of borrowing in the economy, the liberalization of interest rates meant that domestic and external macroeconomic factors in conjunction with newly introduced institutional arrangements and financial instruments came to dominate the way in which interest rates were determined.

Although in the economic literature the interest rate is treated 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 will be 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 form the basis for the mobilization of domestic financial resources, which are then channeled to productive sectors of the economy. Moreover, the high lending rates prevailing in Zambia have provoked intense debate among policy makers and private sector agents concerned with the pace of economic growth and development. It has been observed that the high real lending rates prevailing in the economy are nowhere near levels that can be considered as conducive for investment and economic growth (Muhanga, 2003). Although deposit rates have also risen in

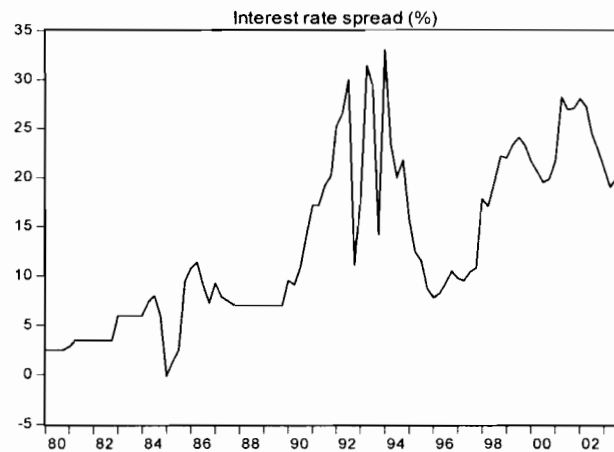
nominal terms in the aftermath of financial sector reforms, they have remained largely negative in real terms. Between 1992 and 2002, the nominal deposit and lending rates averaged 33.4 % and 53.1 %, respectively. In real terms, however, the average for the lending rate was 12.8 % while the average for the deposit rate was negative 6.8 % between 1992 and 2002. 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 as very few businesses can afford to service loans borrowed at high interest rates.

Another perverse aspect of financial sector reforms with regard to interest rates in Zambia is the existence of a significant interest rate spread.<sup>1</sup> The interest rate spread between the banks nominal weighted average deposit and lending rate averaged in excess of 20 % between 1992 and 2002. The wide interest rate spread in Zambia compares unfavourably with other countries in Eastern and Southern Africa, some of which have also been implementing financial sector reforms during the 1990s. For instance, interest rate spreads in Botswana, Kenya, Malawi, Tanzania and Zimbabwe averaged 3.6 %, 14.3 %, 9.8 %, 8.1 % and 10.5 %, respectively over the period 1990 to 2002. Although interest rate spreads have generally widened in most of the countries following financial sector reforms, the wedge has been much higher in Zambia than in any other country in Eastern and Southern Africa that embarked upon financial sector reforms during the 1990s (refer to Appendix A for interest rate spreads in selected countries and Figure 2 for the Zambian interest rate spread).

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<sup>1</sup> The interest rate spread refers to the difference between the banks deposit and lending rates.

**Figure 2: Interest Rate Spread**

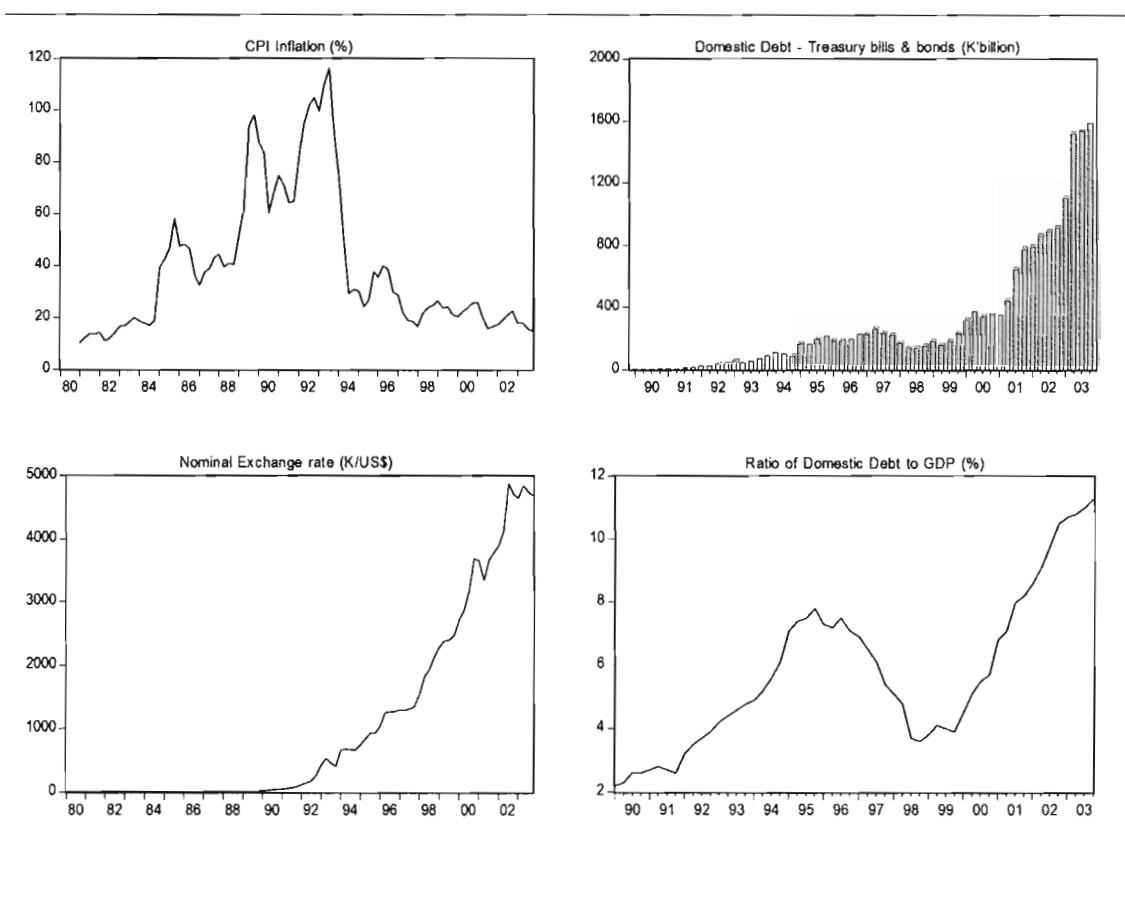


Source: Bank of Zambia; computed as the difference between the banks nominal weighted average lending and deposit rates.

Given the Zambian experience with financial sector reforms, it is therefore not surprising that the debate regarding interest rates has been centered on the negative effects of interest rates in the economy, and the factors responsible for the prevailing interest rate scenario. However, to understand the factors behind the prevailing interest rate scenario in Zambia, it is worth mentioning that following the liberalization of the financial sector, a number of factors come into play in the determination of financial asset prices, including interest rates. Firstly, financial sector reforms open the door to a liberal financial environment, in which market forces of demand and supply become dominant players in the determination of asset prices. Secondly, a liberal financial environment also presents the government with an opportunity to borrow funds from the market to finance shortfalls in its budgets thereby avoiding the monetization of fiscal deficits which occurs through borrowing from the central bank. Thirdly, the liberal financial environment, as is the case in Zambia, also accords domestic residents with an opportunity to freely transact in foreign currencies as well as hold foreign currency deposits within the domestic banking system. And last but not least, a liberalized financial environment engenders competition in the financial sector, which may lead to an efficient provision of financial services in the economy.

Given these attractions of financial sector reforms, one is thus tempted to ask why the liberalized financial environment in Zambia has been associated with such high lending rates. A number of explanations have been advanced in an attempt to explain the causes of high lending rates in Zambia.<sup>2</sup> In summary, these explanations 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 Figure 3); high levels of currency substitution (dollarisation) by domestic residents; and, weak policy credibility.

**Figure 3: CPI Inflation, Exchange Rate and Domestic Debt**



Source: Bank of Zambia, IFS and own computations

The history of weak policy credibility in Zambia can be traced to the early 1980s, when the government first made serious attempts to reform the economy through the adoption of the structural adjustment program (SAP) supported by the International Monetary Fund (IMF) and the

<sup>2</sup> Refer to Muhanga, I. (2003) and Zyuulu, I. (2003).

World Bank in 1983. This program called for the greater role of market forces in the economy, and included measures such as the devaluation of the exchange rate, the removal of controls on interest rates and prices, trade liberalization and the reduction in government expenditure (Simatele, 2003). However, sharp increases in prices and interest rates following the partial implementation of the required reform measures led to the abandonment of the program in 1987 and the adoption of a "home grown" economic program, which re-introduced controls. This program was short-lived and in 1989 the government returned to the IMF/World Bank supported economic program. The implementation of this new program was also partial, and with the introduction of multi-party politics in 1991, the ruling government began to renege on some of the program's commitments in an attempt to win the support of the electorate.

In 1991, a new government assumed power and entered into a new economic program, which called for tight monetary and fiscal policies. This program required the government to meet a number of specific targets in the overall management of the economy. But the government has tended to miss some of the targets. For instance, none of the inflation targets set during the period 1995 to 2003 was achieved (see Table 1 for inflation targets and actuals). Hence, the history of failed attempts at reforming the economy by the government and its commitment to achieving set economic targets may lead the private sector to have low confidence in the government's ability to adopt and implement economic policies. When this happens, policy credibility suffers and the private sector may reflect their low confidence in government policies and economic management in higher inflationary expectations and interest rates.

Although a host of reasons have been advanced in an attempt to explain 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.

**Table 1: Target and Actual Inflation rate (1995 – 2003)**

Year	Target (%)	Actual (%)
1995	35	45.5
1996	20	43.1
1997	15	18.6
1998	15	30.6
1999	20	20.6
2000	19	30.1
2001	17.5	18.7
2002	16	26.7
2003	13	17.2

Source: BOZ Annual Reports

Given that more than a decade has now elapsed since the implementation of financial sector reforms, the possibility now exists for a comprehensive empirical investigation of the determinants of lending interest rates in Zambia. Such an undertaking will not only contribute to the understanding of the main factors behind the high lending rates prevailing in the country, but will also contribute to an increasing number of empirical papers that have been done on Zambia in recent years.<sup>3</sup> With regard to interest rate determination, this paper is the first of its kind on Zambia.

The study's objective is achieved by estimating a model of interest rates conditional on a set of variables that are believed to influence the determination of interest rates in a liberalized financial sector. The empirical methodology employed in the study is Johansen's multivariate cointegration framework. Empirical findings indicate the existence of long-run cointegration relationships between the lending rate, money supply, expected inflation, domestic debt, expected domestic currency depreciation and foreign interest rates. Among the factors empirically identified as crucial in the determination of nominal lending rates in Zambia include expected inflation, the South African lending rate, money supply and domestic debt.

<sup>3</sup> Among the most recent empirical papers done on Zambia include Simatele (2003), Sgherri (2001), Kalinda (2001) and Adam, (1999) and (1995).

The structure of the thesis is as follows. In Chapter 2, we discuss the background to financial sector reforms in Zambia. This is done by briefly reviewing the theoretical and empirical literature regarding the role of the financial sector in the economy and outlining the case for financial reforms. We also review the financial environment in Zambia prior to financial reforms and the reform measures implemented in the foreign exchange and domestic asset markets in the same Chapter. Chapter 2 closes with an assessment of the impact of financial sector reforms in Zambia. In Chapter 3, we review the theoretical and empirical literature on the determinants of interest rates; and outline the conceptual framework of the interest rate model used in the analysis of the determinants of interest rates in Zambia. We also discuss the relevance of the theoretical model to the Zambian situation in the same Chapter. Chapter 4 presents the empirical evidence on the determinants of lending rates in Zambia. This is achieved through the presentation of the data, discussion of the variables and the econometric methodology. Time series analysis of the variables, cointegration tests, model estimation and discussion of the results are also presented in Chapter 4. The summary and conclusions of the study follow in Chapter 5.

## **Chapter 2: Background to Financial Sector Reforms in Zambia**

### **2.1 Introduction**

In this chapter, we provide the background to financial sector reforms in Zambia. We begin with a brief overview of theoretical and empirical arguments on the role of finance in the economy, thereby laying the foundation for financial sector reforms. We then discuss the financial sector environment in Zambia prior to the reforms and highlight the salient features of the reform measures undertaken. We end the chapter with an assessment of the impact of financial sector reforms and how they are linked to interest rate determination.

### **2.2 The Financial Sector and the Economy: Financial Repression Vs Financial Deepening**

The financial sector may be considered as an aggregate of “the wholesale, retail, formal and informal institutions in an economy offering financial services to consumers, businesses and other financial institutions” (DFID, 2004, pg 6). Broadly defined, the financial sector includes all financial institutions such as banks, stock exchanges, insurance companies, credit unions, microfinance institutions and money lenders. Theoretically, the debate among economists on the role of the financial sector in the economy is divided among supporters of financial repression and those who favor financial deepening. These two diametrically opposed positions emanate from different views regarding the role of finance in economic growth.

In classical models, the basic engine of economic growth is savings which are channeled into the accumulation of the capital stock through real investment. Tobin (1965, 1967) presents a growth model and argues that money has a non-neutral effect on the economy's productive potential in the long-run. Tobin's argument, which is based on the Keynesian view of the role of money in the economy, contends that the introduction of money causes economic agents to withdraw productive resources from the economy by holding wealth in form of monetary balances, which can no longer be placed at the disposal of investors. This withholding of savings through liquidity preferences would result in lower savings that can be channeled into physical capital, thereby constraining the economy's long-term productive capacity. Based on this argument, policy prescriptions aimed at

countering the adverse effects of money on economic growth were suggested. These policies, which are collectively referred to as “financial repression” include: the imposition of ceilings on interest rates in order to keep the cost of borrowing low; the imposition of a tax on the holdings of money balances by increasing the growth rate of money supply, and hence the inflation rate, and, the imposition of high reserve requirements on the financial sector in order to limit its ability to create money, thereby reducing the amount of income held in monetary balances.

However, Levhari and Patinkin (1968) present an argument that is diametrically opposed to the Tobin-Keynes conception of the role of money in the economy. The important aspect of the Levhari-Patinkin argument is that it considers money as a factor of production. In this regard, the presence of money in the economy does not only lead to the efficient conduct of transactions, thereby avoiding the various pitfalls of a barter economy, but also promotes the specialization of labor which in turn leads in increased productivity in the economy. Given the potential role of money as a productive factor, its use would result in the economy realizing a higher level of per capita output than would be possible in its absence (Levhari and Patinkin, 1968). Financial repression in this regard is seen as harmful and would only serve to lower the economy's per capita output by destroying one of the factors of production. This argument calls for the replacement of the financial repression paradigm by the financial deepening model and the adoption of measures aimed at improving the efficiency of the financial system.

According to the financial deepening view, the development of the financial sector is important to the growth and development of the economy. The importance of the financial sector stems from a number of functions that it performs in the economy. These functions include facilitating the transmission of savings from surplus units to deficit units; improving the rates of return to savers and reducing the cost of borrowing to investors; and, helping in addressing the problem of adverse selection prevalent in financial markets (King and Levine, 1993b; Levine, 1997). By facilitating the transmission of scarce savings from surplus units to deficit units, the financial system ensures that savings are allocated to investment projects with the highest possible returns, thereby guaranteeing that the augmentation of the economy's physical capital is as productive as possible.

The development of the financial system may also enhance savings and stimulate investment. Savings may improve because financial markets provide economic agents with surplus resources with an opportunity to shift resources to the future and earn a return on those resources. Similarly, financial markets may stimulate investment by allowing investors to borrow against future income and increase their investment expenditure in situations where productive investment opportunities offer a marginal rate of return in excess of the marginal cost. Moreover, through the functions performed by financial intermediaries, such as maturity transformation, liquidity transformation, interest rate transformation, risk transformation and diversification as well as reducing information and transaction costs, the financial sector promotes the use of financial markets by both lenders and borrowers, thereby ensuring a more efficient use of the economy's scarce resources and allowing a higher equilibrium growth path to be realized in the economy (Leland and Pyle, 1977; Naude, 1995).

Despite the theoretical disagreements among economists regarding the role of finance in the economy, a large body of empirical literature that attempts to assess the impact of the financial sector on the economy tends to produce consistent results linking financial sector development to economic growth.<sup>4</sup> In a seminal study by Goldsmith (1969), an empirical relationship between financial development and economic growth was established over long periods of time. Subsequent empirical studies, which have employed different statistical procedures and data sets as well as different measures of financial development, broadly indicate that countries with better developed financial systems tend to grow faster, "specifically, those with (1) large, privately owned banks that funnel credit to private enterprises, and (2) liquid stock exchanges" (Levine, 2003, pg 33). Furthermore, some empirical studies have not only established statistically significant and economically large relationships between some measures of financial development and real per capita growth in the economy, but have also found that some measures of financial development actually "predict the rate of economic growth, capital accumulation, and productivity growth" (King and Levine, 1993b, pg 166). In an empirical study of the impact of financial deepening on economic growth in South Africa, Kularatne (2002) established that financial deepening exerts a positive impact on per capita GDP growth. However, the effect of financial deepening on per capita output

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<sup>4</sup> Some of the empirical studies that have addressed the issue of financial development and economic growth include Levine (1997), Levine and Zervos (1998), Levine, Loayza and Beck (2000), Calderon and Liu (2003), and more recently the Department for International Development (DFID, 2004).

was found to be indirect and occurring mainly through increased investment rates arising from improved financial intermediation and increased liquidity (Kularatne, 2002).

Overall, it should be noted that notwithstanding the different strengths and weaknesses of the empirical methodologies used to examine the finance-growth relationship, the results linking the development of the financial sector to economic growth have been remarkably consistent. It is partly this strong empirical relationship between financial development and economic growth that prompted calls for financial reforms in developing countries.

### **2.3 The Case for Financial Reforms – the McKinnon-Shaw Hypothesis**

Although the literature on financial liberalization can be traced to the works of Levhari and Patinkin (1968), McKinnon and Shaw in 1973 lent further support to the need for financial liberalization in developing countries. According to the McKinnon-Shaw hypothesis, financial repression in developing countries as reflected in interest rate controls resulted in low or negative real interest rates, which contributed to low savings and investment. Moreover, low or negative real interest rates encouraged investment in inefficient and unproductive activities, which were unsustainable in the long-run. It was further argued that financial repression resulted in credit rationing. This is because when interest rates are prevented from adjusting to clear the market, other non-market forms of clearing, such as the rationing of credit through auctions and quantitative restrictions, have to take the place of interest rates. These manifestations of financial repression may not only result in the low quantity of savings and investment, but may also result in the poor quality of the activity that actually occurs (Gemech and Struthers, 2003).

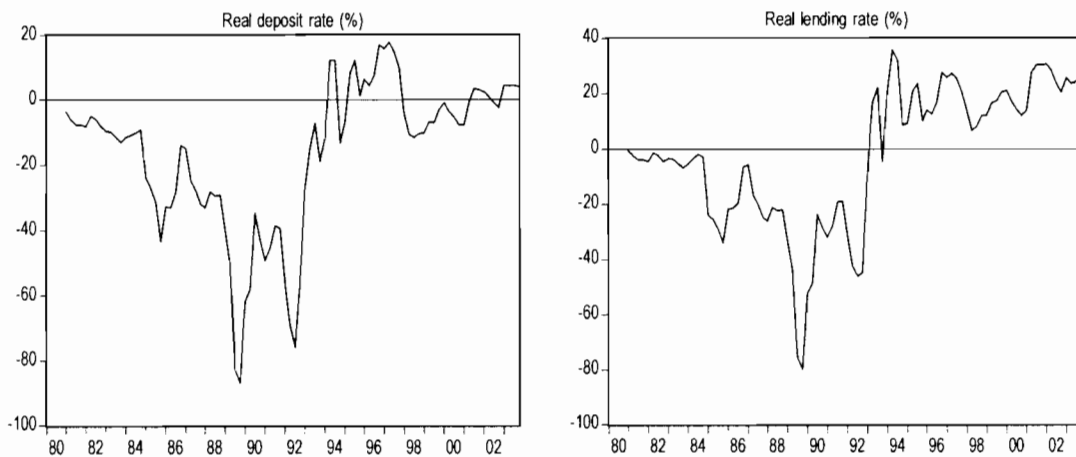
Inevitably, the McKinnon-Shaw theory concluded that removing financial restrictions and allowing market forces to determine real interest rates “can exert a positive effect on growth rates as interest rates rise toward their competitive market equilibrium” (Gemech and Struthers, 2003, pg 2). Thus, the liberalization of the financial sector would result in higher real interest rates, thereby stimulating savings. Increased savings would imply higher levels of investment and consequently higher growth rates in the economy. In addition, higher real interest rates may promote more sustainable investment in the economy due to higher rates of return on investment.

It should be noted that in the McKinnon-Shaw argument, the interest rate that seem to matter is the deposit or savings rate. This can be deduced from McKinnon's complementarity hypothesis, which argues that before any investment can take place in the economy there is a need to accumulate funds through savings. McKinnon (1973) noted that "because of the lumpiness of physical capital, savers may find it convenient to accumulate funds in monetary assets (savings) until they have enough resources to invest in higher yielding physical assets. For economic agents to accumulate savings there is a need for an increase in the rate of interest, which may in turn increase the volume of financial savings through financial intermediaries and thereby raising the pool of investment funds...", a phenomenon referred to as the "conduit effect". Consequently, realized investment in the economy would increase because of the greater availability of investment funds, accumulated through savings.

Although the implementation of financial sector reforms in developing countries have yielded mixed results, financial sector reforms have had some adverse effects in some countries, particularly in the period immediately following the reforms. Several countries that have been adversely affected by financial sector reforms have experienced considerable macroeconomic instability, massive capital outflow and widespread bank failures in the aftermath of financial reforms (Awolade and Ikhide, 2001; Diaz-Alejandro, 1985). In addition, some countries have not been able to realize the much anticipated benefits of financial liberalization, such as increased savings and investment.

In the case of Zambia, it is noteworthy that despite the comprehensive implementation of financial sector reforms, the posited benefits, particularly in the areas of domestic financial resource mobilization and allocation, are yet to be realized. This is because after more than a decade since the liberalization of the financial sector deposits rates have remained close to negative in real terms while lending rates have remained at prohibitively high levels in both real and nominal terms (see Figures 1 and 4).

**Figure 4: Real Deposit and Lending rates**



Source: Bank of Zambia, IFS and own calculations

In this regard, it can be argued that financial liberalization has had a limited impact on the mobilization and allocation of financial resources in Zambia. For instance, total deposits as a percentage of gross domestic product (GDP) averaged 16.9 % between 1994 and 2002 while total private sector credit<sup>5</sup> as a proportion of GDP averaged a mere 6.6 % over the same period. In the financial liberalization paradigm, the failure of financial sector reforms in increasing financial depth through increased deposits can be attributed to real deposit rates that are not high enough or even negative while the failure to improve the allocation of credit may be a consequence of the lack of financial deepening and high inflationary conditions. However, financial sector reforms have also yielded some positive results in Zambia. Some of the positive results include declining inflation rates, falling rates of exchange rate depreciation, rising deposits in the banking system and improved real GDP performance (refer to Table 2).<sup>6</sup> The post-reform period has seen inflation rates

<sup>5</sup> It is not possible to have comparative figures for credit extension to the private sector prior to financial reforms since the economy was over 80 % under the state's control through state owned enterprises to which most of the credit was channelled.

<sup>6</sup> One of the measures used to gauge the extent of domestic financial resource mobilization is total deposits in the banking system as a proportion of GDP; another is the ratio of broad money (M2) to GDP. Higher ratios indicate a deeper financial system. With regard to the allocation of financial resources the proportion of bank credit to the private sector to GDP is one of the measures used.

**Table 2: Summary Statistics for Banking System and Macroeconomic Indicators (%)**

Year	PVT Credit/GDP	*Deposits/GDP	Inflation rate	Exchange rate	Real GDP
				Depreciation	growth
1994	6.2	12.9	54.6	47.8	-13.3
1995	8.0	15.8	34.9	29.1	-2.5
1996	8.8	16.2	43.1	39.8	6.5
1997	5.6	15.4	24.4	8.8	3.4
1998	6.3	15.8	24.5	41.7	-1.9
1999	5.6	16.9	26.8	28.2	2.2
2000	7.2	21.4	26.1	30.3	3.6
2001	5.7	17.9	21.7	16.1	4.9
2002	5.9	19.6	22.2	21.8	3.0
<b>Average</b>	<b>6.6</b>	<b>16.9</b>	<b>30.9</b>	<b>29.3</b>	<b>0.7</b>

Source: Bank of Zambia, various annual reports. \* Deposits include domestic and foreign currency denominated deposits in the banking system.

declining from triple digits of 193 % at the end of 1992 to double digits of around 20 % in recent years while the rate of depreciation in the exchange seem to have also slowed down. In addition, the ratio of total deposits to GDP seems to be on the rise while a consistent positive growth rate in real GDP has been recorded since 1999.

#### **2.4 The Financial Environment prior to Financial Sector Reforms in Zambia**

The financial landscape of the Zambian economy in the 1970s through to the 1980s was shaped by an economic strategy adopted in 1968.<sup>7</sup> At the core of this strategy was state-led import substitution industrialization 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

<sup>7</sup> 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.

and foreign exchange controls. In addition, the government set up a number of financial institutions<sup>8</sup> in an effort of consolidating its dominant role in the financial sector.

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 controls over interest rates over 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 effect, the financial repression strategy was at work in the economy during this period.

In the foreign exchange market, the government pursued a policy of a fixed exchange rate and exercised significant controls on foreign exchange transactions. All foreign exchange earnings had to be surrendered to the BOZ, which then made decisions on allocations to various sectors of the economy. With the onset of the economic slump in the mid-1970s, triggered by declining global copper prices and demand owing to a global recession induced by the oil price shock of 1973, and falling copper production domestically, foreign exchange became increasingly scarce, thereby constraining the economy's productive capacity. The performance of the economy was further weakened by an overvalued exchange rate, which was the consequence of a fixed exchange rate policy.

In the 1970s and early 1980s, the economy was characterized by a relatively low 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 stabilization program (see Chapter 1). In line with the stabilization 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

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<sup>8</sup> Among the financial institutions set up included the Zambia State Insurance Corporation, which was the product of nationalized private insurance and pension companies; Zambia National Commercial bank (ZNCB); National Savings and Credit Bank; Development Bank of Zambia; Lima Bank; Co-operative Bank; and, Zambia Import and Export bank.

sharp increase in lending rates, 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 the foreign exchange market, the government introduced a foreign exchange auction system in an attempt to improve the allocation of available foreign exchange. The auctioning system resulted in a significant depreciation of the exchange rate, which fell by over 200 % between September and October 1985 to K7.50 per US\$ (Simatele, 2003).

In May 1987, the government abandoned the IMF-supported stabilization program and re-introduced controls on interest and exchange rates. However, the economic program put in place by the government, which emphasized “growth from own resources”, was destined to failure given adverse internal and external conditions prevailing at the time of its implementation. Indeed in 1989, the government abandoned the home grown economic program and adopted a new IMF backed economic recovery program. Interest rates were raised though administrative controls on them remained and the exchange rate was devalued. The complete removal of controls on interest rates and the liberalization of the exchange rate did not materialize until September 1992 following the ascendance to power of a new government in November 1991. In October 1991, elections were held under the re-introduced multiparty political system. The elections were won by the Movement for Multi-Party Democracy (MMD), which has been in power since then. The only difference in the implementation of the economic reform program between the MMD and the previous United National Independence Party (UNIP) government lay in the pace and rigor with which the new government implemented the reforms.

## **2.5 Financial Sector Reforms in Zambia**

It is clear from the discussion in the preceding section that attempts toward financial deepening in Zambia started in the mid-1980s. The need for financial deepening stemmed from the growing realization of the importance of financial sector development to economic growth and the deleterious effects of financial repression on economic growth (see section 2.3). Hence in 1992, more rigorous and comprehensive financial sector reforms were adopted and implemented. Khan and Sundararajan (1992) define financial sector reforms “as a set of policy measures designed to

deregulate the financial system and transform its structure with the view to achieving a liberalized market-oriented system within an appropriate regulatory framework.” In Zambia, financial sector reforms consisted of two major components:

- (1) The liberalization of the foreign exchange market and the removal of controls on interest rates; and,
- (2) Reforms to the system of prudential regulation and supervision of financial institutions.<sup>9</sup>

With regard to the liberalization of the foreign exchange market, reform measures undertaken included the liberalization of the current account, and later the capital account in 1994, which formed the basis for a liberal foreign exchange market. In the domestic asset market, reforms took the form of removing controls on interest rates in September 1992 and the re-introduction of an auction in Treasury bills in January 1993. These measures effectively accorded the market a prominent role in the determination of both the exchange and interest rates.

A third component of the reforms was the liberalization of access to banking licenses, which entailed transferring the authority to issue banking licenses from the Ministry of Finance to the BOZ. The move to liberalize entry into the financial sector resulted in the emergence of 7 new locally owned banks between 1991 to 1995, with most of them coming on board around 1993 and 1994 (Brownbridge, 1996). Though a number of these new banks later collapsed, this aspect of financial reforms was aimed at enhancing competition in the banking system in order to foster the provision of quality and efficient banking services in the economy.

The reforms implemented in the financial markets necessitated changes to monetary policy, which until 1991 was conducted using direct instruments in the form of interest and exchange rate controls, statutory reserve ratios, and directed lending to selected sectors of the economy. The objective of monetary policy during the pre-reform period was mainly to promote output growth and

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<sup>9</sup> This component of financial reforms was aimed at strengthening the prudential regulation of the financial system and included the enactment of new financial sector legislation in 1994 contained in the Banking and Financial Services Act (BFSA). The BFSA provided the BOZ with the supervisory and regulatory authority over both banks and non-bank financial institutions.

this was reflected in the instruments of monetary policy at the disposal of the central bank. With the implementation of financial sector reforms, the monetary policy objective changed from that of supporting output growth to that of controlling and stabilizing inflation (Bank of Zambia Act 1996; Simatele, 2003). To achieve this objective in a nascent market-oriented financial sector, indirect instruments of monetary policy implementation had to be adopted. Among the indirect monetary policy tools introduced included the Treasury bill auction in January 1993 and open market operations in March 1995. These tools were supplemented by foreign exchange auctions during the early stages of financial sector reforms. However, the Bank retained the use of the statutory reserve ratio as a direct instrument of monetary control to employ particularly in periods of excessive liquidity conditions, though its use has become less frequent in recent times (Refer to Appendix B for financial sector reform measures undertaken in Zambia).

## **2.6 Impact of Financial Sector Reforms**

Before considering the impact of financial sector reforms in Zambia, it is prudent to highlight some of the weaknesses of the McKinnon-Shaw hypothesis, which as noted above has been the cornerstone for financial liberalization in developing countries. To begin with, the assumptions underlying the McKinnon-Shaw theory are neo-classical in nature: markets are assumed to work to equilibrate the demand and supply of loanable funds; markets are also assumed to operate in a competitive environment. Based on these assumptions, the theory argues that when interest rates are kept low or negative in real terms, economic agents will have low incentive to save, resulting in low levels of loanable funds (McKinnon, 1973). Therefore, with the removal of controls on interest rates, savings are expected to rise with the resultant increase in savings being channeled to investment. The underlying assumption for the expected increase in savings is that savings are responsive to interest rates. This may not be the case, particularly in low income economies.

Furthermore, the interest rate that is fundamental in the McKinnon-Shaw framework is the savings rate and the hypothesis does not directly address the importance of the lending rate on the promotion of economic growth through investment. Since increased accumulation of savings would result in increased amounts of loanable funds, the implication of the McKinnon-Shaw hypothesis is that increased intermediation would automatically result in increased investment and higher

economic growth. The increased supply of loanable funds would also lead to a reduction in the lending rate, thereby promoting investment and economic growth. However, it is worth mentioning that the reduction in the lending rate, which may be a consequence of the increased supply of loanable funds, may result in investment with low rates of return, which may turn out to be unsustainable in the long-run. In this regard, the theory's disregard of the explicit role and level of lending rates in the economy weakens the argument somewhat as loanable funds may be priced at levels that render investment unattractive despite the existence of a large pool of financial savings.

In the McKinnon-Shaw hypothesis, the principal factor that seems to drive economic growth is increased investment, presumably in physical capital. However, in a paper by Romer (1990), it is argued that it is technological change that "lies at the heart of economic growth". Romer notes that endogenous technological change creates the opportunity for unbounded economic growth, and that capital accumulation and technological change account for much of the increase in output. Romer also notes the importance of investing in human capital, which can either be employed in the manufacturing sector or in research activities aimed at producing technology. Of particular importance in Romer's model is the return to investment in human capital for research and development purposes, which is represented by a stream of net revenue that new designs (technology) generates in the future. In this regard, Romer notes that if the interest rate is high, there will be a switch to investment in production for current consumption from investment in research and development; less human capital will be allocated to research and development and the rate of economic growth will be lower. Romer's analysis brings out the important role of technological changes in the promotion of economic growth and the effect of interest rates. While higher interest rates may encourage savings and investment with higher rates of return as postulated by the McKinnon-Shaw theory, they may also constrain technological development because of the sensitivity of the rate of technological change to the rate of interest. Moreover, financial sector reforms may not be sufficient in promoting sustainable economic growth in the absence of investment in human capital.

Furthermore, the McKinnon-Shaw hypothesis, as applied to developing economies, falls short in its assumptions of competitive and working markets. In particular, the theory does not take into account the operations of banking systems in developing countries and how liberalization can

address questions of bank fragmentation, bank distress and financial rationing (Sikorski, 1996). Given that most of the markets, including financial markets, are barely competitive in developing countries and that banking systems tend to be characterized by fragmentation and distress, the implementation of financial sector reforms under such circumstances may worsen the financial situation and accelerate the failure of banks that are already in distress. Even in situations where some semblance of a competitive environment is created, as should be the case following financial sector reforms, this competition may force financial institutions (banks) to raise deposit rates in an attempt to attract deposits. However, in an environment of macroeconomic instability interest rates may be increased to high levels, a situation which may encourage distress borrowing and increase the proportion of bad loans in the banks portfolios. Indeed, records abound of bank failures in developing economies in the aftermath of financial liberalization with consequent negative effects on the financial sector in particular and the economy in general (Naude, 1995; Muke, 1998b; Maimbo, 2000a; Awolade and Ikhide, 2001).

The McKinnon-Shaw theory also ignores the important issue of imperfect information, which characterizes financial markets. In a well known model of imperfect information advanced by Stiglitz and Weiss (1981), it was demonstrated that an equilibrium financial market, such as the one presumed to operate in developed economies, can be characterized by credit rationing due to information asymmetries. The problem of imperfect information, which results in adverse selection and moral hazard, is likely to be more serious in developing countries, particularly after long periods of financial repression. Consequently, the liberalization of the financial sector can lead banks to set imprudently high interest rates to compensate for the risk associated with lending in an environment characterized by significant information asymmetries (Simatele, 2003). Higher lending rates in this case would fail to clear the credit market, but would instead serve as a device to affect the quality of borrowers. Too high an interest rate would attract riskier borrowers (adverse selection) and would give the current pool of borrowers' incentives to choose riskier projects (adverse incentives) to cover the higher financing costs (Naude, 1995).

As a result, high interest rates may result in the rationing of credit by banks, which may work against potential borrowers with viable investment projects. In addition, the higher incidence of bankruptcy associated with high lending rates will also require banks to allocate a greater

proportion of their loanable funds to the accumulation of reserves to cover bad loans while the liberalization of the capital account may also cause banks to re-allocate their portfolios away from loans to other assets such as foreign exchange (Naude, 1995). The consequence of these factors may be the reduction in the supply of loanable funds to the private sector, thereby inhibiting economic growth.

In addition, the McKinnon-Shaw hypothesis does not take into account the importance of macroeconomic stability, or lack of it, prior to the implementation and sequencing of financial sector reforms. A number of economists have highlighted the importance of macroeconomic stability in the success or failure of financial sector reforms. Dornbusch and Reynoso (1993), *inter alia*, note that financial liberalization may result in increased inflation particularly in situations where fiscal deficits are large and the exchange rate is depreciating rapidly. In most developing countries, fiscal deficits have been identified as the major source of macroeconomic instability, especially if they are financed through money creation. It has also been noted that financial sector reforms under conditions of macroeconomic instability may aggravate the problem of asymmetric information (Villauneva, Delano and Mirakhor, 1990; Stiglitz and Weiss, 1981). In particular, Stiglitz and Weiss (1981) argue that with financial sector reforms the interaction of macroeconomic instability and inadequate bank supervision often result in an increase in real interest rates to risky levels while the unstable macroeconomic environment intensifies adverse selection, adverse incentives and moral hazard as both banks and their customers transact risky loans at higher interest rates. It is therefore important that for a country to avoid the adverse consequences of financial liberalization, some stabilization measures must be undertaken prior to financial sector reforms (Cavallo and Cotain, 1993; Chapple, 1990). It may also be important that reform measures are implemented in accordance with the proposed feasible sequence of financial sector reforms (refer to Appendix C, adopted from Awolade and Ikhida, 2001).

According to the proposed feasible sequencing of financial sector reforms, the first step involves the achievement of macroeconomic and financial stability. Macroeconomic stability should be accompanied by measures aimed at cleaning up the financial system through the restructuring of weak financial institutions. The second step involves the introduction of indirect monetary policy instruments. These tools are required for the conduct of monetary policy based on a market-based

financial system. In this regard, the transition from direct to indirect monetary policy tools will involve parallel reforms in central banking functions, money market structures and public debt management (Khan and Sundararajan, 1992). The third step involves the installation of effective prudential regulation and supervision aimed at ensuring that financial institutions in an emerging competitive environment do not take excessive risks. The liberalization of entry into the financial system should also be done at this stage to enhance competition. Step four involves the abolition of all direct controls on interest rates and credit ceilings. With macroeconomic stability and a strong regulatory and supervisory framework in place, the removal of controls on interest rates and ceilings on credit will enable banks to attract long-term deposits and extend long-term loans in an atmosphere of financial stability (Awolade and Ikhide, 2001).

The implementation of financial sector reforms in Zambia took place under conditions of severe macroeconomic instability. In particular, consumer price inflation, which had been on the upswing since the mid-1980s, accelerated to 93 % during 1991, largely on account of central bank financing of the fiscal deficit, which was reflected in an expansion of 95 % in broad money (Brownbridge, 1996; Simatele, 2003). By the end of 1992, inflation rose further to 193 % despite a decline in the government's fiscal deficit to 5 % of GDP from 10 % in 1991. Although the impact of financial sector reforms in Zambia in this regard seem to conform to several authors'<sup>10</sup> expectations when reforms are implemented under conditions of macroeconomic instability, it should be noted that this situation may be likened to the chicken and egg problem. In this case, while the prevailing macroeconomic instability may have necessitated financial sector reforms, the implementation of the reforms under unstable macroeconomic conditions may have induced further macroeconomic instability, at least in the short-run.

In Zambia, the re-introduction of Treasury bill auctions in 1993 marked the beginning of the move toward market-determined interest rates. However, given the unstable macroeconomic environment, the short-term effects of interest rate liberalization 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

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<sup>10</sup> See, for instance, Adam (1995) on Zambia; Brownbridge (1996) on Zambia and Uganda; Ziorklui (2001) on Ghana; and, Odhiambo (2003) on Kenya.

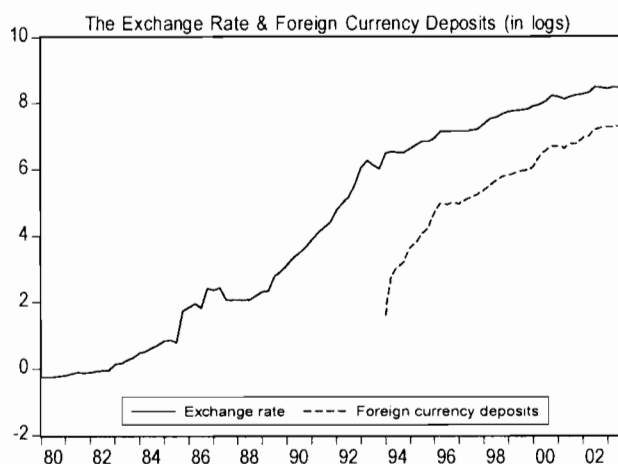
1993, reaching a maximum of 347 % in July 1993” (Adam, 1995, pg 742). The effect of this sharp increase in Treasury bill rates was to push up bank deposit and lending rates, with the savings rate rising to over 90 % from 25 % while lending rates rose to over 130 % from 51 % between June 1992 and June 1993. In the second half of the 1990s, some reductions were recorded in nominal interest rates 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. In this regard, it should be noted that financial sector reforms did not only lead to the market determination of interest rates, but also allowed the government to raise funds from the market to finance shortfalls in its budget. The effect of financing government deficits through borrowing from the market may have been to “crowd out” the productive sector of the economy from the credit market. This crowding out would occur through high interest charges on government debt and may be reflected in high bank lending rates and low levels of bank lending to the private sector.

Another aspect of financial sector reforms, which may have affected the determination of interest rates, albeit indirectly, was the relaxation of exchange controls in the foreign exchange market. The removal of controls on foreign exchange transactions by allowing banks to deal in foreign exchange, authorizing the establishment of bureau de change and allowing residents to hold foreign currency bank deposits led to a sharp depreciation in the exchange rate, with the official exchange rate depreciating by over 165 % between 1992 and 1994. The rapid depreciation of the exchange rate induced residents to switch from domestic currency deposits into foreign currency deposits (see Figure 5). In line with the uncovered interest parity condition (UIP), such a shift is likely to contribute to keeping interest rates on domestic currency assets high as a way of inducing residents to invest in these assets. But with inflation in triple digits, as was the case in the early period of the reforms, interest rates are likely to remain high for a long period of time while the continuous depreciation of the exchange rate sustains a switch from domestic currency to foreign currency assets.

In addition, it has been argued that financial sector reforms when implemented under conditions of high and unstable inflation can result in the collapse of the demand for real domestic money balances. Sgherri (2001) notes that the implementation of financial sector reforms under high inflationary conditions in Zambia “increased the opportunity costs of holding domestic money, while

raising the expected rate of return (and/ or the liquidity) of alternative assets, including foreign currency". In such a situation, high inflationary expectations coupled with high returns on alternative financial assets and/ or increased demand for foreign currency assets for hedging against high inflationary conditions results in a substitution out of domestic money balances into foreign currency assets and high yielding government securities. In Zambia, this substitution was reflected in the collapse in broad money, which fell to 12.5 % of GDP by the end of 1993 from 24 % at the end of 1991 while the annualized growth rate slowed by 30 % (Sgherri, 2001).

**Figure 5: Foreign Currency Deposits and the Exchange Rate**



Source: Bank of Zambia, IFS and own computations

Financial sector reforms are also aimed at enhancing domestic savings mobilization and efficient allocation of credit to productive sectors of the economy. However, several studies undertaken to assess the impact of financial sector reforms on savings mobilization and allocation of credit have shown that in most countries financial sector reforms have so far failed to deliver in these areas.<sup>11</sup> In Zambia, the level of total deposits as a percentage of GDP has averaged 17.9 % during the post-reform period of 1992 to 2003, down from an average of 21.4 % between 1982 and 1992.<sup>12</sup> However, it should be noted that although the downward trend in deposits began in the late 1980s,

<sup>11</sup> See Maimbo and Mavrotas (2003) on Zambia and Ziorklui (2001) on Ghana.

<sup>12</sup> Total deposits referred to here include domestic and foreign currency deposits in the banking system. Removing foreign currency deposits from total deposits indicates a sustained fall in domestic currency deposits, which averaged 11 % of GDP between 1992 to 2003.

financial sector reforms have so far failed to reverse the downward trend in deposits held in the domestic currency. Among the reasons cited for low levels of savings include higher, and more volatile, rates of inflation, which have made it difficult to maintain deposit rates at positive levels; poor economic performance and the associated low income levels; the removal of foreign exchange controls, which allowed residents to purchase and hold foreign currency legally; and, the introduction of government securities auctions, which led to a steep increase in yields on government securities, thereby inducing a diversion of bank deposits into government securities (Adam, 1995; Brownbridge, 1996; Brownbridge and Gayi, 1999; Maimbo and Mavrotas, 2003).

With regard to the objective of enhancing the efficiency of credit allocation in the economy, it has been noted that the combination of very high nominal interest rates and the high inflationary environment greatly increase the risks of bank intermediation for both banks and their borrowers, making it likely that the willingness of banks to supply credit will be curtailed (Harvey and Jenkins, 1994; Odhiambo, 2003). In Zambia, the amount of credit advanced to the private sector by banks as a percentage of GDP averaged 6.6 % between 1992 and 2002. It has also been noted that in instances where credit to the private sector tends to increase after financial sector reforms, most of it is of a short-term nature and that on the whole, long-term credit for productive investment purposes tends to be on the wane (Ziorklui, 2001). The reduction in the amount of credit to the private sector following financial liberalization is partly attributed to the introduction of high yielding government securities, which tend to become the major source of bank revenue, thereby discouraging bank lending to productive sectors of the economy. In this regard, conclusions have been made to the effect that under conditions of macroeconomic instability and sluggish economic performance, financial sector reforms are unlikely to improve credit allocation and may impose severe costs on the economy "in terms of investment foregone during the extended period of macroeconomic instability" (Adam, 1995, pg 744). However, it is worth mentioning that for an economy afflicted with severe macroeconomic imbalances and poor economic performance, policy makers may have no option other than adopting comprehensive economic reforms, including financial sector reforms, aimed at addressing macroeconomic imbalances and restoring economic growth despite the costs that may be incurred in the process. Once financial sector reforms are underway, it is important for the government to exercise fiscal discipline and ensure the

coordination of monetary policy with fiscal policy in order to establish macroeconomic stability and reduce the economic costs associated with the reforms.

One of the goals of financial sector reforms is to enhance banking system efficiency. Although there are several measures of banking system efficiency, one commonly used measure is the banks' interest rate spread. The argument is "that competition following financial sector reforms will lead to an enhanced efficiency of the banking sector that may result in the reduction of interest rate spreads between lending and deposit rates" (Ziorkluis, 2001, pg 21). Based on this approach, it can be argued that the banking system in Zambia has certainly become inefficient as reflected in an average interest rate spread in excess of 20 % for most of the post-reform period.

The wedge between the deposit and the lending rate can arise for several reasons. These include high operating, transaction and default costs. High operating and transaction costs can arise in situations where the majority of bank assets are held in financial instruments with short-term maturities and their liabilities (deposits) are also of a short duration while high default costs would arise from a large and increasing proportion of non-performing loans in banks' total assets (Naude, 1995). In the Zambian banking system, high default costs are reflected in a high proportion of non-performing loans in total bank loan portfolios, which averaged 21 % between 2000 and 2002. Muhanga (2003) attributes the high proportion of non-performing loans to the long history of credit delinquency partly perpetuated by a weak legal framework, and by the unfavorable economic environment. In such a situation, an attempt by banks to remain solvent may cause them to increase the wedge between the deposit and lending rate. Furthermore, macroeconomic instability, reflected in high and unstable inflation rates will also drive a wedge between the deposit and lending rate. This may be compounded by the requirement for banks to maintain cash reserves with the central bank which earn no interest. In this case, the required ratio on cash reserves, which averaged 18.3 % in Zambia between 1992 and 2003, coupled with the inflation tax on reserves is passed on to depositors in form of low deposit rates and to borrowers in form of high loan rates. A high inflationary environment may also create an incentive for monetary authorities to raise the banks cash reserve ratios, which will have the effect of further increasing the wedge between the deposit and loan rate (Fry, 1985). Overall, the effect of a large wedge between the

deposit and loan rate would be to impede greater mobilization of deposits and constrain the demand for credit for investment purposes.

With regard to the financial sector reform's objective of promoting competition, it should be noted that despite the entrance of some new banks in the Zambian banking system, the larger proportion of the market still remains under the control of a few banks, which include Barclays bank, Standard Chartered bank and the State-owned Zambia National Commercial bank. These three banks, which account for over 70 % of the banking market, continue to exercise some degree of oligopoly that enables them "to maintain large interest rate spreads, needed to cover the cost of their own inefficiencies and that of non-performing loans" (Brownbridge and Gayi, 1999, pg 8). Competition is further impeded because of market segmentation, particularly in the credit market. In this regard, foreign banks (Barclays, Standard Chartered and Citi bank) mainly service large and foreign corporate customers while the market for the state-owned bank consists mainly of state-owned and privatized companies. Small domestic private banks mainly lend to small or medium local enterprises as well as to activities related to commerce.

From an assessment of the impact of financial sector reforms in Zambia, it is possible that financial sector reforms have had a limited impact on the economy so far. Although progress has been made in a number of areas including the modernization of the payments system, the regulatory and supervisory framework and monetary policy, more work is still required for financial sector reforms to achieve the desired goals, particularly in the areas of domestic financial resource mobilization and allocation. Crucial to achieving these important objectives is the achievement and maintenance of a stable macroeconomic environment.

## **Chapter 3: Determinants of Interest Rates in Liberalized Financial Sectors – An Overview of Theoretical and Empirical Literature**

### **3.1 Introduction**

In this chapter, we review the theoretical and empirical literature on the determinants of interest rates in liberalized financial sectors. We also present and discuss the conceptual framework of the interest rate model used in the analysis of the determinants of interest rates in Zambia in the empirical chapter of this thesis. We close the chapter with the discussion of the relevance of the theoretical model to the determination of interest rates in Zambia.

### **3.2 Review of Theoretical Literature**

Traditional theories of interest rate 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 was 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 reasoning 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 and Kabubo, 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 hypothesized. For instance, the central bank's open market operations involving sales of government bonds may result in increased bond prices and a subsequent reduction in interest rates while bond purchases may lead to a fall in bond prices and an increase in interest rates.

Hence, in the Keynesian analysis an expansion in money supply is associated with a reduction in nominal interest rates while a contraction in money supply results in 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.

Another theoretical model of interest rate is that advanced by Tobin (1965, 1967). Tobin presents a non-monetary neo-classical growth model and 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 behavior. 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 behavior 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 behavior 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 globalization, 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 and Gupta, 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 and Khan (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, pg 65). 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 and Rhodd, 1993; Miller and Russek, 1996; Linde, 2001).

### 3.3 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 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 negative significant 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 would 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 and Warner (1993), using the Johansen and Juselius (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 and Murphy, 1989; Peng, 1995). With regard to developing countries, empirical studies broadly provide evidence that appears to be in line with 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 and Blake, 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 and Ewing, 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 and Prati (1993) for Italy, where a monetary expansion was associated with lower interest rates while a monetary contraction resulted into

higher interest rates. To rationalize 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 and Kabubo (1998) and Dua and Pandit (2001), among others, for developing economies. In particular, Dua and Pandit (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 and Khan (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. Their 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 and Kabubo (1998) adopted the Edwards and Khan model to analyse financial sector reforms and interest rate liberalization 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 and Vasudevan (1998) for India, both domestic and external factors were found to be important determinants of domestic interest rates. Patnaik and Vasudevan (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 and Kapur (1990) based on the Edwards and Khan model aimed at analyzing 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 and Gupta (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. Their 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 and Gupta, 1994, pg 14). In addition, they found expectations of exchange rate changes to significantly influence 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 tends to indicate that nominal interest rates are positively related to fiscal deficits (de Haan and Zelhorst, 1990; Cebula and Rhodd, 1993; Miller and Russek, 1996;).

More recently, Linde (2001) investigated the empirical relationship between government fiscal deficits and interest rates for Sweden and established that larger budget deficits will tend 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, pg 80). 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 should be noted that domestic interest rates in a liberalized financial system are potentially influenced by domestic and external factors, which include money supply, expected inflation, government spending, 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.

### 3.4 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 analyzing 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 nominal interest rate,  $i_t^*$  is the foreign 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,  $\pi_t^e$  is expected inflation,  $i_{t-1}$  is lagged nominal interest rate and  $\varepsilon_t$  is the stochastic error term.

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  $\pi_t^e$  is the expected inflation.

Equation (2) relates the nominal interest rate to the real interest rate and expected inflation. Although the equation is a basic definition, its 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 the 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.

$$i_t = i_t^* + e_t \quad (3)$$

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 and Pandit (2001), equilibrium conditions in the goods and money markets are specified by the following equations, respectively.

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

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.

$$M = M_1(Y, r) + M_2(i) \quad (5)$$

Where:  $M$  is real money supply,  $M_1, M_2$  represents the transactions and speculative demand for money, respectively,  $i$  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 and Pandit (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 variables noted 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:

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

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

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). Furthermore, the system contains four endogenous variables,  $y, m, r$  and  $i$ . Exogenous variables include  $g, \pi^e, i^*$  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. Hence, the model of interest rate determination derived is specified as follows (refer to Appendix D for a detailed derivation of the model).

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

Where:  $g_t$  is government spending, financed through domestic debt, and  $\zeta_t$  is the stochastic error term.

In the model specified in equation (6), *a priori* 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  $\alpha_1 > 0$  or  $< 0$ . In this regard, we hypothesize a negative coefficient on money supply, and positive coefficients on expected inflation, foreign interest rates, the expected change in the exchange rate and government spending.

### 3.5 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, like most developing economies, has become more open following financial sector reforms and has completely 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 characterized by a high degree of currency substitution. In a liberalized financial environment characterized 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 Figure 5 above), 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 monetization 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), our model would help in establishing as to which of the two opposing views is relevant to the Zambian situation.

Our 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 interest 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 and Pandit, 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.

## Chapter 4: Empirical Evidence on Interest Rate Determination

### 4.1 Introduction

This chapter provides 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*.

### 4.2 Data and Variables

We use quarterly data collected over the period 1980 to 2003. 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 undertaking 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. Measures of foreign interest rates used include the United States (US) and South African (SA) lending rates. The choice of the US lending rate reflects the fact that most official foreign

exchange transactions are conducted using the US dollar while 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 realized values. Inflation is computed as the annualized rate of change in the economy-wide consumer price index (CPI). The proxy used for domestic debt is the level 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.<sup>13</sup>

Since the common 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.<sup>14</sup> This transformation was aimed at 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 economy-wide CPI (refer to Appendix E for the description and derivation of the variables).

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<sup>13</sup> 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).

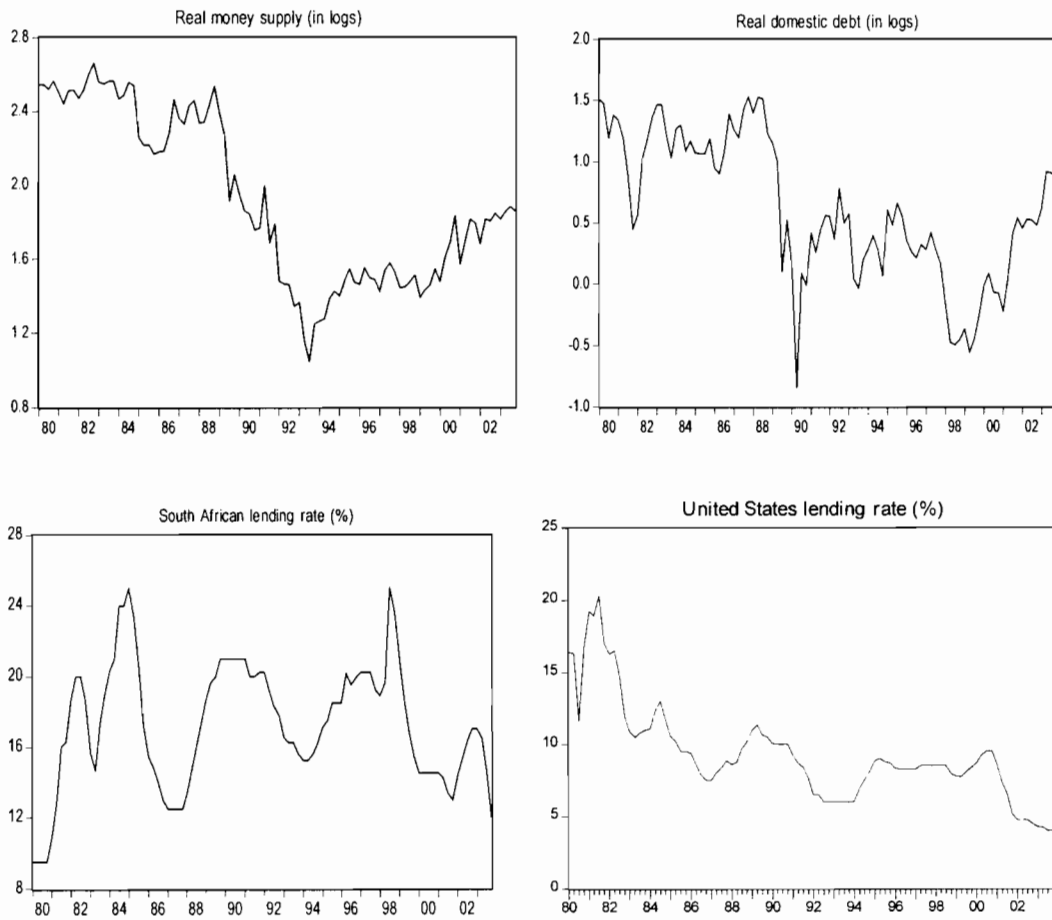
<sup>14</sup> The logarithmic transformation was found to be appropriate based on the Schwarz Bayesian criterion (SBC) test. The test gave larger SBC statistics for the log transformed data than for non-transformed data.

### 4.3 Preliminary Data Analysis

In Figure 6 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 debt to GDP in the latter part of the 1990s (see Figure 3). For most of the domestic variables (inflation, money supply and the lending rate), a change in behavior 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 monetizing fiscal deficits in order to reduce inflation and inflationary expectations.

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.

**Figure 6: Money supply, Domestic debt and foreign interest rates**



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.

#### **4.4.0 Econometric Methodology**

The econometric methodology employed in analyzing 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 behavior 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. Cointegration analysis can be employed in either a single-

equation or VAR framework, with the former attributed to Engle and Granger (1987) and the latter to Johansen (1988).

In this paper, we employ cointegration techniques using the VAR framework. 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.

#### **4.4.1 Time Series Properties of the Variables**

The classical approach to econometric time series modeling is based on the assumption that the dependent and independent variables in a regression model are stationary in order to avoid the problem of spurious regression (Granger and Newbold, 1974). Stationarity refers to a situation where the variables exhibit constant first and second moments, that is, constant means and variances. In general, time series variables exhibit non-stationarity, implying that they have time-varying moments. Time series variables that exhibit non-stationarity are said to be generated by unit root processes and proceeding to model such series without taking into account their non-stationary nature usually results in spurious regressions. Spurious regressions refer to results that indicate statistically significant relationships among variables, as indicated by high values of correlation coefficients or *R-squared*, when in actual fact the relationship is only an indication of contemporaneous correlations rather than any meaningful causal relationships (Harris, 1995). Therefore, to avoid the problem of spurious regressions, it is always advisable to check for the presence of unit roots in time series data.

We test for unit roots using the Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) tests. Both tests are aimed at testing the null hypothesis that the series are non-stationary (have a unit root) against the alternative of stationarity. In practice, the DF test amounts to estimating equation (7) and testing for the size and significance of the coefficient on lagged values of the series.

$$x_t = \rho x_{t-1} + u_t \quad (7)$$

The null hypothesis tested is that  $\rho = 1$  against the alternative hypothesis that  $\rho < 1$ . Usually, the standard approach used to test for the significance of any coefficient in a regression involves the construction of a t-test, but under the null of non-stationarity the computed t-statistic does not follow a standard t-distribution but a DF distribution (Harris, 1995). It is also noteworthy that testing for unit roots using equation (7) involves making the prior assumption that the underlying data generating process for the series is a simple first order autoregressive (AR) process with zero mean and no trend component; implying the absence of serial correlation in the error term (Harris, 1995).

In general, the ADF test is the standard approach used to test for unit roots because it accounts for deterministic components in the series as well as the possibility of serial correlation in the error term. The test involves the inclusion of the drift, trend and a number of lagged differenced terms of the series in the regression equation and is based on estimating the following equation.

$$\Delta x_t = \alpha + \theta t + \delta x_{t-1} + \sum_{i=2}^p \beta_i \Delta x_{t-i} + u_t \quad (8)$$

In equation (8), re-parameterising equation (7) results in  $\delta = \rho - 1$  so that unit root tests are based on  $\rho = 1$ , which is equivalent to  $\delta = 0$ . The  $H_0 : \delta = 0$  while the  $H_1 : \delta < 0$ . Acceptance of the null hypothesis indicates the presence of a unit root while rejection of the null hypothesis is an indication of a stationary series. The term  $\sum_{i=2}^p \beta_i \Delta x_{t-i}$  is aimed at accounting for the

possibility of autocorrelation in the error term while  $\alpha$  and  $\tau$  represent the drift and trend components in the data generating process, respectively. In this regard, the series are assumed to follow a  $p^{th}$  order autoregressive process rather than an  $AR(1)$  process. Unit root test results based on equation (8) are presented in Table 3.

**Table 3: 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.

The results indicate that for each variable the test statistic (DF and ADF) are less negative than corresponding critical values at 5 % level of significance. Hence, the null hypothesis of a unit root cannot be rejected, indicating that the variables are non-stationary. Having established that all the variables are non-stationary, we consider the order of integration of the variables. The order of integration refers to the number of times that the series must be differenced to render them stationary. If the series has to be differenced once to become stationary, it is regarded as integrated of order one. If second differences are required to induce stationarity then the series is considered as integrated of order two, and so on. ADF tests conducted on first differences of each of the variables are shown in Table 4. Given that each of the ADF statistics is more negative than the 5 % critical value, the null hypothesis of a unit root is rejected, indicating that the first differences of the variables are stationary. Thus, all the variables are integrated of order one.

**Table 4: Unit Root Test results (First differences)**

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

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

#### 4.4.2 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<sup>15</sup>, we consider a general VAR estimation, specified as:

$$z_t = A_1 z_{t-1} + \dots + A_m z_{t-m} + \mu + \delta_t \quad (9)$$

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

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

$$\Delta z_t = \sum_{i=1}^{k-1} \Gamma_i \Delta z_{t-i} + \Pi z_{t-k+1} + \mu + \delta_t \quad (10)$$

<sup>15</sup> Refer to Johansen (1988) and Johansen and Juselius (1990) for detailed discussion of the methodology.

Where:  $\Delta$  denotes the first difference operator and  $\Pi = \alpha\beta'$ ;  $\alpha$  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  $\beta$  is the matrix that contains long-run equilibrium (cointegrating) relationships (Fedderke and Romm, 2004). According to Johansen and Juselius (1990), the hypothesis of cointegration can be formulated as the hypothesis of the reduced rank of the long-run impact of the matrix,  $\Pi$ , and the presence of cointegration is indicated by the rank of  $\Pi$ . Hence, cointegration tests in a multivariate framework are aimed at investigating whether the coefficient matrix  $\Pi$  contains information about long-run relationships between the variables in the data matrix (Johansen and Juselius, 1990). In this investigation, three possible cases arise about the rank of  $\Pi$ :

- (1) the matrix  $\Pi$  may be of full rank, that is rank of  $\Pi = p$ , in which case the vector process  $z_t$  is stationary;
- (2) the matrix  $\Pi$  may be of zero rank, that is the matrix may be the null matrix, indicating the absence of any cointegrating relations. In such a case, the variables in levels are modeled in differenced form;
- (3) The matrix  $\Pi$  may be of reduced rank,  $r \leq (n - 1)$ , implying that the number of linearly independent rows and columns in the matrix is less than or equal to the number of variables minus 1.

The typical problem faced when testing for cointegration is that of determining how many  $r \leq (n - 1)$  cointegrating vectors exist in  $\beta$ . Consequently, testing for cointegration amounts to finding the number of  $r$  linearly independent columns in  $\Pi$ . This is done by using the Trace and Maximal Eigenvalue test statistics. The Trace test tests the null hypothesis that  $r = q$ , where  $q = (1, 2, \dots, n - 1)$  against the unrestricted alternative that  $r = n$  while the Maximal Eigenvalue tests the null that there are  $r$  cointegrating vectors against the alternative that there are  $r + 1$  cointegrating vectors (Harris, 1995). If the test statistics exceed the critical values at a chosen level

of significance, the null hypothesis is rejected but if the test statistics are less than the corresponding critical values the null hypothesis is not rejected. In general,  $r > 1$  and in such situations issues of identifying long-run equilibrium relationships emerge, and when  $r > 1$ , identification can be achieved by placing restrictions on the  $\alpha$ ,  $\beta$  or  $\Gamma$  space.<sup>16</sup>

We consider two models to analyse the determinants of lending rates. Although in equation (6) only one foreign interest rate measure is included, we use two foreign interest rate measures to check for the robustness and sensitivity of the results to different foreign interest rate measures. We analyse the determinants of domestic nominal lending rates by using the following specification:

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

In the other specification, the SA lending rate (*SLDR*) is replaced by US lending rate (*USLR*). In both cases, our prior expectation is of one cointegrating vector.

#### 4.4.3 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 on 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. Cointegration test results for domestic variables and the SA and US lending rates are tabulated in Tables 5 and 6, respectively.

<sup>16</sup> Refer to the detailed discussion in Fedderke and Liu (2002).

**Table 5: Cointegration Tests Results with the SA lending rate**

Sample Period: 1980 - 2003

Trace Test			Critical values	
Null	Alternative	Trace statistic	5 %	1 %
$r = 0$	$r \geq 1$	122.34*	94.15	103.18
$r \leq 1$	$r \geq 2$	75.69	68.52	76.07
$r \leq 2$	$r \geq 3$	44.02	47.21	54.46
$r \leq 3$	$r \geq 4$	24.95	29.68	35.65
$r \leq 4$	$r \geq 5$	10.79	15.41	20.04
$r \leq 5$	$r \geq 6$	3.65	3.76	6.65

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Max Eigen value Test			Critical values	
Null	Alternative	Max-Eigen statistic	5 %	1 %
$r = 0$	$r = 1$	46.65*	39.37	45.10
$r \leq 1$	$r = 2$	31.67	33.46	38.77
$r \leq 2$	$r = 3$	19.07	27.07	32.24
$r \leq 3$	$r = 4$	14.15	20.97	25.52
$r \leq 4$	$r = 5$	7.14	14.07	18.63
$r \leq 5$	$r = 6$	3.65	3.76	6.63

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

**Table 6: Cointegration Tests Results with the US lending rate**

Sample Period: 1980 - 2003

Trace Test			Critical values	
Null	Alternative	Trace statistic	5 %	1 %
$r = 0$	$r \geq 1$	116.84*	94.15	103.18
$r \leq 1$	$r \geq 2$	66.91	68.52	76.07
$r \leq 2$	$r \geq 3$	41.00	47.21	54.46
$r \leq 3$	$r \geq 4$	23.07	29.68	35.65
$r \leq 4$	$r \geq 5$	11.39	15.41	20.04
$r \leq 5$	$r \geq 6$	3.34	3.76	6.65

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Max Eigen value Test			Critical values	
Null	Alternative	Max-Eigen statistic	5 %	1 %
$r = 0$	$r = 1$	49.92*	39.37	45.10
$r \leq 1$	$r = 2$	25.92	33.46	38.77
$r \leq 2$	$r = 3$	17.93	27.07	32.24
$r \leq 3$	$r = 4$	11.67	20.97	25.52
$r \leq 4$	$r = 5$	8.05	14.07	18.63
$r \leq 5$	$r = 6$	3.34	3.76	6.63

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

From these results, we can deduce that domestic variables and the two proxies of foreign interest rate measures 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 liberalization and foreign interest rates. The reason for including such a variable is that prior to financial liberalization, 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 7 presents VECM estimates of the long-run relationships between domestic variables and the SA lending rate. 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<sup>17</sup>, 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 (12) while the elasticities of the lending rate with regard to variables expressed in percent were computed using equation (13).

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<sup>17</sup> 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.

**Table 7: 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 <sup>2</sup>	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 dropped from 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.

$$\varepsilon_{i,x} = \frac{di}{dx} * \frac{x}{i} = \frac{\hat{b}}{i} \quad (12)$$

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.

$$\varepsilon_{i,r} = \frac{di}{dr} * \frac{r}{i} = \hat{b} * \frac{r}{i} \quad (13)$$

Where  $r$  denotes percent or growth rate while other parameters are as defined in equation (12).

Table 8 tabulates the computed elasticities of the baseline model. These results indicate that a 1 percent increase in money supply leads to a reduction of 0.02 percent in the nominal lending rate while an increase of 1 percent in expected inflation results in an increase of 0.43 percent in nominal lending rates when evaluated at mean values of the lending rate, money supply and expected inflation (see column 3 in Table 8). The economic importance of domestic debt is small, with the implied elasticity of 0.005 percent for a 1 percent 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 percent for a 1 percent 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 percent change in the SA lending rate leads to a small change of 0.03 percent in the domestic nominal lending rate.

**Table 8: Implied Elasticities of the Baseline model 1,  $\varepsilon_{i,x}$** <sup>18</sup>

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 our 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 these two regressors shown in Table 9. 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 9).

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 regard, a 1 percent change in the SA lending

<sup>18</sup> 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  $r$  in 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.

rate results in a change of between 0.59 and 0.63 percent in the domestic nominal lending rate.<sup>19</sup> This result indicates that in the post-reform period, foreign interest rates became 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.

**Table 9: 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 elasticities 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 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.

<sup>19</sup> 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 liberalization 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.

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. 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 one for a 1 percent 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.

To check for the robustness and the sensitivity of the results obtained in Table 7, the model was re-estimated with the US lending rate, and the results are depicted in Table 10. In the baseline model, given in column (2), only the US lending rate has an unanticipated sign and is statistically insignificant. The economic and statistical significance of the estimated coefficients for domestic regressors are similar in magnitude to the results obtained in model 1. Certainly, the elasticities associated with the estimated coefficients on domestic regressors are almost the same in size to those obtained for model 1 (see elasticities evaluated at mean values in Tables 8 and 11). Again, we notice the economic significance of expected inflation and the US lending rate in model 2a when we control for financial sector reforms. However, the US lending rate remains statistically insignificant despite the correct sign. The results obtained in model 2b that includes the structural break dummy are similar to those obtained in model 1b, in which the expected inflation and change in the exchange rate as well as foreign interest rates appear to dominate the determination of nominal lending rates. Model 2c includes an interaction variable, and the results indicate that all the regressors have anticipated signs and are statistically significant, though the US lending rate remains statistically insignificant. This model also identifies expected inflation and foreign interest rates as economically important factors in the determination of nominal lending rates in Zambia as demonstrated by the magnitude of the elasticities shown in Table 11.

**Table 10: VECM Estimation of the lending rate with the US lending rate**

Variables	2	2a	2b	2c
LEDR(-1)	1.00	1.00	1.00	1.00
RMS(-1)	0.5674* (0.0702) [8.07295]	0.2902** (0.1078) [2.6915]	0.4493** (0.1293) [3.4747]	0.5865* (0.1339) [4.3782]
INFL_A(-1)	-0.4061* (0.0747) [-5.4338]	-0.5328* (0.0820) [-6.4964]	-0.4639* (0.1095) [-4.2363]	-0.4161** (0.1154) [-3.6071]
DEBT(-1)	-0.2059* (0.0453) [-4.5464]	-0.1544** (0.0409) [-3.7731]	-0.1991* (0.0469) [-4.2482]	-0.2235* (0.0465) [-4.8094]
CNEER(-1)	-0.1796** (0.0583) [-3.0840]	-0.0832*** (0.5942) [-1.5765]	-0.1642** (0.0623) [-2.6361]	-0.1252** (0.0631) [-1.9109]
USLR(-1)	0.2371 (0.6407) [0.3701]	-0.3713 (0.5942) [-0.6249]	-0.2241 (0.7052) [-0.3178]	0.2127 (0.7315) [0.2908]
DUSLR(-1)				-1.8408 (1.2707) [-1.4487]
Constant	-124.91	-61.65	-95.98	-118.29
ECM (-1)	-0.3207 (0.0797) [-4.0256]	-0.4436 (0.0806) [-5.5065]	-0.2594 (0.0829) [-3.1291]	-0.3622 (0.0719) [-5.0339]
Adj-R <sup>2</sup>	0.44	0.52	0.51	0.60
D92	1992:3 – 2003:4			
D93			1993:3 – 2003:4	1993:3 – 2003:4

\*(\*\*)(\*\*\*) denotes significance at 1 %, 5 % and 10 % levels, respectively. Standard errors are in ( ) while t-statistics are in [ ].

**Table 11: Implied Elasticities of the Models Estimated with the US lending rate**

<b>Regressor (x)</b>	<b>Model 2</b>	<b>Model 2a</b>	<b>Model 2b</b>	<b>Model 2c</b>
RMS ( $x_1$ )	-0.016	-0.008	-0.012	-0.016
INFL ( $x_2$ )	0.445	0.584	0.509	0.456
DEBT ( $x_3$ )	0.006	0.004	0.006	0.006
CNEER ( $x_4$ )	0.158	0.073	0.144	0.109
USLR ( $x_5$ )	-0.061	0.096	0.058	-0.055
DUSLR ( $x_6$ )				0.178

Source: own computations. Computed at mean values of 39.6 %, 36.1 %, 31.7 %, 9.3 % and 3.5 % for expected inflation, domestic nominal lending rate, expected change in the exchange rate, US lending rate and the interaction variable (DUSLR), respectively.

In general, the estimates from our models seem to be consistent with the theoretical framework outlined in the preceding chapter. In this regard, an expansion in money supply appear to result in a reduction or an increase 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 and foreign interest rates. The lack of robustness is also reflected in parameter instability especially in models estimated with the SA lending rate. In addition, the US lending rate seems to be consistently insignificant. These results 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 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 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 liberalization. After liberalization, their 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 and other models indicating otherwise. Given the conflicting result regarding the sign of the expected change in the exchange rate parameter in our models, we are unable to ascertain the direction of the influence of the expected change in the exchange rate on the nominal lending rate 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 (see Table 1). 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 domestic banks to raise nominal lending rates in order to protect the value of their loans against inflation.

Our empirical results also indicate the violation of Ricardian equivalence and show that fiscal deficits financed through issuances of government securities may result in increased interest rates. Although the topic 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 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.

To gauge the response of the lending rate to shocks to any of the variables in our models, we undertook impulse response analysis. The resultant impulse response functions are shown in Appendix F. The responses of the lending rate to shocks in most of the variables were found to be generally plausible, with an exception of the expected change in domestic currency and the US lending rate. We found that a positive shock to real money supply tends to result in a permanent reduction in the nominal lending rate while positive shocks to expected inflation, domestic debt and the SA lending rate lead to permanent increases in nominal lending rates. The positive response of the lending rate to a positive shock in the SA lending rate was established after financial liberalization. However, in some models, a depreciation in the exchange rate was found to result in a permanent reduction in the lending rate while in other models, a permanent increase in the lending rate was noted. Finally, a positive shock to the US lending rate was found to result in a permanent reduction or marginal increase in the domestic nominal lending rate even after controlling for financial sector reforms.

## Chapter 5: Summary and Conclusion

This paper sought to investigate the determinants of interest rates in the Zambian economy following the implementation of financial sector reforms. The paper focused on the determinants of the lending rate with the aim of isolating and understanding the factors that have contributed to high lending rates in the economy. The theoretical and empirical arguments concerning the role of the financial sector in the economy were reviewed, outlining the case for financial sector reforms in developing countries and assessing the impact of financial sector reforms in Zambia. We then reviewed the theoretical and empirical literature on interest rate determination and outlined a conceptual framework of the interest rate model that captures the domestic and foreign factors that are perceived to influence the determination of interest rates in developing economies following financial sector reforms. The empirical methodology used in model estimation was Johansen's multivariate cointegration framework.

Empirical evidence indicated 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 some measure of the foreign interest rates (SA and US lending rate). With regard to the determination of lending rates, empirical evidence identified both domestic and foreign factors as important determinants of lending rates in Zambia. However, foreign interest rates were only found to be important factors in the determination of domestic nominal lending rates after financial liberalization. In particular, the SA lending rate was found to play an economically and statistically significant role in the determination of domestic nominal lending rates in Zambia. The strong response of the Zambian lending rate to the SA lending rate may reflect both the importance of SA 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.

With regard to domestic factors, inflationary expectations were found to be an economically and statistically dominant factor in the determination of nominal lending rates. Empirical results also indicated that money supply, domestic debt and the expected change in the domestic currency affect the determination of lending rates. However, the muted impact of these factors on domestic nominal lending rates may be due to their effect being captured by inflationary expectations. In

general, we may interpret the empirical results regarding the high nominal lending rates that have prevailed in the Zambian economy in the post-reform period as perhaps a result of high inflationary expectations and a mark-up on interest rates on domestic financial assets relative to interest rates on foreign financial assets. Moreover, the tight monetary policy that has been pursued for most of the post-reform period may have contributed to high lending rates given the empirically negative relationship established between money supply and lending 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. High inflationary expectations, which may be attributed to the lack of private sector confidence in some government policies is in this case reflected in high interest rates. For inflationary expectations to decline there is a need for the government to establish a stable macroeconomic environment by ensuring prudent macroeconomic management which entails the co-ordination of fiscal and monetary policies. Since fiscal mismanagement has been the main source of macroeconomic instability leading to high inflationary expectations, excessive money supply and increased domestic debt, the government must exercise fiscal discipline and adhere to its policy pronouncement in order to appear credible to the private sector and gain the support of financial markets.

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 characterized by macroeconomic instability, the impact of foreign interest rates on the domestic interest rate may be attributed to a mark-up on domestic interest rates relative to foreign interest rates to account for the unstable macroeconomic environment. Although empirical evidence from our models seems to suggest that domestic policy needs to respond more to changes in interest rates in SA than in the US, the important point to emphasise is the need for the government to pursue credible economic policies that would engender a stable macroeconomic environment in order to help in reducing the risk premium reflected in the significant influence of foreign interest rates on domestic interest rates.

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 recognize 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 the foreign interest rates in our 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 this paper. In addition, alternative measures of the exchange rate may have to be considered in order to 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, our results may be considered as tentative rather than conclusive.

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## Appendices

### Appendix A: Interest Rate Spreads for Selected Countries (1990 – 2002)

Country	Average Spreads (%)	Minimum spread (year)	Maximum spread (year)
Botswana	3.6	1.0 (1990)	6.0 (2000)
Kenya	14.3	5.1 (1990)	16.2 (1996)
Malawi	9.8	2.0 (1990)	18.0 (2002)
Tanzania	8.1	-4.0 (1995)	17.0 (1996)
Zambia	17.4	6.1 (1991)	24.4 (1993)
Zimbabwe	10.5	-8.9 (1992)	24.1 (2001)

Source: IFS and own computations

## Appendix B: Major Financial Sector Reform measures undertaken\*

Policy Measure	Date implemented
Liberalisation of commercial banks interest rates	September 1992
Introduction of foreign exchange bureau de change	October 1992
Unification of the exchange rate system	December 1992
Introduction of the primary Treasury bills auction	January 1993
Introduction of the 28-day Treasury bill	March 1993
Introduction of the 182-day Treasury bill	August 1993
Introduction of the BOZ foreign exchange dealing system	December 1993
The Foreign Exchange Control Act revoked	January 1994
Introduction of foreign currency accounts	March 1994
Enactment of the Banking and Financial Services Act (BFSA)	June 1994
Introduction of Government Bond auctions	December 1994
Introduction of BOZ Open Market Operations (OMO)	March 1995
Enactment of the Bank of Zambia Act No. 43	December 1996
Introduction of the Book-entry trading system in Government securities	August 1997
Listing of Government bonds on the Lusaka Stock Exchange	March 1998
Introduction of 18-month Government bonds	October 1998
Establishment of the Zambia Electronic Clearing House	September 1999
Introduction of an enhanced early warning system for the financial system	March 2000
Introduction of longer terms Government securities (273-day TBs and 24-months bonds)	October 2000
Introduction of BOZ guidelines for foreign exchange trading	February 2001
Introduction of Repurchase Agreement Transactions in the money market	February 2002
Introduction of broad-based interbank foreign exchange market	July 2003

Source: Bank of Zambia, various annual reports and circulars

\* I am thankful to Anthony Musonda of Bank of Zambia for providing me with a chronology of monetary and financial policy measures, which was partly used to pick up some major policy measures related to financial sector reforms.

## Appendix C: Feasible sequencing of financial liberalization programmes

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### Step 1: Restoration of macroeconomic and financial stability

1. Reduce fiscal deficits
2. Tighten monetary and credit policies
3. Stabilize balance of payments and restore appropriate exchange rates
4. Restructure or liquidate defunct financial institutions

### Step 2: a) Development of indirect monetary instruments

1. Introduce or reactivate indirect monetary instruments
2. Liberalize interest rates on these instruments
3. Set up auctioning procedures
4. Introduce central bank refinancing facilities

### b) Strengthening of the regulatory environment and bank supervision

5. Establish rules and guidelines for loan classification
6. Make provisions for bad loans, interest rate capitalization, capital adequacy and limits on loan concentration

### Step 3: Enhancement of competition among banks

1. Extend more bank licences
2. Allow foreign banks
3. Allow non-bank financial institutions to compete with banks
4. Privatize banks

### Step 4: Removal of direct controls

1. Fully liberalize lending and deposit rates
2. Abolish direct credit ceilings

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Source: Alawode and Ikhide (2001)

## Appendix D: 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

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

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

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

Solving for  $i_t$  from (v) yields the following

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

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:

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

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

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

$$\alpha_0, \alpha_2, \alpha_3, \alpha_4, \alpha_5 > 0 \text{ while } \alpha_1 < 0.$$

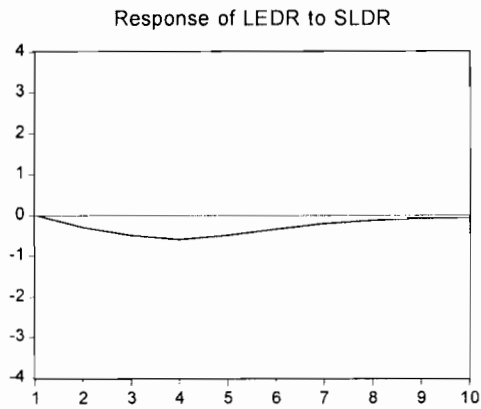
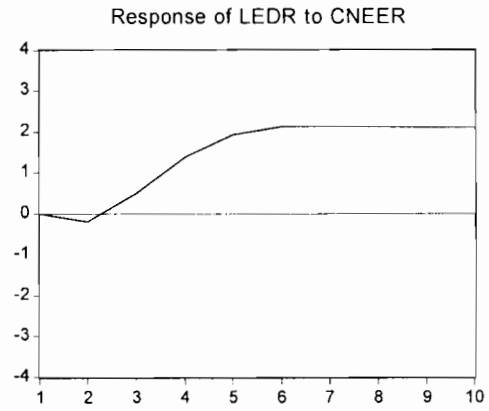
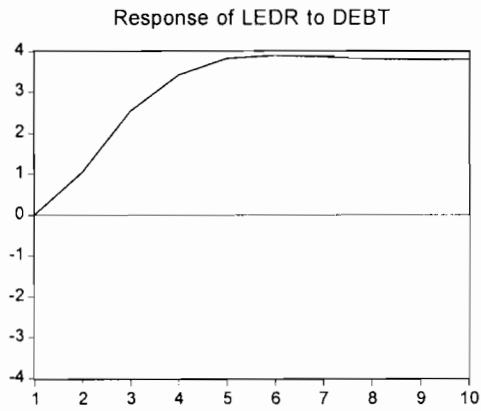
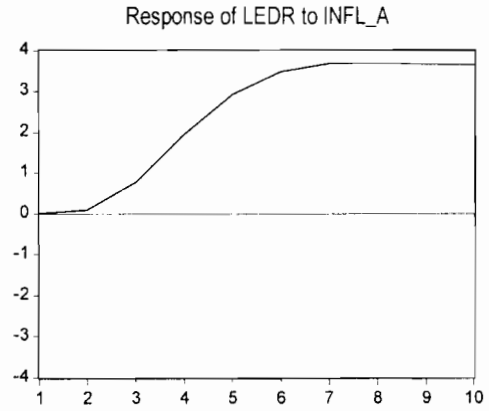
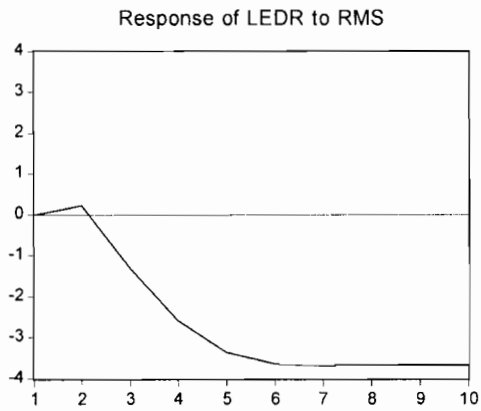
### Appendix E: Summary description and derivation of the variables

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	$D92 * SLDR$
DUSLR	US lending rate interacted with dummy, D92	$D92 * USLR$
INFL_A	Annualized rate of inflation	$\text{Log}(CPI/CPI(-4)) / .01$
CNEER	Change in the nominal effective exchange rate	$\text{Log}(NEER/NEER(-4)) / .01$
RMS	Real money supply	$\text{Log}(\text{Broad Money}/CPI)$
DEBT	Real domestic debt (TBs and bonds)	$\text{Log}(\text{Nominal Domestic Debt}/CPI)$

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.

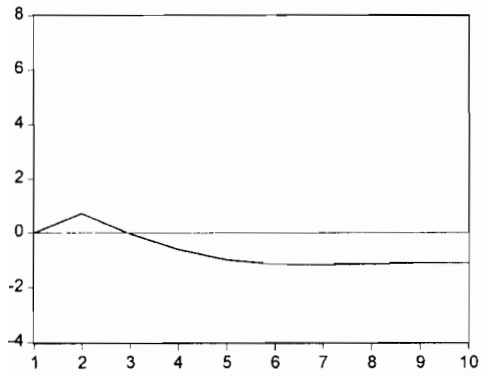
## Appendix F: Impulse Response Functions

### Baseline Model 1

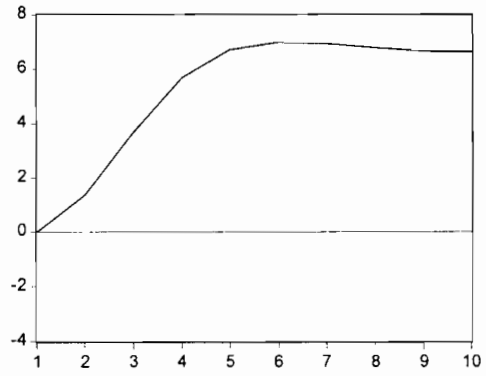


Model 1c

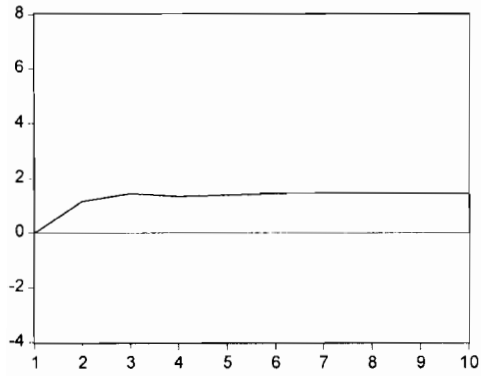
Response of LEDR to RMS



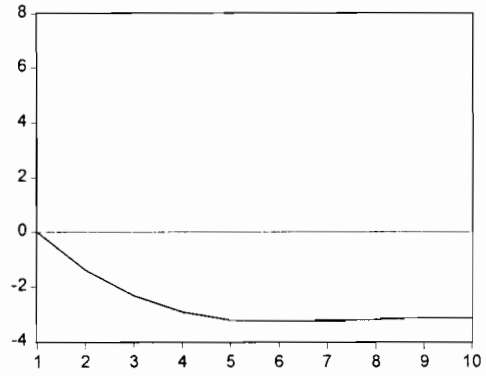
Response of LEDR to INFL\_A



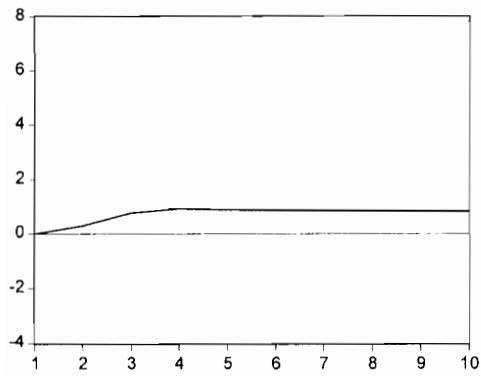
Response of LEDR to DEBT



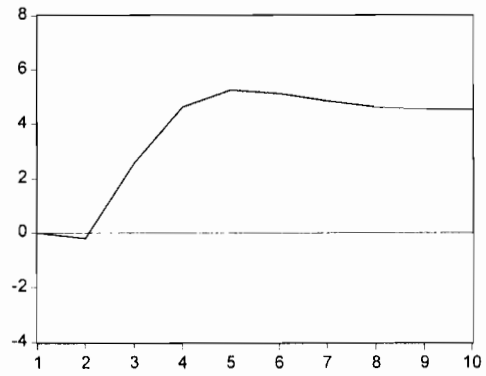
Response of LEDR to CNEER



Response of LEDR to SLDR

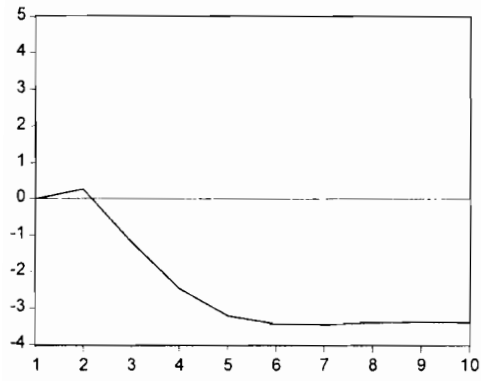


Response of LEDR to DSLDR

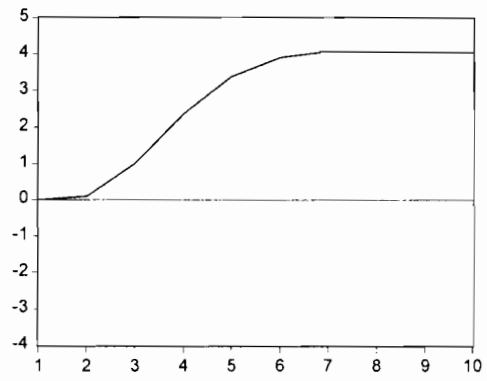


Baseline Model 2

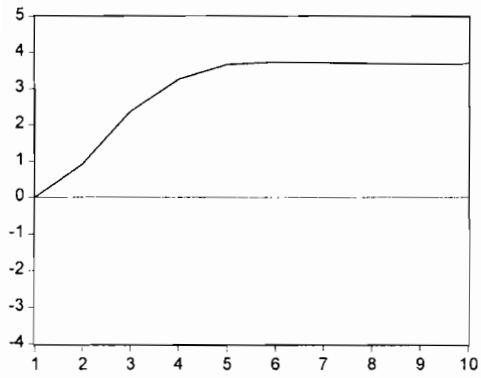
Response of LEDR to RMS



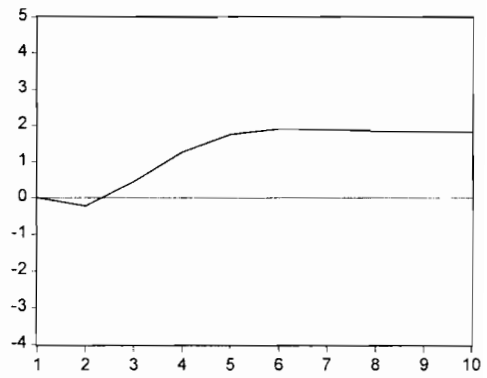
Response of LEDR to INFL\_A



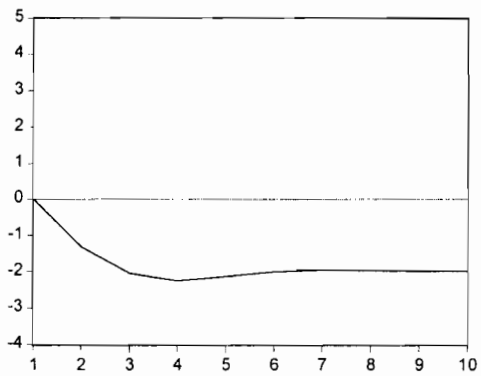
Response of LEDR to DEBT



Response of LEDR to CNEER

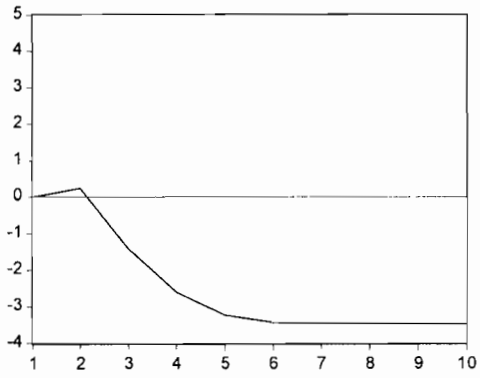


Response of LEDR to USLR

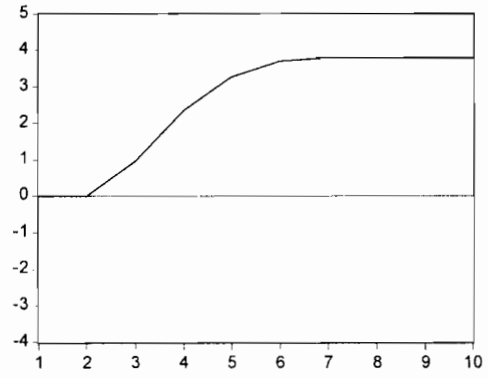


Model 2c

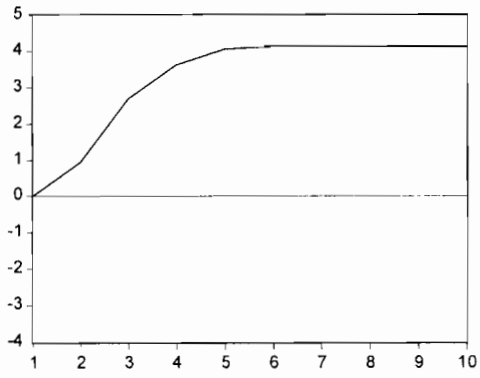
Response of LEDR to RMS



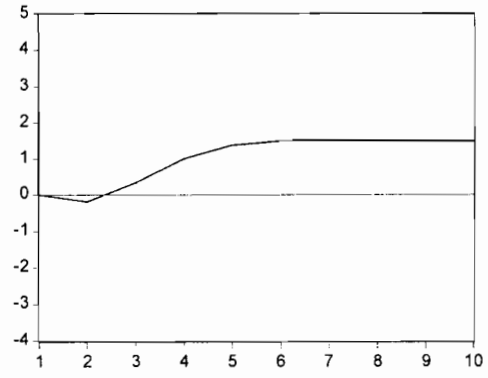
Response of LEDR to INFL\_A



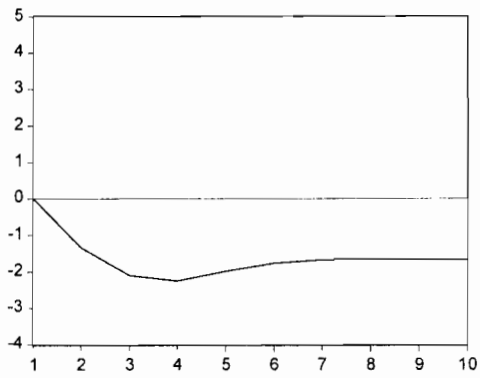
Response of LEDR to DEBT



Response of LEDR to CNEER



Response of LEDR to USLR



Response of LEDR to DUSLR

