

Issues On The Zambian Economy



Bank of Zambia

THE BOZ READER, VOL.01, NO. 04

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CONTENTS	PAGE
<i>Foreword</i>	<i>i</i>
Money Neutrality: The Case of Zambia	1
Money Demand in Zambia	13
Can Net Open Positions Explain Short-Term Movements in the Kwacha/Us Dollar Exchange Rate?	22
Fractal Analysis of Zambia's Inflation	46
Local Economic Development Strategies: A Complementary Developmental Approach for Enhanced Economic Growth and Poverty Reduction in Zambia	56
The Impact of Mining on Sustainable Development in Zambia	67
Operation of the Swap Market in Zambia	79
Demystifying Basel II: A Case Study of Zambia	89

Foreword

This is the fourth issue of the Bank of Zambia Reader Issues on the Zambian Economy, a publication aimed at providing national and international readership with analyses by economists and other social scientists in government, business, international agencies, academia and other research institutions.

In addition, the Reader continues to contribute towards the creation of economic literature and exchange of views on theoretical, policy and practical issues on the Zambian economy.

This issue has articles covering several topical subjects of current debate in the economy including: Money Neutrality: The Case of Zambia, Money Demand in Zambia, Can Net Open Positions Explain Short-Term Movements in the Kwacha/Us Dollar Exchange Rate?, The Economics of Currency Crisis: Lessons for Zambia, Fractal Analysis of Zambia's Inflation, Local Economic Development Strategies: A Complementary Developmental Approach for Enhanced Economic Growth and Poverty Reduction in Zambia, The Impact of Mining on Sustainable Development in Zambia, Operation of the Swap Market in Zambia, and Demystifying Basel II: A Case Study of Zambia.

We wish to thank the contributors of these articles to the Reader and hope that this will encourage other economists and social scientists to put their ideas to paper as part of their contribution to the wealth of ideas and literature on the Zambian economy through this publication. In addition, we wish to take this opportune time to invite comments or brief notes on the articles in this Reader. Further, articles are invited from researchers and writers on various topics that are relevant to the Zambian economy. In this regard, all correspondence should be channelled to the Director, Economics Department, Bank of Zambia, P. O. Box, 30080, Lusaka Zambia. Comments and articles can also be sent via e-mail to pr@boz.zm.

The views and interpretations expressed in this reader are those of the authors and do not necessarily represent the views and policies of the Bank of Zambia.

Caleb M. Fundanga
Governor
Bank of Zambia
February 2008

CHAPTER ONE

Money Neutrality: The Case of Zambia

By

Peter Zgambo¹

Abstract

This paper investigates the money neutrality proposition using Zambian data. Empirical results from the study indicate the existence of a long-run relationship between the price level (consumer price index) and broad money supply, thereby validating the money neutrality hypothesis in the Zambian case. The policy implication arising from this result is that the current monetary policy framework, based on monetary aggregate targeting, is appropriate for Zambia given the focus on controlling growth in money supply in order to contain inflation in the long-run.

I Introduction

In this paper, we undertake a time series analysis of the neutrality of money using Zambian data. This undertaking is based on the economic theory, which suggests a close link between changes in money supply and the general price level as well as the current monetary policy framework based on monetary aggregate targeting that is used in conducting monetary policy in Zambia. The relationship between money supply and the price level is espoused through the neutrality of money proposition, which is premised on the assumption of the existence of a long-run relationship between money supply and the general price level in the economy. The implication of the money neutrality proposition is that in the long-run, changes in money supply should have no effect on real variables such as employment or output, but should instead result in proportionate changes in the price level.

In the paper, we attempted to establish empirically the existence of a stable long-run relationship between money supply and the price level, and hence validate or invalidate the money neutrality hypothesis in the case of Zambia. The estimation technique used in the study is Ordinary Least Squares (OLS), with the resultant residuals from the regression model used to establish whether the variables under investigation are cointegrated. In addition, Granger Causality tests are used to investigate causality between the money supply and the price level.

Empirical results revealed the existence of a long-run relationship between broad money supply and the general price level [Consumer Price Index (CPI)]. In this regard, the money neutrality hypothesis was validated in the Zambian case. However, Granger Causality tests yielded conflicting results, particularly in the short-run. Long-run Granger Causality tests seem to indicate that money supply causes the price level, thereby lending support to the

¹*The author is a Manager in the Financial Markets Department of the Bank of Zambia.*

existence of a long-run relationship between money supply and the price level. With regard to the policy implications, the study seems to support the current monetary policy framework based on monetary aggregate targeting. In this regard, for the Bank of Zambia to control inflation in the long-run, there is need to continue focusing efforts on controlling the rate at which money supply grows in the economy.

The organisation of the paper is as follows: Section two advances the theoretical basis of the money neutrality proposition. Section three deals with data issues, including correlation and Granger Causality tests. The time series properties of the data are considered in Section four while estimation and cointegration tests are undertaken in Section five. The conclusion is presented in Section six.

II Theoretical Basis of the Neutrality of Money Proposition

The neutrality of money hypothesis is at the core of the Quantity Theory of money, which was first advanced by classical economists. In its original formulation by Irving Fisher (1922), the Quantity Theory of money was formulated as a transactions equation in form of an identity:

$$MV = PT \quad (1)$$

Where M = money balances, V = velocity of money circulation, P = price level, and T = volume of transactions.

In this formulation, the velocity of money was assumed to be constant and so was the volume of transactions. Given the constancy of V and T, the transactions equation postulated that changes in money induce proportionate changes in the price level.

In the Cambridge formulation of the Quantity Theory, a money supply function was added to the money demand function, with the money market assumed to be in equilibrium when demand for money is equal to money supply. This gave rise to the following Cambridge equation:

$$M_s = M_d = kPY_f \quad (2)$$

where M_s = money supply, M_d = money demand, $k = \frac{1}{V}$ is the reciprocal of the income velocity, P = price level, Y_f is full employment output. In this formulation V , k and $Y = Y_f$ are assumed to be constant in the long-run.

In this case, the classical prediction is that changes in the levels of money stocks will lead to proportionate changes in the price level, implying that the elasticity of the price level with respect to a change in money supply equals unity (Frisch, 1983).

In the neoclassical version of the Quantity Theory, the economic system was assumed to be characterised by a dichotomy between two systems of price determination. These include:

- (1) Relative prices, resulting from supply and demand conditions prevailing in the real sector; and
- (2) Nominal prices, which are a function of the interaction between demand for money and money supply in the monetary sector.

The distinction of the economic system between the real and monetary sectors leads to the neoclassical conclusion that doubling money supply only ends up in doubling nominal prices, leaving relative prices unaffected. Since relative prices remain unchanged, the volume of goods demanded and supplied in the real sector remains the same. This property

of the neoclassical model “... that a change in the supply of money influences only the general price level and leaves relative prices and therefore production and unemployment levels unchanged is known as the neutrality of money....”²

The monetarists re-formulated the Quantity Theory as a theory of comparative statics, which yields alternative price levels for alternative levels of money supply, assuming equilibrium in the real sector. In this monetarist framework, the Quantity Theory can be interpreted as a theory of nominal income that “maintains that changes in the money stock are the dominant determinant of changes in money income” (Meyer et al, 1978). This proposition implies that changes in the rate of growth of money supply alter at least in the short-run both the general price level and real variables. However, in the long-run, changes in money supply will only have lasting effects on the general price level.

In another version of the Quantity Theory, Patinkin (1974) took into account the “real balance effect whose function was to explain the adjustment of the price level in response to changes in the quantity of money” (Gale, 1982). Again, it was concluded in this approach that an equi-proportional change in all prices and the quantity of money would leave real variables unchanged. This is basically the homogeneity property or the neutrality of money concept underlying the Quantity Theory.

Finally, Milton Friedman brought out the causal relationship between money supply and the change in the price level, noting that, “inflation is always and everywhere a monetary phenomenon and can be produced only by a more rapid increase in the quantity of money than in output” (Friedman, 1970b). In the Friedman formulation, growth in money supply is considered to be the primary force driving changes in the price level and it is for this reason that monetarists have tended to emphasize policies aimed at controlling the rate at which money supply grows in order to bring inflation under control.

It is apparent from the theoretical background that there exists a relationship between changes in money supply and the price level in the economy and that the neutrality of money hypothesis is based on “the invariance of real quantities with respect to changes in the money stock in the long-run” (Gale, 1982).

II Data and Preliminary Data Analysis

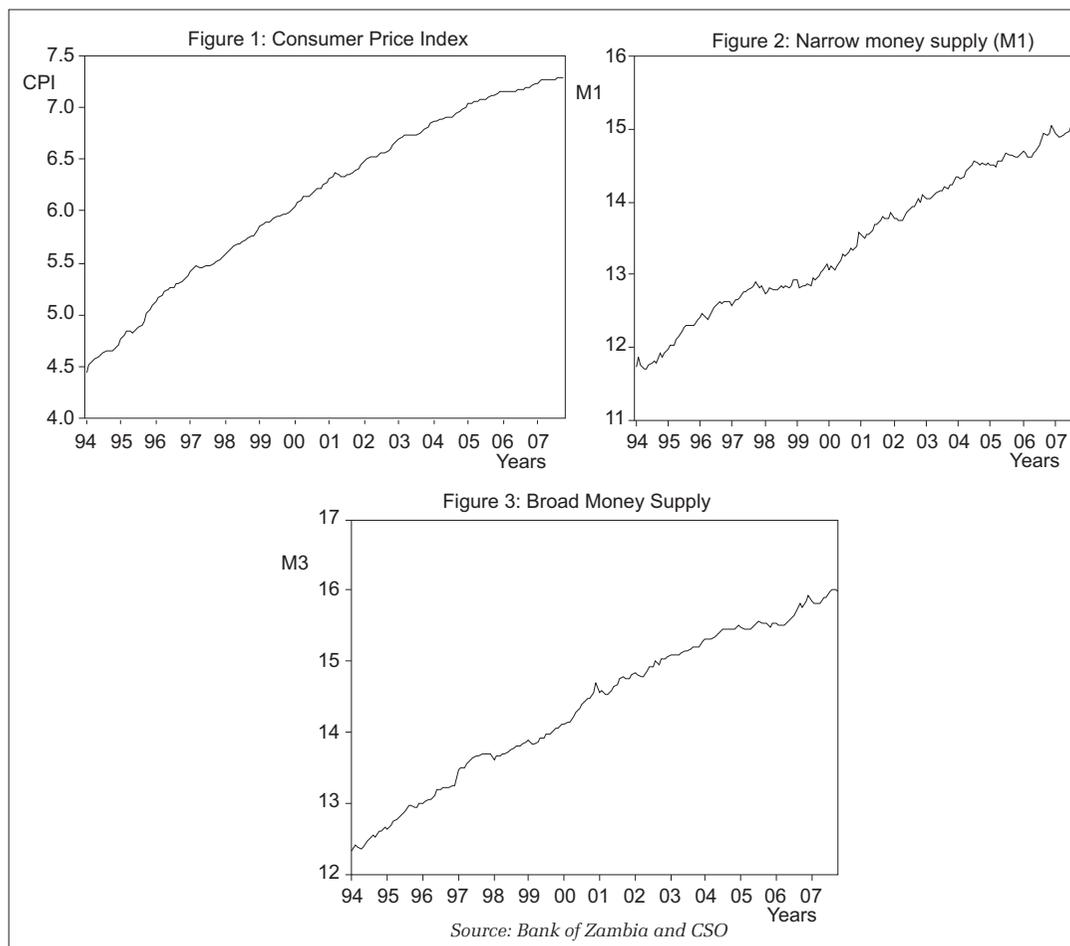
Data Description, Transformations and Sources

The time series data used in this study is the consumer price index and the money supply. The CPI was used as a proxy for the general price level. Money supply measures used are the narrowly defined money supply (M1) and broad money supply (M2). Monthly data collected over the period January 1994 to October 2007 is used. Data was linearised using logarithmic transformation. With regard to sources, the data was obtained from the Bank of Zambia Fortnightly Statistics and Central Statistics Office (CSO) databases.

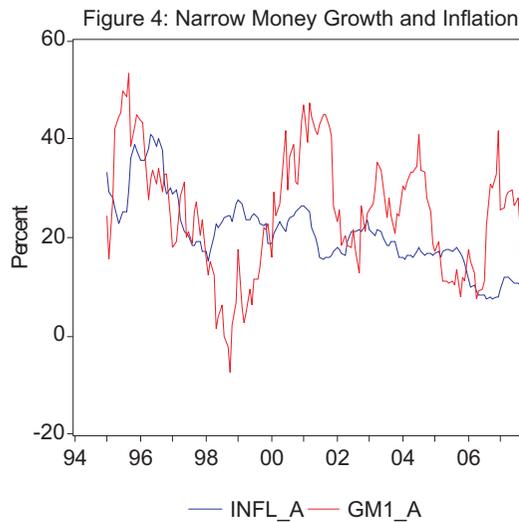
Preliminary Data Analysis: Correlation and Granger Causality Tests

Preliminary data analysis through graphical and correlation analyses indicate strong upward trends in CPI, M1 and M2 series (see Figures 1, 2 and 3). Furthermore, contemporaneous correlation analysis shows a strong positive correlation between the logs of CPI and M1, with a correlation coefficient of 0.98 and an even stronger positive correlation between the log of CPI and M2 as evidenced by a correlation coefficient of 0.99.

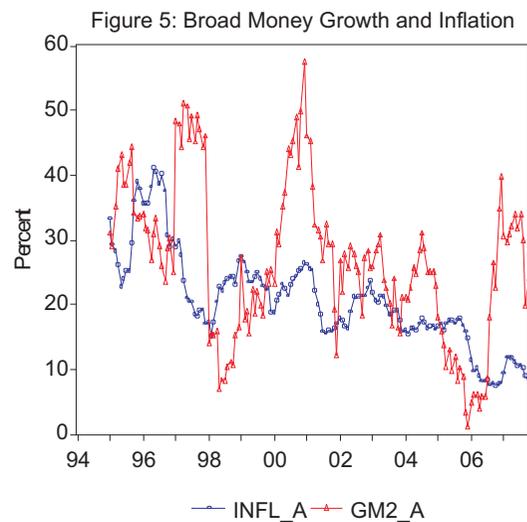
²Op cit, p. 226



Correlation analysis was also conducted on the growth rates of the logs of CPI (i.e. inflation), and money supply. The resulting series of the annualised growth rates in money supply and inflation are shown in the Figures 4 and 5. Correlation between the growth rate in narrow money supply (M1) and inflation is rather weak given a correlation coefficient of 0.22. With regard to the correlation between broad money growth and inflation, a correlation coefficient of 0.32 indicates a slightly stronger linear association, though in general it remains weak. It is worth mentioning that empirically, the correlations between money supply growth rates and inflation have not been found to be always parallel. Sometimes, depending on the sample period, the correlation can be strong and robust while at other times it can be weak or may even breakdown (DeLong; 2002).



Source: Author's computations



Source: Author's computations

Granger causality tests of CPI and M1 and CPI as well as M2 give inconclusive evidence. In the short run, test results show that CPI seems to Granger cause narrow money supply. This result is counterintuitive given the expectation that causality should run the other way, that is, narrow money supply should be Granger causing CPI. However, at longer horizons of more than 18 lags, narrow money supply seems to Granger cause CPI, as expected. The results obtained for narrow money growth rates and inflation also shows that inflation seems to Granger cause narrow money growth in the short run while in the long run, growth in narrow money seems to Granger cause inflation.

With regard to Granger causality tests of broad money and CPI, the results seem to show unidirectional causality in the very short-run, though over the medium to the long-run, CPI seem to Granger cause broad money supply. Furthermore, causality tests of growth in broad money supply and inflation show that only in the short-run does growth in broad money Granger cause inflation. In the long run, the results seem to suggest that inflation Granger causes broad money growth. Again, this is contrary to theoretical expectations (refer to Appendices A and B for Granger causality test results).

IV Time Series Data Properties: Stationarity and Order of Integration

Any empirical work based on time series data assumes that the underlying time series is stationary. In a situation where the time series are non-stationary, regression results based on the traditional Ordinary Least Squares methodology tend to be highly unreliable. The unreliability of regression results in a situation of non-stationary time series is mainly on account of the problems that are inherent in non-stationary time series data. These problems include autocorrelation, where successive values of the variables are correlated; spurious regressions, reflected in high R-squared values and giving the impression of the existence of a meaningful relationship among the variables when in fact this is not the case; and, the difficulties involved in making forecasts of non-stationary time series variables (Gujarati, 2003).

It is because of these problems that empirical work based on time series data has to begin by investigating the properties of the data generating process underlying the time series before

proceeding with the estimation process. The purpose of investigating the time series properties is to establish whether or not the time series are stationary and to determine their order of integration. A time series is considered to be stationary if it exhibits constant mean, variance and auto-covariance over time³. A time series, which does not exhibit the characteristics of constant mean and variance, and whose covariance between any time periods depends on time is said to be non-stationary.

Unit Root Tests

The data properties of the variables are investigated using unit root tests. The graphical illustration of the variables in levels shows the presence of trends in the series (see Figures 1 to 3). This is suggestive of non-stationarity in the variables as it indicates the presence of variable means. To confirm this, formal tests of unit roots are undertaken.

Testing for unit roots involved regressing individual time series on their own one period lagged values and determining whether the coefficient on the lagged value of the series is statistically significantly different from zero. A general equation (3) for the Augmented Dickey-Fuller (ADF) test for unit roots was estimated. The reason for using the general specification was to take account of any autocorrelation that may be present in the series and also to account for the presence of the trend, which is evident in all the variables in levels.

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \sum \Delta Y_{t-i} + u_t \quad (3)$$

The null hypothesis for testing for the unit root is:

$$H_0 : \delta = 0, \text{ while the alternative hypothesis is } H_1 : \delta < 0$$

The results of the unit root tests are given in Appendix D. Using the ADF test statistic, the null hypothesis of non-stationarity is not rejected for the series in levels, implying that the variables are non-stationary. However, unit root tests on the first differences of variables indicates that the variables are stationary as reflected in more negative values of ADF Statistics compared to 5% critical values.

V Estimation and Tests for Cointegration

Cointegrating Regression Model

The tests conducted for stationarity above enabled us to determine the order of integration in the series, which was found to be one in the CPI and money supply measures (M1 and M2). This means that the series required to be differenced once in order to render them stationary. Given this finding, it follows that there may exist a long-run relationship between variables, implying that the variables may be cointegrated. If the variables are cointegrated, then their linear combination tends to be integrated of at most the same order or a lower order. In this case, since CPI and money supply measures are integrated of order one, their linear combination is expected to be integrated of order zero, that is, to be stationary. Therefore, provided that one checks for stationarity of the residuals in a regression of non-stationary variables, the traditional regression methodology of Ordinary

Least Squares (OLS) can be applied to the estimation of non-stationary time series variables (Gujarati, 2003). Given this, we proceed to apply the OLS technique to estimate the long-run relationship between CPI and money supply.

The regression results of CPI and narrow money supply are given in Appendix D. The results indicate that the coefficient on the log of M1 is significant and correctly signed. A coefficient of 0.84 indicates that a unit change in M1 induces a positive change of 0.84 units in CPI. The coefficient on the log of M1 can be interpreted as a measure of the elasticity of CPI to changes in M1. In this case, a 1 percent increase in narrow money supply results in an increase of 0.84 percent in CPI.

The results of the regression of CPI on broad money supply are broadly similar to those obtained with narrow money (see Table 1). In this regard, the elasticity of CPI to changes in broad money is slightly smaller than that obtained with narrow money supply. Hence, an increase of 1 percent in broad money supply results in an increase of 0.78 percent in CPI. Note that both regressions seem to explain the variations in CPI very well given the adjusted R-squared of 0.97 for the equation with narrow money supply and 0.99 for the equation with broad money supply. However, the estimated equations seem to be afflicted with the problem of serial correlation as can be deduced from the Durbin-Watson statistics.

Table 1: Regression results of CPI and broad money supply

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.075253	0.078416	-64.72198	0.0000
LM2	0.781093	0.005445	143.4511	0.0000
R-squared	0.992093	Mean dependent var	6.142823	
Adjusted R-squared	0.992045	S.D. dependent var	0.837976	
S.E. of regression	0.074739	Akaike info criterion	-2.337661	
Sum squared resid	0.916084	Schwarz criterion	-2.300167	
Log likelihood	196.0259	F-statistic	20578.23	
Durbin-Watson stat	0.236173	Prob(F-statistic)	0.000000	

Tests for Cointegration

What is important in the cointegrating regression models estimated above is to test for cointegration between the variables. In the estimation approach adopted in this paper, testing for cointegration is akin to testing for stationarity in the residuals from the estimated equations. In this case, after obtaining the residuals from the model, unit root tests on the residuals are conducted to establish whether the residuals are stationary or non-stationary.

Cointegration is confirmed if the residuals from the estimated equations are stationary, otherwise the variables are not cointegrated.

Unit root tests on the residuals from the regression of CPI and narrow money shows that the residuals are non-stationary as evidenced by the ADF statistic of -2.47 compared to the critical value of -2.88. The implication of this result is that CPI and narrow money supply are not cointegrated. However, unit root tests on the residuals from the regression model of CPI and broad money supply established that the residuals are stationary given the ADF statistic of -3.35 (see Appendix E). In this regard, CPI and broad money supply can be considered to be cointegrated, implying that there exists a stable long-run relationship between them.

The finding that CPI and broad money supply are cointegrated validates the neutrality of money proposition in the Zambian case. It should be noted that although the results from the regression model show a coefficient on broad money supply that is less than unity (that is, 0.78), which implies that a 1 percent increase in money supply does not result in 1 percent increase in CPI in the long-run, evidence of cointegration at least confirms that the money neutrality proposition holds in the Zambian case. The less than unity coefficient on broad money supply also shows that there may be other variables that influence the movement in CPI in the long-run, as one would expect.

VI Conclusion

The time series analysis of the money neutrality proposition with regard to Zambia indicates the existence of a long-run relationship between broad money supply and the price level. This result implies that changes in broad money supply have an important effect on changes in the price level in the long-run. In this regard, the current monetary policy framework that targets growth in monetary aggregates, in particular broad money, to control inflation in the economy may be appropriate given the existence of a long-run relationship between the price level and broad money supply. However, the results obtained in this paper should be considered to be tentative given the limitations of two variable models and some of the weaknesses noted in the estimated models. Furthermore, the relatively small sample size, which focuses mainly on the post-economic liberalisation period is another factor that should be taken into account when evaluating the results of this study.

Appendix A: Narrow Money, CPI and Inflation - Pairwise Granger Causality

I. Narrow Money and CPI

Null Hypothesis	Obs	Lags	F-Statistic	Probability
LCPI does not Granger Cause LM1	165	1	2.66	0.09296
LM1 does not Granger Cause LCPI			1.79	0.18286
LCPI does not Granger Cause LM1	164	2	9.31	0.00015
LM1 does not Granger Cause LCPI			0.69	0.50237
LCPI does not Granger Cause LM1	160	6	2.18	0.04789
LM1 does not Granger Cause LCPI			0.38	0.88912
LCPI does not Granger Cause LM1	154	12	1.47	0.14205
LM1 does not Granger Cause LCPI			0.97	0.47225
LCPI does not Granger Cause LM1	148	18	1.47	0.11221
LM1 does not Granger Cause LCPI			1.63	0.06481
II. Narrow Money Growth and Inflation				
GM1_M does not Granger Cause INFL_M	164	1	0.13	0.72071
INFL_M does not Granger Cause GM1_M			12.4	0.00056
GM1_M does not Granger Cause INFL_M	163	2	1.14	0.32354
INFL_M does not Granger Cause GM1_M			4.63	0.01112
GM1_M does not Granger Cause INFL_M	159	6	1.68	0.12698
INFL_M does not Granger Cause GM1_M			2.16	0.05024
GM1_M does not Granger Cause INFL_M	153	12	1.44	0.15718
INFL_M does not Granger Cause GM1_M			1.11	0.35400
GM1_M does not Granger Cause INFL_M	147	18	1.86	0.02621
INFL_M does not Granger Cause GM1_M			1.17	0.29443

Appendix B: Broad Money, CPI and Inflation - Pairwise Granger Causality Tests

I. Broad Money and CPI

Null Hypothesis	Obs	Lags	F-Statistic	Probability
LCPI does not Granger Cause LM2	165	1	6.02	0.01517
LM2 does not Granger Cause LCPI			4.00	0.04716
INFL_M does not Granger Cause GM2_M	163	2	1.43	0.24216
GM2_M does not Granger Cause INFL_M			1.54	0.16157
INFL_M does not Granger Cause GM2_M	159	6	2.47	0.02657
GM2_M does not Granger Cause INFL_M			1.48	0.18719
INFL_M does not Granger Cause GM2_M	153	12	1.51	0.12680
GM2_M does not Granger Cause INFL_M			1.12	0.35134
LCPI does not Granger Cause LM2	148	18	1.54	0.08908
LM2 does not Granger Cause LCPI			1.23	0.24694
II. Broad Money Growth and Inflation				
INFL_M does not Granger Cause GM2_M	164	1	2.82	0.09514
GM2_M does not Granger Cause INFL_M			3.59	0.05977
INFL_A does not Granger Cause GM2_A	163	2	4.62	0.01112
GM2_A does not Granger Cause INFL_A			1.14	0.32354
INFL_A does not Granger Cause GM2_A	159	6	2.16	0.05024
GM2_A does not Granger Cause INFL_A			1.68	0.12967
INFL_A does not Granger Cause GM2_A	153	12	1.11	0.35400
GM2_A does not Granger Cause INFL_A			1.44	0.15718
INFL_M does not Granger Cause GM2_M	147	18	1.63	0.06345
GM2_M does not Granger Cause INFL_M			1.08	0.38282

Appendix C: Unit Root Tests

Unit Root Test Results (on levels)

Series	ADF Statistic	Critical Values*	Lag length
Consumer price Index	<u>-0.2052</u>	<u>-3.4387</u>	<u>6</u>
Narrow money (M1)	<u>-2.5008</u>	<u>-3.4387</u>	<u>6</u>
Broad money (M2)	<u>-1.8445</u>	<u>-3.4387</u>	<u>6</u>

*Critical values are at 5% level of significance. If the computed ADF statistics are less negative than the critical values, then the series is considered to have a unit root. Stationarity is conformed by a more negative ADF statistic than critical values.

Unit Root Test Results (First Differences)

Series	ADF Statistic	Critical Values*	Lag length
<u>Consumer price Index</u>	<u>-7.4601</u>	<u>-3.4387</u>	<u>6</u>
<u>Narrow money (M1)</u>	<u>-5.3415</u>	<u>-3.4389</u>	<u>6</u>
<u>Broad money (M2)</u>	<u>-5.2015</u>	<u>-3.4387</u>	<u>6</u>

Appendix D: Regression results of CPI and Narrow Money Supply

Dependent Variable: LCPI					
Method: Least Squares					
Date: 12/29/07 Time: 22:59					
Sample: 1994:01 2007:10					
Included observations: 166					
Variable	Coefficient	Std. Error	t-Statistic	Prob.	
C	-5.179665	0.145093	-35.69885	0.0000	
LM1	0.840612	0.010744	78.24252	0.0000	
R-squared	0.973910	Mean dependent var	6.142823		
Adjusted R-squared	0.973751	S.D. dependent var	0.837976		
S.E. of regression	0.135766	Akaike info criterion	-1.143797		
Sum squared resid	3.022902	Schwarz criterion	-1.106303		
Log likelihood	96.93516	F-statistic	6121.891		
Durbin-Watson stat	0.111578	Prob(F-statistic)	0.000000		

Appendix E: Unit Root Tests on the Residuals

Series	ADF Statistic	Critical Values*	Lag length
<u>Residual_M1</u>	<u>-2.4693</u>	<u>-2.8791</u>	<u>1</u>
<u>Residual_M2</u>	<u>-3.3516</u>	<u>-2.8791</u>	<u>1</u>

Note: Residual_M1 were the residuals obtained from regression of CPI on narrow money supply while Residual_M2 were obtained from the regression model of CPI on broad money supply.

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CHAPTER TWO

Money Demand in Zambia

By

Emmanuel Pamu, Wilson Phiri & Chungu Kapembwa⁴

Abstract

This paper provides an empirical analysis of the money demand function in Zambia using data from January 1997 to March 2007 using a cointegrated vector autoregressive (VAR) model. The results show that the exchange rate and the consumer price index are important variables in the money demand function. The consumer price index was included as the relevant opportunity cost of holding money in an economy with underdeveloped financial markets. The exchange rate was included in the money demand equation to capture the currency substitution effects. The results also show that the consumer price index is driven more by the nominal exchange rate which is determined by exogenous supply side factors.

I Introduction

Monetary policy implementation in Zambia is constrained by lack of a clear understanding of the monetary transmission mechanism. The objective of this paper, therefore, is to contribute to the empirics of the money demand function in Zambia. The paper also makes an attempt to analyse the effect of monetary disequilibrium on the Consumer Price Index using a cointegrated vector autoregressive (VAR) model.

The specification of the money demand function plays an important role in macroeconomic analysis for both theoretical and empirical purposes. At the analytical level, the money demand function is the key element in the formulation of economic theories. From an operational point of view, the determination of stable relationships between real balances and other macroeconomic variables is an essential requirement for the formulation of quantitative monetary targets. The transmission mechanism of monetary policy shocks depends on the variables that determine the demand for money balances.

Sriram (2001) states that the demand for money plays a major role in macroeconomic analysis, especially in selecting appropriate monetary policy actions and that as a result of this fact, theoretical and empirical research has been undertaken on the demand for money function over several decades. Arize, Darrat and Meyer (1999) indicate that most research has been targeted at the identification of key variables that determine the demand for money. This is done in addition to determining the stability of the estimated money demand function which is important in monetary policy implementation. Indeed, Bae and De Jong (2005) in their study indicate that the money demand function is very critical in macroeconomic modeling and monetary policy formulation.

⁴The authors are economists in the Economics Department.

The conventional money demand equation includes income and interest rate as determinants of money demand. We use a formulation which is typically used for developing countries in which the interest rate on other financial assets is excluded from the model. This follows directly from the paucity of financial alternatives to money in developing countries. The relevant substitution in such countries is therefore between money and goods, or real assets, with the opportunity cost being the expected rate of inflation. Therefore, the variables we include in the money demand equation are money supply, non-traditional exports, as a proxy for real income, the nominal exchange rates, and domestic consumer price index. The paper is organised in four sections, section two is a theoretical exposition of money demand, section three provides an empirical analysis of money demand in Zambia while section four concludes.

II The Model

Conventional models of money demand in developing countries typically include only real income as a scale variable and the rate of inflation as an opportunity cost variable. Domestic interest rates are excluded either because alternative financial assets are assumed not to be available so that the choice of asset holdings is limited to either money or real assets or government regulations associated with financial repression imply that such rates tend to display little variation over time so that their potential effect is difficult to determine econometrically. With financial liberalisation and the development of the Government securities market, this argument may not apply in the Zambian situation any longer especially for the period after 1994. In the study of the demand for money function in Morocco, Hoffman and Tahiri (1994) have argued that a foreign interest rate can also serve as the relevant opportunity cost of holding domestic monetary assets. A similar result has been obtained by Calvo and Mendoza (1996) for Mexico.

A general limitation of most conventional money demand studies in developing countries results from their ignoring the fact that when informal credit markets are large, the relevant opportunity cost of holding any cash balances is the interest rate in the informal financial sector and not the official interest rate. Van Wijnbergen (1982), for instance, showed that the informal-market interest rate had a significant effect on the demand for deposits in Korea.

Currency substitution, the process whereby foreign currency substitutes for domestic currency as a store of value has become a pervasive phenomenon in many developing countries. In situations with high and variable inflation rates and uncertainty about domestic policies have prevailed for a substantial period of time, a largest proportion of domestic sales and contracts are transacted in foreign currency. To capture the effect of currency substitution, researchers usually introduce into an otherwise conventional money demand equation the interest differential between domestic and foreign assets or the expected rate of depreciation.

In view of the developments in the Zambian economy, after liberalization of financial markets in the early 1990s which saw an increase in foreign currency deposits and a persistent depreciation of the nominal exchange rate for some time, we include the expected exchange rate depreciation in the model. Laidler (1977; 135) in his study indicates that inflation expectations play a significant role in influencing money demand. This is proxied by the actual rate of inflation.

The money demand equation is therefore expressed as follows;

$$\ln m = a + \ln y + \ln \pi + \ln e \quad (1)$$

where $\ln m$ denotes the log real money demand, $\ln y$ the log of real income, $\ln \pi$ the log of the consumer price index and $\ln e$, the log of the expected depreciation.

III Empirical Analysis

The estimation of the demand for money function in developing countries has generated a voluminous literature over the years, which has, by and large, followed advances in econometric and statistical methods particularly cointegration techniques and the estimation of long run relationships in economics. We use a cointegrated vector autoregressive (VAR) model. It is important to note that in a cointegrated VAR model, the components of the vector process can be integrated of different orders. This allows for the selection of variables for their economic importance and not for their statistical properties. It is thus perfectly in order to include in a cointegrated VAR model variables that are both I(1) and I(0). This is a fundamental departure from the traditional cointegration analysis².

In Zambia, all interest rates are I(0). By including a stationary variable in the vector process, we add an extra cointegrating vector, that is, an extra dimension to the cointegrating space. One can formulate the hypothesis that one of the components of the vector process is in fact stationary. Thus the stationarity of the individual series can be formulated in a natural way in terms of parameters in the multivariate system and is a hypothesis that is conveniently checked inside the model rather than a question that has to be checked before the analysis starts.

The relationship between inflation and interest rates can be expressed as:

$$(1+n) = (1+\pi)(1+r) \quad (2)$$

where n denotes the nominal interest rate, π denotes inflation and r the real interest rate.

In the post liberalisation era, with developments in the financial sector especially following the introduction of Government securities as alternative assets to holding real money balances, an argument could be put forward to suggest that interest rates should be included. However, to the extent that these interest rates are a function of the inflation rate, we could exclude the interest rate from the model.

The Data

Due to data constraints, the period January 1997 to March 2007 is considered and monthly data was used. The monetary aggregate used is broad money (M3), defined as the sum of currency in circulation, demand deposits, bills payable, time and savings deposits and other foreign exchange deposits. In the absence of monthly data series on real activity, non traditional exports are used as a proxy. The consumer price index (CPI) is used as the price

²Various studies on money demand show that time series variables are not stationary individually and only become stationary when they are combined. As a result, Dickey et al (1991) suggest an approach that performs unit root test to determine the order of integration and to find out if the variables are cointegrated. Johansen and Juselius (1990), Dickey, Jansen and Thornton (1991), Mehra (1989) have applied cointegration tests in the estimation of the money demand functions.

variable. It is important that we have included the log of the consumer price index which is eventually differenced in VAR framework to get the rate of inflation.

Our intention is to draw our inferences, not from the cointegrating vectors which are not uniquely identified, but from the resulting cointegrated VAR model focusing on the equilibrium correction model and the variance decomposition.

Econometric Results

We first carried out unit root tests to establish the stationarity of the Domestic Consumer Price Index (*Cpid*), the Money supply (*M3*), the Copper Price (*Cu*)³, Non- traditional exports (*Ntes*), the exchange rate (*E*), using the Augmented Dickey Fuller test. All the variables were found to be I(1) as shown in Table 1.

Table 1 Unit Root Tests (Augmented Dickey Fuller)

Variable	Test Statistic in levels	Test Statistic in Differences	Order of Integration
<i>Cpid</i>	2.3	-4.8	1
<i>M3</i>	1.0	-10.4	1
<i>Cu</i>	-2.5	-16.2	1
<i>Ntes</i>	-0.7	-11.3	1
<i>E</i>	-2.4	-10.9	1

95% critical value for the Augmented Dickey Fuller statistic = -2.9

Cointegration Analysis

Four variables are included in the cointegration analysis, including the money supply, the consumer price index, the nominal exchange rate, and non-traditional exports. After determining that all the variables were of the same order of integration, we carried out a cointegration test with unrestricted intercept while the trend was restricted to lie in the cointegrating space. The structural shocks are identified using the Choleski decomposition using the following ordering of the variables: the money supply, the non traditional exports, the exchange rate and consumer price index i.e., from what we think is the most exogenous to the least. The results of the cointegration tests based on the Maximal Eigenvalue of the stochastic matrix were as follows:

Table 2: Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix.

Null	Alternative	Statistic	95% Critical Value
$R = 0$	$R = 1$	35	31
$R < = 1$	$R = 2$	26	25
$R < = 2$	$R = 3$	11	19
$R < = 3$	$R = 4$	4	12

The results suggest that we reject the null hypothesis of no cointegration and that there are two cointegrating vectors. These results imply that there are two long run equilibrium relationships between money supply, real income (proxied by non-traditional exports), the exchange rate and the consumer price index. Rather than focus on the values of the cointegrating vectors, we draw inferences from the equilibrium correction model.

The money market is assumed to be in instantaneous equilibrium so that a monetary shock is expected to result in an adjustment in the exchange rate or the interest rate in the short term and in the long run in an adjustment in prices. This is illustrated in Figure 1, which shows equilibrium in the goods market as GG and money market equilibrium as mm in the space of the exchange rate E and domestic prices P. An increase in domestic prices reduces real money balances and creates disequilibrium unless the demand for real balances is reduced as well. Money market equilibrium is therefore restored by an appreciation of the exchange rate, which increases the expected depreciation or the nominal interest rate in line with the uncovered interest parity condition presented in equation 3. This explains the negative relationship between prices and the exchange rate. Goods market equilibrium is attained in line with the relative purchasing power parity condition presented in equation 4 (note that everything is presented in logs).

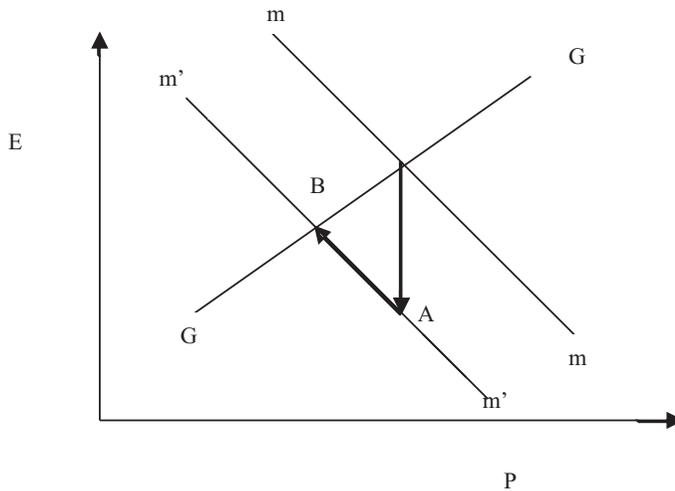


Figure 1

$$i^d = i^f + e_{t+1} - e_t \tag{3}$$

$$p^d = p^f + e_{t+1} - \lambda \tag{4}$$

In equations 3 and 4 , i^d and i^f refer to domestic and foreign interest rates while p^d and p^f denote the domestic and foreign prices, respectively.

As illustrated in Figure 1, a monetary shock that reduces the money supply from mm to m'm' leads to an overshooting of the appreciation of the nominal exchange rate to point A. This occurs as a result of the stickiness of prices in the short term. In the long run, the exchange rate depreciates to point B as prices adjust.

It is important to establish which of the variables in the money demand equation responds most to the disequilibrium in the short term³. The natural question to ask about the

³Sriram (2001) believes that to get good estimation results for the demand for money great care must be taken in variable selection and the framework chosen. He believes that the error-correction models (ECMs) have shown to meet these criteria. The ECM is convenient for measuring correction from the disequilibrium of the previous period and resolve the problem of spurious regressions.

adjustment vectors is whether the coefficients in $\hat{\alpha}$ are zero for a subset of equations. This hypothesis means that the subset of variables is weakly exogenous. To proceed with the equilibrium correction models, we make a restriction of one cointegrating vector. The results of the equilibrium correction model are presented in Table 3.

Table 3: Results from Equilibrium Correction Models (t and P-Values)

	<i>M3</i>	<i>ntes</i>	<i>e</i>	<i>cpid</i>
$\hat{\alpha}$ (t-Value)	-2.7	-3	-1.19	4.8
P-Value	0.008	0.003	0.24	0

The above results suggest that the response of the money supply to disequilibrium is negative and significant. This does not suggest weak exogeneity of broad money and is inconsistent with the assumptions we have made in the identification of the shocks using the Choleski decomposition. Nevertheless, we proceed to carry out variance decomposition analysis.

Table 4: Orthogonalised Variance Decomposition (%)

<i>Variable</i>	<i>M3</i>	<i>ntes</i>	<i>e</i>	<i>cpid</i>
Exchange Rate	14	3	80	3
Consumer Price Index	17	12	46	25
Money Supply	76	18	1	5
Non-Traditional Exports	11	55	31	3

The above results of variance decomposition tests suggest that a significant percentage of the variation in the consumer price index, 46 percent, is explained by the exchange rate, while the supply of money explains only 17 percent of the variation in the consumer price index. The results also imply exogeneity of the money supply and non-traditional exports. Thus, using variance decomposition analysis, the validity of our assumptions in the Choleski decomposition is affirmed.

These results suggest that we can improve on the results by considering different specifications of the model. We first consider a different ordering of the variables in the model, by letting the consumer price index come before the exchange rate. This is in line with the Dornbusch model of overshooting presented in Figure 1, in which money market equilibrium is initially attained through exchange rate adjustments. The cointegration results are presented in Table 5.

Table 5: Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix.

Null	Alternative	Statistic	95% Critical Value
$R = 0$	$R = 1$	53	32
$R < = 1$	$R = 2$	27	25
$R < = 2$	$R = 3$	13	19
$R < = 3$	$R = 4$	6	12

The cointegration results suggest a stronger long run equilibrium relationship with two cointegrating vectors. In this model, we also assume two cointegrating vectors. The results of the equilibrium correction model are presented in Table 6.

Table 6: Results from Equilibrium Correction Models

	<i>M3</i>	<i>ntes</i>	<i>e</i>	<i>cpid</i>
$\hat{\alpha}1$ (t-Value)	1.5	4.4	-0.79	-5.4
P-Value	0.14	0.0	0.43	0.0
$\hat{\alpha}2$ (t-Value)	1.14	-1.9	3.90	-2.6
P-Value	0.26	0.05	0.0	0.01

The results from this latter specification of the model are economically intuitive. The results imply statistically significant and negative speed of adjustment coefficients in both cointegrating vectors for the inflation equation. The results also suggest that the money supply is weakly exogenous. The variance decomposition results are presented in Table 7.

Table 7: Orthogonalised Variance Decomposition (%)

<i>Variable</i>	<i>M3</i>	<i>ntes</i>	<i>e</i>	<i>cpid</i>
Exchange Rate	24	36	22	18
Consumer Price Index	26	37	18	19
Money Supply	70	27	2	1
Non-Traditional Exports	13	49	6	30

The results of variance decomposition confirm the endogeneity of the exchange rate with only 22 percent of the variation in the exchange rate being explained by its own shocks and non-traditional exports explaining 36 percent. This result suggests that the exchange rate is determined more by exogenous supply side factors.

In this model, the consumer price index is also endogenous, with 37 percent of the variation in the consumer price index explained by trends in non traditional exports. The impact of the money supply is only 26 percent. This could be due to an indirect effect through the exchange rate and ultimately prices and therefore suggesting some multicollinearity between the non-traditional exports and the exchange rate in terms of the impact of these variables on the domestic consumer price index.

In a bivariate cointegrated VAR model of the exchange rate and the consumer price index, we found cointegration existing between the exchange rate and the consumer price index. The equilibrium correction model presented in Table 8 implies weak exogeneity of the exchange rate in the bivariate model, while the consumer price index responds to disequilibrium as shown by the statistical significance of the speed of adjustment coefficient (t-Value of 4 and P-Value of 0). These results remain valid even with a reversal of the ordering of variables in the VAR model and still imposing the Choleski decomposition.

The results from the equilibrium correction models are supported by the variance decomposition results presented in Table 9 where 93 percent of the variation in the exchange rate is explained by its own shocks and 93 percent of the variation in the consumer price index is explained by the variation in the nominal exchange rate.

Table 8: Results from Equilibrium Correction Models (t and p-Values)

	<i>e</i>	<i>cpid</i>
$\hat{\alpha}1$ (t-Value)	-0.93	-4
p-Value	0.36	0

Table 9: Orthogonalised Variance Decomposition after 50 months (%)

<i>Variable</i>	<i>e</i>	<i>cpid</i>
Exchange Rate	93	7
Consumer Price Index	93	7

In terms of the dynamics, the exchange rate begins having a significant effect on the consumer price index from the six month as shown in Table 10.

Table 10: Orthogonalised Variance Decomposition of the CPI (%)

<i>Variable</i>	<i>e</i>	<i>cpid</i>
One Month	1	99
Six Months	55	45
Fifty Months	93	7

The above results underscore the importance of the exchange rate in the determination of inflation in Zambia. In order determine an appropriate strategy for maintaining inflation in single digit, it is important that we control variables that have a significant impact on the exchange rate. The results also show that the nominal exchange rate is more a function of the exogenous supply side factors.

IV Conclusion

From the above results and analysis, it is clear that the exchange rate and the consumer price index are important variables in the money demand function for Zambia. The consumer price index was included as the relevant opportunity cost of holding money in an economy with underdeveloped financial markets. The exchange rate was included in the money demand equation to capture the currency substitution effects. The results also show that the consumer price index is driven more by the nominal exchange rate which is affected by exogenous supply side factors such as non-traditional exports. In order determine an appropriate strategy for maintaining inflation in single digit, it is important that we control variables that affect the exchange rate. According to the Dornbusch model of overshooting, monetary policy affects the exchange rate and interest rates in the short run which tend to overshoot the long run equilibrium level while inflation responds with a significant lag in the long run. However, our statistical analysis shows that the exchange rate is driven more by supply side and other factors than the money supply.

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CHAPTER THREE

Can Net Open Positions Explain Short-Term Movements in the Kwacha/US Dollar Exchange Rate?

By

Chipili Jonathan Mpundu and Chileshe Angela Nachivula⁸

Abstract

The study analyses the relationship between net foreign exchange positions of commercial banks and changes in the Kwacha/US dollar exchange rate in Zambia over a period of 10 years starting in 1995. A weak negative empirical relationship is found during the July 2003 to December 2005 sub-period. This corresponds to the period when the Interbank Foreign Exchange Market System was introduced. It is established that net positions have a negligible impact on the exchange rate. Nonetheless, net positions provide useful information about the future direction of the exchange rate. This may suggest that agents are now using market information to influence the behaviour of the exchange rate as opposed to the period prior to the introduction of the Interbank Foreign Exchange Market System when the central bank played a dominant role.

I. Introduction

There is enormous literature documenting the difficulties in predicting exchange rates using structural or time series models (Frankel and Rose, 1995). While there is agreement among economists that variables such as interest rates, prices and output can explain exchange rate changes over medium and long horizons, it is argued that these variables are not useful for tracking exchange rate changes on a daily, weekly, or monthly basis. Short-run exchange rate dynamics are believed to mainly depend on non-fundamental forces such as bandwagon effects, over-reaction to news, technical trading, and excessive speculation rather than fundamentals (Ibid, 1995). Major economic, financial, and political developments over intervals alone generally do not explain exchange rate movements very well. This reinforces the consensus view regarding the inadequacy of structural exchange rate models based on macroeconomic fundamentals for high frequency data. As a result, the focus on transaction related data set has over the years led to some economists to consider using such data to model short-term exchange rate dynamics. Policymakers also want to understand what drives exchange rate changes over relatively short periods. This is for the purpose of understanding how market agents shape their expectations once a specific event has happened and also help them understand factually the type of flows taking place in the market on a continuous basis.

This study attempts to explain short-term changes in the exchange rate in the spot market in Zambia by pursuing a transaction-oriented line of research by focusing on net positions held by commercial banks in the foreign exchange market. Specifically, we examine whether net positions bear any useful relationship with the short-term movements in the Kwacha/US dollar exchange rate.

⁸The authors are economists in the Financial Markets Department of the Bank of Zambia. The usual

The rest of the paper is organised as follows: The next section defines and discusses foreign exchange open positions and their importance to the exchange rate. Section III presents a brief analytical framework on this subject matter while section IV provides empirical findings of the extent of the relationship between the variables under investigation. Section V is the conclusion.

II. Definition and Importance of Foreign Exchange Open Positions

Due to the risky nature of trading in foreign exchange, financial institutions use various mechanisms to control market risk. Even though each institution has its own system of controlling market risk, banks have long maintained clearly established position limits on the maximum open position that each trader or group can carry overnight, with separate probably less restrictive intraday or day limits on the maximum open position that can be taken during the course of a trading session.

Foreign exchange open positions represent mismatched foreign assets and liabilities in the corresponding foreign currencies related to foreign exchange transactions that can lead to potential gains or losses due to exchange rate fluctuations. In the Zambian context, open positions are defined as “a situation where assets in a particular currency do not equal liabilities in that currency, including unhedged forward commitments to purchase or sell the currency” (Government of the Republic of Zambia, Statutory Instrument No. 57 of 1996).

The open position limits are carefully and closely monitored and authority to exceed them, even temporarily, requires approval of a senior officer or regulator. Most markets impose quantitative limits on the overall position, although they differ in the choice of the methods proposed by the Basel Committee with regard to the computation procedures. Most quantitative limits apply either continuously or for overnight positions. Different computations of open position limits include:

- i. Net aggregate position, defined as the absolute value of the difference between the sum of all long positions and the sum of all short positions;
- ii. Shorthand method which is defined as the sum of all long positions or the sum of all short positions, whichever is greater; or
- iii. The gross aggregated position, defined as the sum of all long positions plus the sum of all short positions.

The Bank of Zambia (BoZ) has adopted the gross aggregated method in computing the open positions of banks. The open position limit is imposed on exposure to the overall and single currency (US dollar) currently set at 15% and 10%, respectively as at February 2006. These limits are monitored daily for compliance purposes. To determine the open position limit of a commercial bank, the BoZ looks at the overall currency exposure vis-à-vis regulatory capital. Hence, the open position limit is arrived at by multiplying the regulatory capital of a bank by the overall exposure limit, which is then divided by the Bank of Zambia selling exchange rate ruling at the same date as that of the regulatory capital. Commercial banks report net foreign exchange open positions on a daily basis for compliance purpose.

The supervisory authority imposes the limits in most countries while in a few countries limits are set directly by bank management and the supervisory authority monitors those foreign exchange positions. The frequency for verification of compliance with limits also

varies widely. Compliance can be verified randomly, monthly, weekly, daily or during normal on-site examinations.

The limits on net open positions balance the desire for liquidity, prudential concerns and worries about speculation. Net open foreign exchange positions allow dealers to provide liquidity to the market by absorbing innovations to the order flow, but expose them to exchange rate risk. These positions also allow dealers to speculate against the domestic market (and the central bank) by building positions before expected currency depreciation takes place. Expectations of currency depreciation that lead banks to take sizeable foreign exchange positions can become self-fulfilling. Long position limits protect banks against sudden depreciation and reduces scope for speculative attacks in the face of pressures for the depreciation of the domestic currency. In contrast, short position limits protect banks from a sudden appreciation and reduce banks' ability to take speculative short net open positions that could lead to sharp currency appreciation.

Foreign exchange dealers absorb order flow imbalances and also provide liquidity to the market. In pure dealer markets, order imbalances are cleared by a combination of exchange rate adjustment and dealers' inventory management. Dealers set two-way exchange rates at which suppliers and those demanding foreign exchange can trade, absorb any excess supply or demand of foreign exchange, and adjust their exchange rates to manage their net open foreign exchange positions.

In the Zambian foreign exchange market, some dealers known as primary dealers play a central role in the determination of exchange rates. Primary dealers are market-makers who quote two-way exchange rates at which they are willing to deal with other dealers, with a bid/offer spread that reflects many factors including the level of competition in the market. The bid/offer spread covers the exchange rate risk associated with possible exchange rate fluctuations between the time at which they buy and the time at which they sell foreign exchange. The scope for market making is limited, among other factors, by regulations about net open foreign exchange position.

III. Analytical Framework

One data set frequently cited in the US by private sector market commentators is the net positions of speculators on the futures market published by the US Commodity Futures Trading Commission (CFTC). Private sector analysts consider whether speculators have increased or decreased their net positions in a particular currency, and in conjunction with other information, often make a judgment about how the change relates to recent trends and future movements in exchange rates. Implicit in the commentary of private sector analysts is the belief that tracking speculators helps those trying to understand exchange rate dynamics and that changes in the position data of the Commitments of Trader report are a proxy for changes in speculators' short-term directional views.

It is argued that the firm supplying the foreign currency, or taking a short position, gains if the currency depreciates against the US dollar relative to the futures price. The one buying the foreign currency, or taking a long position, gains if the currency depreciates. Participants in the futures market can use these contracts to speculate or to hedge. It is argued that by observing net positions, one can relate recent and future movements in the exchange rate to the former.

Klitgaard and Weir (2004) argue that net positions change when players in the market, acting on their interpretation of public and private information, bet that underlying demand will move exchange rate values from their prevailing levels. The strong correlation with

exchange rate movements suggests that the behaviour of these players reflects, to an extent, the broader speculative community that interprets and influences short-term dynamics.

In analysing the relationship between net open position limits of speculators in the futures market and changes in the exchange rate, Klitgaard and Weir (2004) used a scatter graph as shown in Chart 1 in the Appendix. They postulated that the relationship between these two variables reflected in observations in the upper-left quadrant represents a week when commercial banks increased their holdings of short foreign currency positions relative to long positions and the exchange rate depreciates. Similarly, lower-right quadrant shows commercial banks increasing long foreign currency positions and the exchange rate appreciates. Observations in the other two quadrants (lower left and upper right) suggest that the exchange rate moved in a direction that is inconsistent with the foreign currency holding position of commercial banks.

Klitgaard and Weir (2004) found a strong and stable contemporaneous relationship between these two variables. They however, concluded that net positions do not appear to be valuable in anticipating future exchange rate movements particularly over the following week. They established that net positions of speculators can track 30 to 40 percent of the exchange rate movements of major currencies over the same week.

IV. Empirical Findings²

In this study, we adopt the approach taken by Klitgaard and Weir (2004) to the Zambian spot foreign exchange market in an attempt to understand short-term movements in the Kwacha/US dollar exchange rate. Daily data are used from January 1995 to December 2005. In examining the relationship, the sample is divided into four sub-periods namely, January 1995 to March 1996, April 1996 to January 2001, February 2001 to mid-July 2003, and mid-July 2003 to December 2005³ to take into account the structural changes that occurred in the market in terms of the determination of the official exchange rate⁴. The relationship is also examined over the whole sample period.

In examining the relationship between these two variables, we begin by looking at visual evidence and correlation and Granger causality tests before formally testing the strength of the relationship by estimating two empirical equations that relate changes in the daily spot BoZ-mid Kwacha/US dollar exchange rate to net positions of commercial banks using the Ordinary Least Squares method⁵.

$$dplbozextr_t = \alpha_0 + \alpha_1 ousdopl_t + \epsilon_t \dots\dots\dots 1.1$$

$$dplbozextr_t = \alpha_0 + \alpha_1 usdopl_t + \epsilon_t \dots\dots\dots 1.2$$

Where $dplbozextr_t$ is the percentage change in the mid-BoZ Kwacha/US dollar exchange rate, $ousdopl_t$ and $usdopl_t$ are the overall foreign currency and US dollar (single currency) open positions, respectively and ϵ_t is the error term with all classical properties.

²All the charts and empirical results referred to in the discussion in this section are presented in the appendix.
³During this period, the official exchange rate is derived from rates determined in the interbank market generally referred to as the IFEM system. Details on how the IFEM system operates is contained in the 2004 BoZ annual report including other unpublished BoZ documents.
⁴The determination of the official exchange rate has undergone some changes since the abolition of exchange controls in 1994. The official rate was linked to the BoZ dealing window auction rate during January 1995 to March 1996 and February 2001 to mid-July 2003 periods while during the April 1996 to January 2001 and mid- July 2003 to December 2005 periods, the official rate was derived from the rate determined in the interbank market.
⁵The variables under study are I(0). The unit root results can be obtained from the authors on request.

The underlying theory suggests that coefficients on net positions imply the average percentage change in the exchange rate when the net position changes by US \$1.0 million. The rationale for estimating two equations using the two measures of open position is to determine which one of them has a stronger bearing on the Kwacha/US dollar exchange rate movement.

In terms of visual evidence, it is not apparently clear from Charts 2 and 3 to discern a notable relationship between the exchange rate both in levels and first difference and net open positions. However, scatter graphs in Charts 4 to 6 reveal that the distribution of observations in the four quadrants appear somewhat even although there are traces of more observations falling in the upper-left and bottom right quadrants post-IFEM period where the relationship between the two variables is consistent as postulated by Klitgaard and Weir (2004). The relationship is not clear during other sub-sample periods where most observations are concentrated in the top quadrants. This corresponds to the period when the BoZ dealing window (i.e. auctioning of foreign exchange) was active. It is not surprising to get this kind of result as evidence shows that the foreign exchange market was generally inefficient during auction periods (Chipili, 2004). In such a situation, one would not expect net open positions to necessarily matter vis-à-vis exchange rate movement. The inefficiencies inherent in the auction system brought about problems, among others, lack of readily available liquidity in the foreign exchange market and information flow asymmetry among market participants, a situation which generated multiple exchange rates quoted on the same currency. The problems and limitation inherent in the period is evidenced by the fact that there is no discernable pattern that suggests any relationship between the net open position and the daily percentage change in the exchange rates. However, a discernable pattern emerges after the introduction of the IFEM system that addressed a number of problems and limitations alluded to above.

The correlation coefficient results in Table 1 show a very weak inverse relationship between the exchange rate and net open positions. The Granger causality tests reported in Table 2 generally indicate that net open positions help to predict movement in exchange rate. Nonetheless, two-way causation exists between the change in the exchange rate and net positions. This relationship is more evident when the exchange rate is determined in the interbank market.

Further, the regression results of the empirical equations (1.1) and (1.2) above presented in Table 3 indicate that the relationship between exchange rate and open positions is not statistically significant over the whole sample period and sub-sample periods prior to the introduction of the IFEM. However, evidence of a weak inverse relationship is found post-IFEM period. It is established that a US \$1.0 million swing in the open position leads to a 0.000002% change in the exchange rate. The insignificant impact of net positions on the exchange rate is confirmed by the impulse response presented in Chart 8. Further, the adjusted reveal that net open position only explains about 0.5% of the variation in the exchange rate. This result is supported by the variance decomposition test, which shows that net open positions only accounts for about 0.05% of the variation in the exchange rate. Further, the impulse response indicate that there is no contemporaneous relationship between net open positions and the exchange rate. The exchange rate only responds to the change in the open position after one day and the impact of the latter on the former lasts for about a week.

Both measures of the net open position exert about the same influence on the exchange rate. The existence of the relationship between the variables under study post-IFEM period could be attributed to the fact that there is a greater role for market agents to rely on market information in determining the exchange rate movement given the reduced role of the

Central Bank in the foreign exchange market in the recent past. It also demonstrates the ability by market agents to exploit information available in the market in influencing the exchange rate behaviour.

V. Conclusion

The study has attempted to establish the relationship between net foreign exchange positions of commercial banks and changes in the exchange rates in Zambia over a period of 10 years starting in 1995 using daily data. The estimation method employed takes into account the structural changes that took place over this period in terms of the approach of determining the official exchange rate. The study documents a weak negative empirical relationship between net foreign exchange positions of commercial banks and changes in the exchange rates during the IFEM period only. While net positions can be used to predict the direction of the exchange rate, its impact on the exchange rate is negligible. The results would suggest that agents are now inclined to use market information in influencing the direction of the exchange rate as opposed to periods when the Central Bank played a dominant role.

Appendix

Chart 1

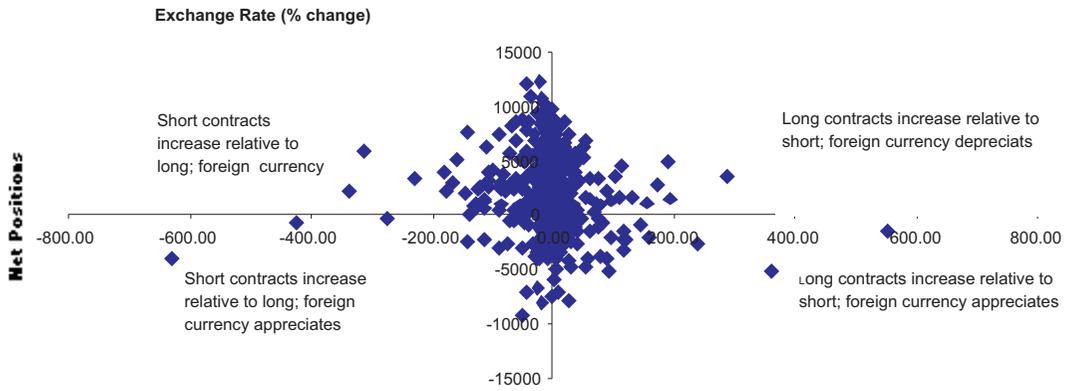


Chart 2

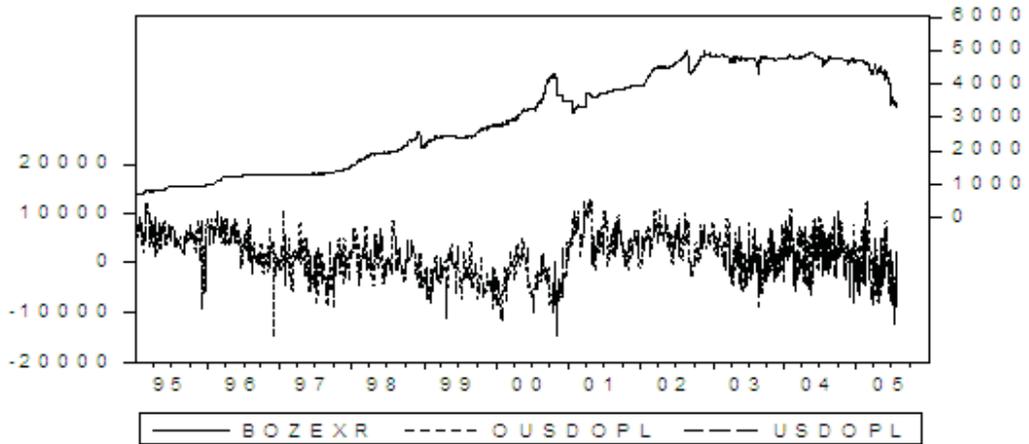


Chart 3

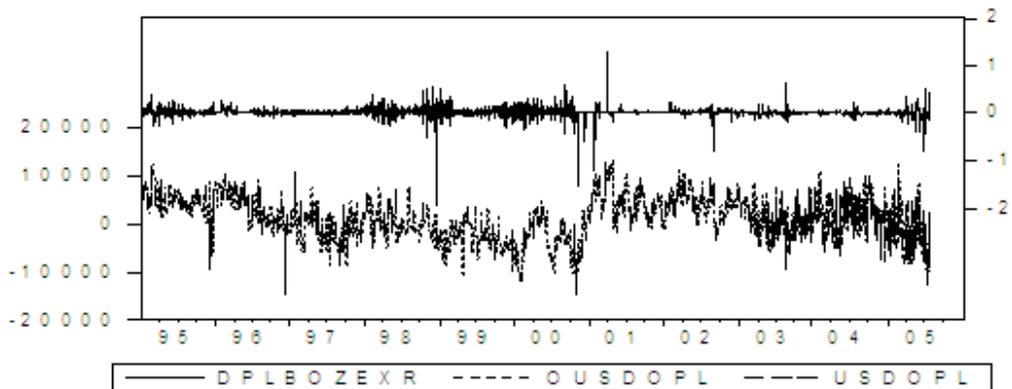


Chart 4

Jan 1995 - April 1996

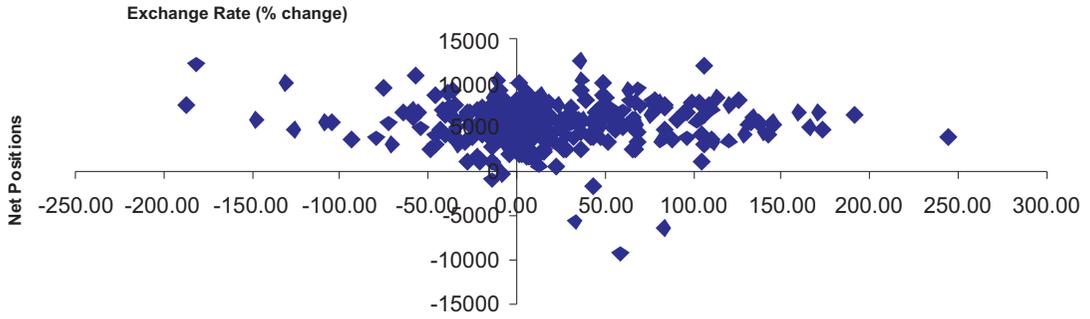


Chart 5

May 1996 - Jan. 2001

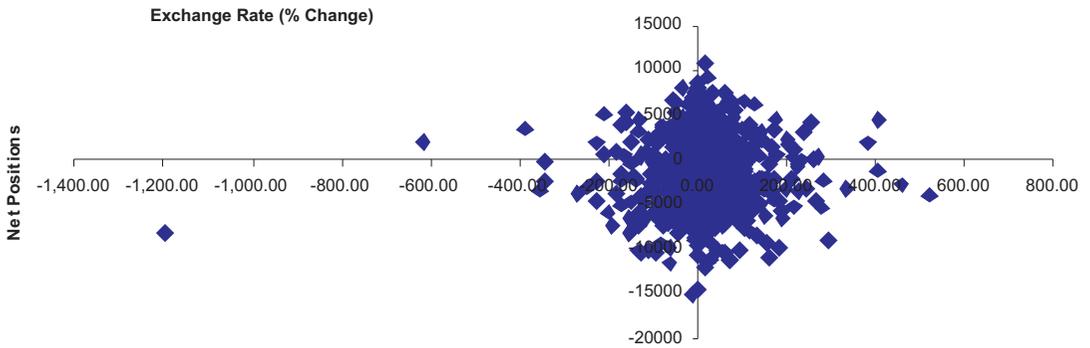


Chart 6

Feb. 2001 - 23 Jul 2003

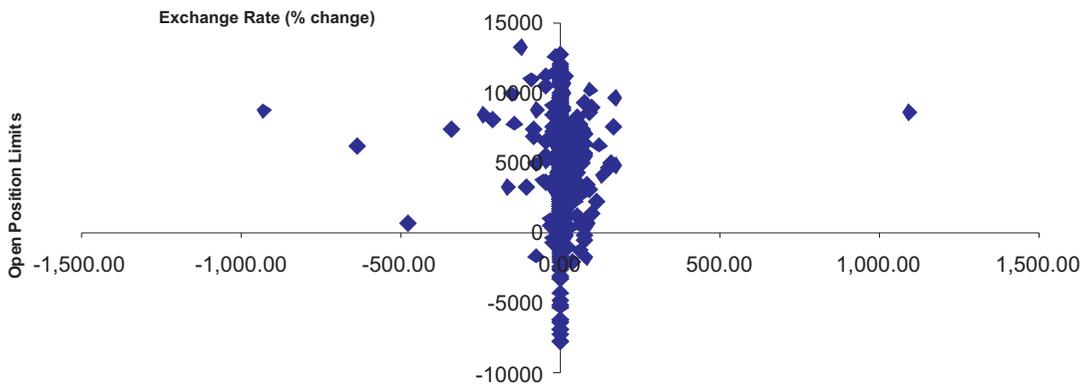


Chart 7

(IFEM) 23 Jul 2003 - Dec 2005

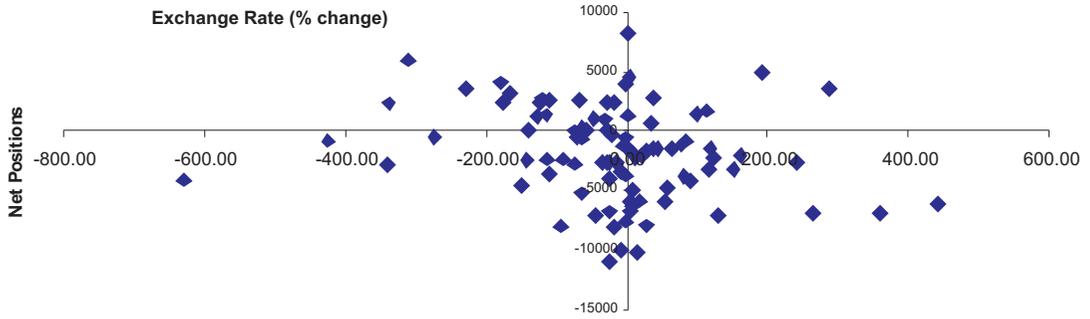


Chart 8

Response to Cholesky One S.D. Innovations ± 2 S.E.

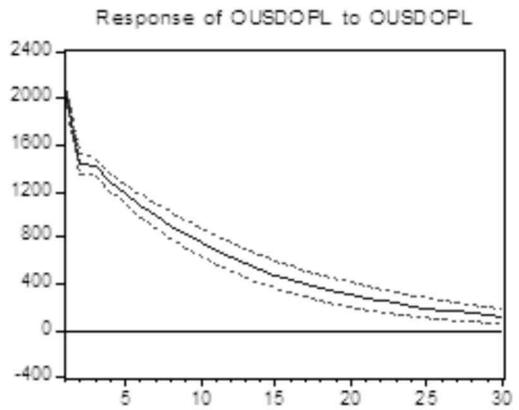
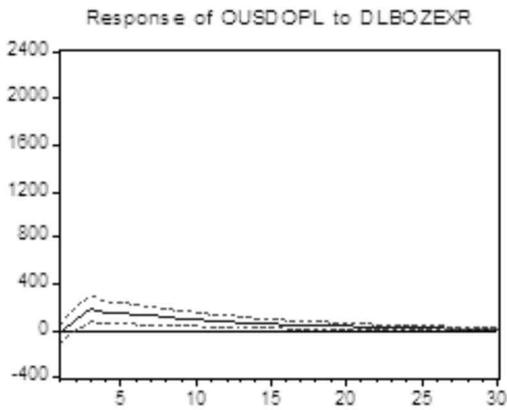
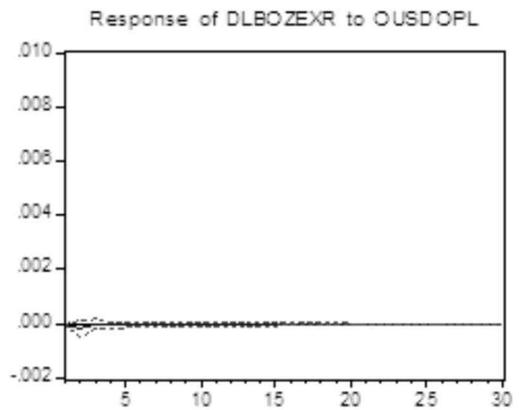


Table 1. Correlation Results

Period	Variables			
		dplbozextr	ousdopl	usdopl
Jan 1995-Dec 2005	dplbozextr	1.000000		
	ousdopl	-0.013876	1.000000	
	usdopl			
Jan 1995-Mar 1996	dplbozextr	1.000000		
	ousdopl	-0.019153	1.000000	
	usdopl			
Apr 1996-Jan 2001	dplbozextr	1.000000		
	ousdopl	-0.014663	1.000000	
	usdopl			
Feb 2001-Jul 2003	dplbozextr	1.000000		
	ousdopl	-0.017473	1.000000	
	usdopl			
Jul 2003-Dec 2005	dplbozextr	1.000000		
	ousdopl	-0.087190	1.000000	
	usdopl	-0.083274		1.000000

Table 2. Granger Causality Tests

Pairwise Granger Causality Tests

Date: 01/24/06 Time: 18:08

Sample: 1/03/1995 12/30/2005

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
OUSDOPL does not Granger Cause DPLBOZEXR	2752	0.50474	0.60372
DPLBOZEXR does not Granger Cause OUSDOPL		9.49369	7.8E-05

Pairwise Granger Causality Tests

Date: 01/18/06 Time: 17:21

Sample: 1/03/1995 3/29/1996

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
OUSDOPL does not Granger Cause DPLBOZEXR	321	3.77858	0.02389
DPLBOZEXR does not Granger Cause OUSDOPL		3.28815	0.03860

Pairwise Granger Causality Tests

Date: 01/18/06 Time: 17:37

Sample: 4/01/1996 1/30/2001

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
OUSDOPL does not Granger Cause DPLBOZEXR	1258	0.07146	0.93104
DPLBOZEXR does not Granger Cause OUSDOPL		0.08926	0.91462

Pairwise Granger Causality Tests

Date: 01/18/06 Time: 17:44

Sample: 2/01/2001 7/22/2003

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
OUSDOPL does not Granger Cause DPLBOZEXR	644	0.19304	0.82449
DPLBOZEXR does not Granger Cause OUSDOPL		6.02722	0.00255

Pairwise Granger Causality Tests

Date: 01/18/06 Time: 17:48

Sample: 7/23/2003 12/30/2005

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
OUSDOPL does not Granger Cause DPLBOZEXR	528	7.27024	0.00077
DPLBOZEXR does not Granger Cause OUSDOPL		8.21247	0.00031

Pairwise Granger Causality Tests

Date: 01/30/06 Time: 10:50

Sample: 7/23/2003 12/30/2005

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
USDOPL does not Granger Cause DPLBOZEXR	528	10.7211	2.7E-05
DPLBOZEXR does not Granger Cause USDOPL		9.33995	0.00010

Table 3 Regression Results

Period						
Jan 1995- Dec 2005		c	ousdopl	usdopl	adjusted R^2	S.E.
		0.0087				
		(4.1002)				
	dplbozxr		-3.36E-07		-0.0002	0.1039
			(-0.7282)			
Jan 1995- Mar 1996						
		0.0020				
		(2.7240)				
	dplbozxr		-3.88E-08		-0.0028	0.0056
			(-0.3105)			
Apr 1996- Jan 2001						
		0.0095				
		(2.6681)				
	dplbozxr		-4.67E-07		-0.0006	0.1239
			(-0.5201)			
Feb 2001-Jul 2003						
		0.0094				
		(2.0259)				
	dplbozxr		-4.08-07		-0.0012	0.0747
			(-0.4428)			
Jul 2003-Dec 2005						
		-0.0024				
		(-0.5235)				
	dplbozxr		-2.08E-06		0.0057	0.0915
			(-2.0073)			
		-0.0082				
		(-2.0263)				
	dplbozxr			-2.32E-06	0.0054	0.0915
				(-1.9587)		

Table 4 Variance decomposition of DLBOZEXR

Variance period	Decomposition S.E.	DLBOZEXR	OUSDOPPL
1	0.008229	100.0000	0.000000
5	0.008257	99.95301	0.046990
10	0.008257	99.94992	0.050083
15	0.008257	99.94869	0.051308
20	0.008257	99.94819	0.051811
25	0.008257	99.94798	0.052016
30	0.008257	99.94790	0.052101

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CHAPTER FOUR

The Economics of Currency Crisis. Lessons for Zambia

By

Mulenga Emmanuel Pamu

Abstract

The paper explains how Zambia can suffer a significant depreciation in its exchange rate if expectations regarding fundamentals are changed due to a reversal in the current fiscal and monetary policy stance especially in view of the forthcoming 2006 general elections and a turnaround in the current trends in the international price of copper. Nevertheless, this possibility is reduced by the debt relief under Heavily Indebted Poor Countries initiative and the Multilateral Debt Relief Initiative. However, it is argued in the paper that the economy could be further insulated from the possibility of a currency crisis through the accumulation of an adequate amount of external reserves as expectations on the future path of the exchange rate are anchored partly on official reserves.

I Introduction

Large capital inflows can bring considerable economic benefits to a country but if not properly managed can cause an economy to overheat¹, increase exchange rate volatility and lead eventually to a currency crisis as capital flows out. A currency crisis can be defined as an event involving large international capital outflows that forces a country to abandon a fixed exchange rate arrangement. Examples of currency crises falling under this definition include: the breakdown of the Bretton Woods system (1971); the European Exchange Rate Mechanism (ERM) crisis (1992-1993); Mexico (1994); Thailand, Indonesia, Korea, Malaysia (1997); Russia (1998); Brazil (1998-1999); Argentina (2001). Eichengreen, Rose and Wyplosz (1996) define a currency crisis as an event in which a pressure index – a weighted average for a given month of the exchange rate depreciation plus the percentage loss of reserves – exceeds some threshold. Under this definition, data for 34 emerging market economies over the period 1975-1998 indicate, on average, roughly 3 currency crises per year or 2 currency crises per country over the 23-year period². Eichengreen et al (1996) include the percentage point increase in the short term interest rate as a percentage point change component of the pressure index. Frankel and Rose (1996) define a currency crisis as an event in which the percentage exchange rate depreciation in a given month exceeds a certain absolute threshold and also exceeds the average rate of currency depreciation over the previous year by another threshold.

The literature on the causes of the Asian currency and financial crisis suggests that the fundamental cause of the Asian crisis of the late 1990s was a sudden reversal of capital

¹Capital flows may lead to an excessive expansion of aggregate demand which is likely to be reflected in inflationary pressures, real exchange rate appreciation and widening current account deficit.

²Mussa and others (2000), where the threshold for the pressure index was set at the sample mean plus three standard deviations.

inflows into the region that followed the implementation of economic liberalisation measures. This is referred to in the literature as the sudden stop phenomenon. The increase in capital inflows in Asia was partly due to the low returns on investments in advanced market economies due to high costs of production.

In the Zambian context, with a freely floating exchange rate, we can think of a currency crisis as a significant depreciation of the nominal exchange rate and loss of international reserves. The external sector performance of the Zambian economy has improved significantly since 2003 as a result of the increase in the international price of copper, Zambia's main export product, and debt relief following the attainment of the enhanced Heavily Indebted Poor Countries (HIPC) initiative completion point in April 2005 and the implementation of the Multilateral Debt Relief Initiative (MDRI). These developments, coupled with the implementation of a tight monetary policy, have resulted in the appreciation of the Kwacha against major currencies. The appreciation of the nominal exchange rate has increased returns on Zambian assets whose rates are already high by international standards. The increases in returns have attracted capital inflows of a short-term nature. The purpose of this paper is to make an analysis of the implications of the increase in these short-term inflows. The paper is organised as follows, in section two we present the economics of currency crises, section three presents the circumstances under which a currency crisis could occur in Zambia while section four concludes with policy recommendations.

II The Economics of Currency Crises

In the literature, the causes of currency crises are classified in different categories as first generation, second generation and third generation models. The breakdown of the Bretton Woods system gave rise to the first generation models focusing on the country's ability to defend a fixed exchange rate. The ERM crisis gave rise to second generation models focusing on countries political willingness to defend the exchange rate (willingness to maintain high interest rates) while the third generation models are based on balance sheet mismatches.

First Generation Currency Crises

According to the first generation models of currency crisis, a currency crisis is caused by economic fundamentals that are inconsistent with the maintenance of a fixed exchange rate regime. The focus is on the countries holding of foreign exchange reserves. Large fiscal deficits and/or rapid money growth lead to inflation, causing the fixed exchange rate to be become overvalued in real terms. Overvaluation leads to large current account deficits and loss of reserves. Market participants anticipate that the country will run out of reserves and sell the domestic currency, leading to a crisis. The attack can occur before the country runs out of reserves. This is shown in a model developed based on the following building blocks:

Money Market Equilibrium;

$$\frac{M}{P} = \alpha - \lambda i \quad (1)$$

where M denotes money supply, P denotes the price level, i denotes the interest rate, α is a constant while λ is the interest responsiveness of the demand for money.

Uncovered Interest Parity;

$$i = i^* + \frac{\Delta E_{t+1}}{E_t} \quad (2)$$

The asterisk denotes foreign interest rates while E refers to the exchange rate.

Purchasing Power Parity;

$$P = P^f E \quad (3)$$

P denotes prices while P^f denotes foreign prices. Assuming that the foreign price is equal to 1, then $P=E$.

The central bank balance sheet is defined as;

$$M = D + R \quad (4)$$

M denotes money supply, D denotes domestic credit while R denotes international reserves so that a change in money supply is defined as

$$\Delta M = \Delta D + \Delta R \quad (5)$$

Substituting equations 2 and 3 into 1 yields the following:

$$\frac{M}{E} = \alpha - \lambda \left(i^f + \frac{\Delta E}{E} \right) \quad (6)$$

$$\begin{aligned} M &= E \left(\alpha - \lambda \left(i^f + \frac{\Delta E}{E} \right) \right) \\ M &= E\beta - \lambda \Delta E \\ E &= \frac{M}{\beta} + \frac{\lambda \Delta E}{\beta} \end{aligned} \quad (7)$$

Under a fixed exchange rate regime $E=0$ so that we have the following:

$$E = \frac{M}{(\alpha - \lambda i^f)} = \frac{M}{\beta} \quad (8)$$

The above equation implies that the exchange rate is a function of the domestic supply of money relative to foreign money supply. The higher the domestic money supply relative to the foreign money supply, the higher the nominal exchange rate and vice versa. Equation (8) can be rewritten as follows:

$$E = \frac{D + R}{(\alpha - \lambda i^f)} \quad (9)$$

For the exchange rate to remain fixed, the change in domestic credit should be equal to the change in reserves, assuming foreign money supply and demand remain constant. Assuming the rate of change in the domestic credit is given by μ , the rate of change in reserves should be;

$$\Delta R = -\mu \quad (10)$$

This can only be sustained if there are sufficient reserves held by the central bank. Assuming the initial amount of reserves held by the central bank is R_0 , the time it takes for the reserves to run out is given by;

$$T = \frac{R_0}{\mu} \quad (11)$$

After T, the exchange rate will have to float. This however is a naïve view, which implies that reserves run out smoothly and then the exchange rate floats after reserves are depleted. In reality, the exchange rate collapses with a crash with a dramatic run of agents trying to change domestic currency for foreign currency.

Under a fixed exchange rate regime, agents hold real balances of

$$\beta = \frac{M}{E} \quad (12)$$

Once reserves are depleted at T, agents hold real balances of

$$\frac{M}{E} = \beta - \lambda \frac{\Delta E}{E} \quad (13)$$

This implies a loss of wealth for the agents because

$$\frac{M}{E} < \beta \quad (14)$$

Agents observe the shadow value of the exchange rate which can be derived from the following;

$$E = \frac{M}{\beta} + \frac{\lambda \Delta E}{\beta} \quad (15)$$

Taking

$$\Delta E = \frac{\Delta M}{\beta} = \frac{\Delta D}{\beta} = \frac{\mu}{\beta} \quad (16)$$

Then the shadow price of foreign exchange is given by

$$\bar{E} = \frac{M}{\beta} + \frac{\lambda\mu}{\beta^2} \quad (17)$$

When we set wealth under the shadow rate equal to the rate under the fixed exchange rate regime, we can derive the timing of the attack as follows.

$$E = \frac{M}{\beta} = \bar{E} = \frac{M}{\beta} + \frac{\lambda\mu}{\beta^2} = \frac{D + \mu T}{\beta} + \frac{\lambda\mu}{\beta^2} \quad (18)$$

$$T = \frac{R}{\mu} - \frac{\lambda}{\beta}$$

Speculative attacks are the rational response of investors to macroeconomic policies that are inconsistent with a stable exchange rate. The collapse of the regime in a crash is what we should expect as economic agents attempt to maintain the value of their wealth. Analyses of individual country experiences have found a link between excessive credit growth and subsequent crises in a number of countries including Mexico, Argentina, Italy, and France.

In Zambia, the possibility of suffering from a crisis caused by fundamentals described above can be allayed in two ways; by ensuring that the Bank of Zambia accumulates adequate external official reserves and by pursuing appropriate fiscal and monetary policies. The commitment of the authorities to implementing sound macroeconomic policies is important in the prevention of a fundamentally driven currency crisis. The level of reserves is important in the determination of a currency crisis since it affects the expectations about the future path of the exchange rate. It is therefore important that the Bank of Zambia takes advantage of the improved external sector performance to accumulate more reserves.

Second Generation Currency Crises

In the first generation models of currency crises, the behavior of the exchange rate is determined by exogenous fundamentals unrelated to the behaviour of economic agents. Market participants base their expectations on the assumption that their actions will not affect fiscal balances or domestic credit policies. By contrast, the interaction between expectations and actual outcomes is at the core of second generation models in which market expectations directly influence macroeconomic policy decisions. Such models are also referred to as the endogenous-policy approach, since policy makers' actions in these models represent optimal responses to macroeconomic shocks. The expectations and actual outcomes lead to self-fulfilling crises. A currency crisis can be thought of as a shift in expectations toward the devaluation outcome which makes the defense of the exchange rate costly. When there is no shift in expectations, currency stability is maintained. Thus there is the possibility of multiple equilibria depending on whether or not there is a change in

expectations. A change in expectations moves the economy from a good equilibrium to a bad equilibrium.

Such an interpretation of financial crises distinguishes between two kinds of volatility, one related to financial markets and one related to macroeconomic fundamentals. The former volatility substantially exceeds the latter. Market sentiment - in the form of sudden and arbitrary changes in market participants' expectations - then plays a prominent role in the determination of a crisis. As a result, second generation models are deemed to square better with the stylized facts of global financial markets.

The second generation models focus on situations in which the interest rate policy required to maintain a stable exchange rate has high output and employment costs. The 1992, ERM crisis occurred because some countries such as Italy were required to pursue tight monetary policies in order to maintain a fixed exchange rate at a time when their economies were entering a recession. Market participants develop expectations that the exchange rate will become politically unsustainable and sell the domestic currency, leading to a crisis.

These models do not however explain what causes the shifts in private agents' expectations. In other words the theory remains silent on the determinants of the losses of confidence that are the cornerstone of the analysis. However, crisis episodes are typically preceded by strong macroeconomic performance and substantial volume of capital inflows then shift in market sentiments based on rational reasons for concern about economic fundamentals and/or political developments leading to acceleration of capital outflows as ban run psychology takes hold.

Third Generation Currency Crises

Recent variants on currency crisis models have focused on balance sheet effects. When a country has more foreign currency debt than foreign currency assets, exchange rate depreciation will create difficulties of servicing the debt, making it more difficult to roll over short term debts, and increase the speeds with which the country runs out of foreign exchange reserves. Adverse shifts in expectations are more vicious in the presence of such balance-sheet mismatches.

Financial and currency crises can generate a vicious circle by amplifying each other. A currency crisis has an adverse impact on the financial sector when banks' liabilities are denominated in a foreign currency. Devaluation increases the domestic currency value of these liabilities. As banks typically lend domestically, in the local currency, devaluation exposes them to a currency mismatch and a deterioration of their balance sheets. In turn, a banking crisis can lead to a currency crisis through the burden it imposes on the fiscal side of the economy. The cost of addressing the consequences of a banking crisis, such as the liquidation of insolvent banks, is borne by the public sector. A financial crisis is therefore associated with a large and possibly unexpected worsening of the fiscal position of the country. A drastic change in the effective public liabilities can trigger expectations of monetisation of the fiscal deficit and exchange rate depreciation. Thus a country's vulnerability to a financial crisis strongly depends on the strength of the financial sector. The strength of the financial intermediaries also affects the impact of devaluation on real variables. By worsening the balance sheet of intermediaries, devaluation can generate a pronounced tightening in credit market conditions, possibly leading to a contraction in credit market conditions and possibly leading to a contraction in output.

Contagion

Contagion can be defined as the spreading of the crisis from one country to another. As countries become more integrated and the distribution of information in markets remains asymmetric, the possibility of contagion increases. This was seen in the ERM crisis of 1992-1993, the 'tequila' effects of the Mexican peso crisis of 1994-1995, the 'yellow fever' effects of the Asian crisis of 1997-1998 and the asset market contagion following the Russian devaluation and default in August 1998 and the Brazilian devaluation in 1999. The contagion effect associated with private capital is likely to occur through four channels;

1. Trade arrangements and exchange rate pressures contribute to volatility and contagion.
2. There is the 'wake-up call' phenomenon where the collapse of one country's currency alters investor's perception about other countries economic fundamentals.
3. Institutional investors' herding behavior induces common outcomes in countries with heterogeneous fundamentals.
4. There are financial links between countries. The pattern of financial holdings can cause shocks to spill over to other countries regardless of those countries fundamentals.

Factors that may Cause a Currency Crisis in Zambia

With improved expectations regarding the future performance of the economy coupled with high returns on Government securities, the Zambia economy has seen a significant increase in portfolio investment flows, particularly during the second half of 2005 when expectations regarding an appreciated Kwacha became entrenched. In June 2005, foreign investment in Government securities stood at about US\$14 million while at end December 2005, this stood at US\$ 238 million as shown in Table 1. The returns faced by the foreign portfolio investors are enhanced by the appreciation of the exchange rate. These flows are expected to continue until the interest parity condition is achieved by either lower domestic interest rates or having a depreciated exchange rate in expectations.

Table 1: Foreign Investment in Government Securities in US\$ millions

Type of Instrument	Jun 2005	Sept 2005	Nov 2005	Dec 2005	Mar 2006	Apr 2006
Treasury bills	0	13	70	102	152	171
Bonds	14	14	29	36	67	68
Total	14	27	99	138	219	238

Source: Bank of Zambia

The currency crisis that could occur in Zambia is more likely that of the second generation type, moving the economy from a stable to an unstable equilibrium. This would occur as a result of a change in expectations which become self-fulfilling ex-post. It is important to underscore that the possibility that crises can be self-fulfilling does not imply that the likelihood of an attack is unrelated to economic fundamentals. Indeed in second generation models there is a range of strong fundamentals in which a speculative attack would not occur, that is, the Government would not find it advantageous to validate market expectations and devalue the currency. Similarly, there is a range of weak fundamentals

where the cost of defending the peg is so high that the speculative attack, forcing the abandonment of the peg, is inevitable. Finally, there is an intermediate vulnerable range of fundamentals, in which the peg could survive if expectations are favourable but would be abandoned if an attack were to materialise. In the Zambian context, with a freely floating exchange rate, we refer to a currency crisis as a significant depreciation of the nominal exchange rate and loss of international reserves. This may occur when a change in expectations, as fundamentals change, lead to significant capital outflows. The factors that may lead to a change in expectations are:

1. A reversal in the macroeconomic policy stance: The Government has implemented sound fiscal and monetary policies especially from 2003. A reversal in this policy stance, more especially in view of the forthcoming general elections, would revise expectations of agents in the economy towards a depreciated exchange rate. Large devaluations in developing countries have often been preceded by expansionary fiscal and monetary policies, interest rate premia, real exchange rate appreciation and widening current account imbalances; and
2. An exogenous change in the current trends in the international price of copper: In addition to the implementation of sound macroeconomic policies, Zambia has benefited from a significant increase in the international price of copper. A reversal in the direction of the international price of copper which is protracted would lead to a revision in expectations regarding the future path of the exchange rate.

However, the effect of these factors on expectations will be mitigated by the fact that the external debt position has reduced after reaching the enhanced HIPC initiative completion point and the delivery of Multilateral Debt Relief by the multilateral creditors. Despite the latter mitigating factor being overwhelming, it is important that the authorities take advantage of the improved external position to increase the stock of external reserves which provide some resilience against the effect a possible reversal in capital flows. Krugman (1979) demonstrated that reserves can be wiped out by a speculative attack once they have reached a sufficiently low level. If the level of reserves is low and expectations change, it will be Nash equilibrium for investors to withdraw from the economy.

The reversal in capital flows can also be caused by a decline in domestic interest rates. Domestic interest rates can be reduced by the continued improvement in fiscal performance especially with continued budget support from donors following the attainment of the HIPC initiative completion and increased demand for Government securities as increased inflows are supported by monetary accommodation⁴.

The third generation models of currency crises suggest that a currency crisis can also be triggered by weaknesses in the financial sector arising from a combination of insufficient capitalisation and supervision. The performance of the Zambian financial system can be characterised as strong with commercial banks recording net foreign assets. Therefore, the state of the financial system is not likely to pose a serious threat to the foreign exchange market.

III Conclusion

The paper presented different models of currency crises and concludes that Zambia can suffer from a significant depreciation in its exchange rate if expectations regarding

⁴This implies unsterilized purchases of the excess foreign exchange supply.

fundamentals are changed due to a reversal in the current fiscal and monetary policy stance and a turnaround in the current trends in the international price of copper. However, this possibility is reduced by the debt relief following the attainment of the enhanced HIPC initiative completion point and the delivery of debt relief under the Multilateral Debt Relief Initiative. This notwithstanding, it is argued in the paper that the economy could be further insulated from the possibility of a currency crisis through the accumulation of an adequate amount of external reserves as expectations of agents on the future path of the exchange rate are anchored partly on the amount of official reserves. The first generation models suggest that the ability of the economy to maintain a given exchange rate depends on the amount of external reserves.

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CHAPTER FIVE

Fractal Analysis of Zambia's Inflation

By

Chibelushi M Musongole

Abstract

In this paper, the structure of Zambia's inflation is explored. The rescaled range approach is used to investigate the behaviour of Zambia's inflation for the period January 1986 to December 2007. The Hurst coefficients and the fractal dimensions of the annual inflation, food inflation and the non food inflation are computed. It is found that the Hurst coefficients and the fractal dimensions of the food inflation and the non-food inflation are the same. The computed Hurst coefficient for the overall inflation is higher than those of the food and the non-food inflation and thus has a smaller fractal dimension compared to those of the food and non-food inflation. It is found that Zambia's inflation is characterized by the Hurst phenomenon of long memory. This phenomenon may play an important role in the modeling and forecasting of inflation in Zambia.

I Introduction

Inflation plays a primary role in monitoring the economy of a country. Inflation in Zambia is one of the major variables used to gauge economic performance. It comprises two components, the food inflation and the non-food inflation. Thus inflation in Zambia is influenced by factors that affect both food and non-food items. The movement of inflation in Zambia generally seems unpredictable. This study investigates the fractal structure of inflation in Zambia. The intention is to determine whether inflation in Zambia is characterized by long memory. Long memory is a phenomenon that has been studied widely. In econometrics and finance for example, the studies of long memory were motivated at the time when the study of long memory specifications for price processes was done by Mandelbrot (1969). Econometric literature reviews on long memory studies has been documented in Baillie (1996) and Robinson (2003).

In investigating the fractal structure of Zambia's inflation, Chaos Theory is applied using the rescaled range (R/S) methodology to compute the Hurst coefficients of the overall inflation, food inflation and the non-food inflation. The R/S technique has been applied extensively to natural phenomena to detect any biases in behaviour over time.

Fractal Theory and Chaos Theory have very strong links. Fractals are sets that exhibit properties of self-similarity. The simplest geometric property of a fractal is measured by its fractal dimension (Mandelbrot, 1982). The fractal dimension of a time series reveals the time series characteristics in terms of how it occupies its space. The early work related to chaos and fractals occurred in the field of biology, meteorology, physics, chemistry and computer science (Chatterjee and Yilmaz, 1992). In Meteorology, the work of Lorenz (1963)

involving weather predictions popularized fractal and chaos theory. Other areas of wide application include finance (Mandelbrot, 1997). In more recent times, Chaos Theory has been applied using the Hurst exponent to show evidence of long-range dependence in the Brazilian term structure of interest rates (Daniel et al 2006). Evidence of long memory in inflation using the Hurst exponent has been shown (Backus and Zin, 1993).

Other studies that have applied the R/S analysis include for example, the investigation of trends in the Yen/Dollar, Mark/Dollar, Pound/Dollar, and Yen/Pound exchange rates (Peters 1991, 1994), the determination of the fractal structure of the Kwacha/US Dollar exchange rate (Musongole, 2003) and the investigation of the existence of long memory characteristics in the mood indices of various stock markets (Musongole, 2002).

An important motivation for the use of Chaos Theory is that it provides an opportunity to describe randomness as a result of a known deterministic process without assuming a distribution of the process.

This paper investigates the long memory phenomenon in the Zambia's inflation using chaos theory. The Rescaled Range analysis technique is applied to the monthly inflation data for the periods January 1986 - December 2007. The Hurst coefficients and the fractal dimensions of the overall inflation, food inflation and non-food inflation are computed and interpreted.

The paper is divided into five sections of which the first part is the introduction. In the second section, a discussion of the R/S analysis technique is provided. The data used in the analysis is described in section three. The fractal structure of the overall inflation, food inflation and non-food inflation are computed and the findings are presented and discussed in section four. Concluding remarks are given in section five.

II Rescaled Range Method

The long memory phenomenon is sometimes measured by the Hurst exponent. There are several methods that may be used to compute the Hurst exponent. For example, the method introduced by Barabasi and Vicsek (1991), the method by Di Matteo et al. (2005). This section outlines the steps required to undertake the Rescaled Range analysis technique largely applied by Peters (1991, 1994) and the Benoit Software as follows:

Consider an interval, or window, of length w in a trace. Within this window, one can define two quantities:

$R(w)$, the range taken by the value of y in the interval. The range is measured with respect to trend in the window, where the trend is estimated simply as a line connecting the first and the last point within the window. This subtracts the average trend in the window.

$S(w)$, the standard deviation of the first differences of the values of y within the window. The first difference of the y 's are defined as the differences between the values of y at some location x and y at the previous location on the x axis:

$$\Delta y(x) = y(x) - y(x - \Delta x) \quad (1)$$

where Δx is the sampling interval, i.e., the interval between two consecutive values of x .

A reliable measurement of $S(w)$ requires data with a constant sampling interval Δx , because the expected difference between successive values of is a function of the distance separating them. $S(w)$ in the rescaled range method is used to standardise the range $R(w)$ to allow comparisons of data sets; if $S(w)$ is not used, the range $R(w)$ can be calculated on data sets that have a non-constant sampling interval.

The rescaled $R/S(w)$ range is defined as:

$$R / S(w) = \left\langle \frac{R(w)}{S(w)} \right\rangle \quad (2)$$

where w is the window length and the angled brackets $\langle R(w) \rangle$ denotes the average of a number of values of $R(w)$.

The basis of the method is that, because of self-affinity, one expects the range taken by values of y in a window of length w to be proportional to the window length to a power equal to the Hurst exponent H , i.e.,

$$R / S(w) = w^H \quad (3)$$

In practice, for a given window length w , one subdivides the input series in a number of intervals of length of w , measures $R(w)$ and $S(w)$ in each interval, and calculates $R/S(w)$ as the average ratio $R(w)/S(w)$ as in (2). This process is repeated for a number of window lengths, and the logarithms of $R/S(w)$ are plotted versus the logarithms of w . If the trace is self-affine, this plot should follow a straight line whose slope equals the Hurst exponent H . The fractal dimension of the trace can then be calculated from the relationship between the Hurst exponent and the fractal dimension:

$$D_{rs} = 2 - H \quad (4)$$

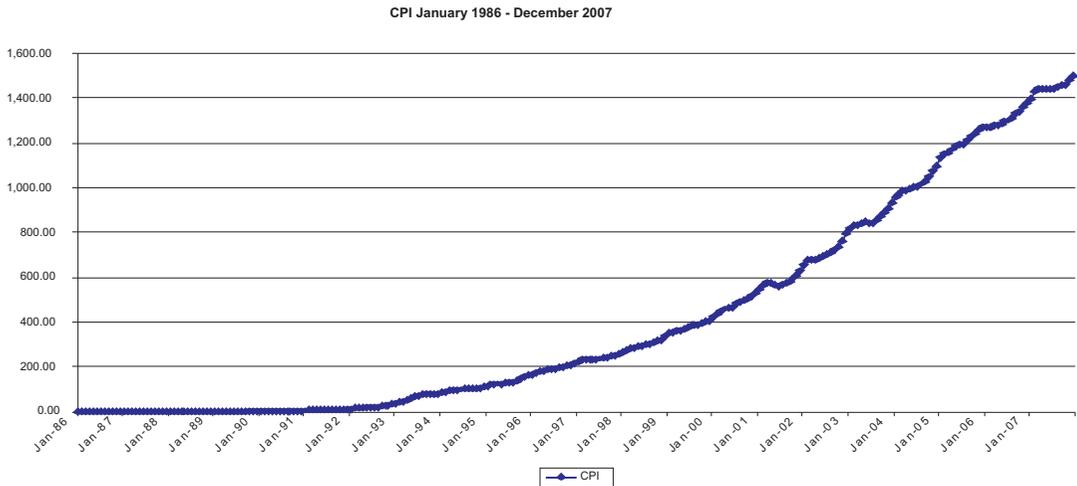
where D_{rs} denotes the fractal dimension estimated from the rescaled range method.

The Hurst exponent $H=0.50$ would imply an independent process. $0.50 \leq H \leq 1.00$ Implies a *persistence* time series, and a persistence time series is characterised by long memory effects. Theoretically, this implies that current events influence what happens in the future. $0 \leq H \leq 0.50$ signifies *antipersistence*. An antipersistence process reverses itself more frequently than a random process.

III Data

The data considered here are the Consumer Price Index (CPI), overall inflation, food inflation and non-food inflation for the periods January 1986 to December 2007. The data are plotted in the Figures 1, 2, 3, and 4 respectively.

Figure 1: CPI January 1986 December 2007



The CPI in Figure 1 shows exponential growth globally for the periods 1986 - 2007 with local (monthly) fluctuations.

In the following Figures 2, 3, and 4, overall inflation, food inflation and non-food are plotted. The graphs show violent swings in the periods between 1988 and 2004. From 2005 inflation had a downward global trend with local monthly fluctuations.

Figure 2: Overall Inflation January 1986 December 2007

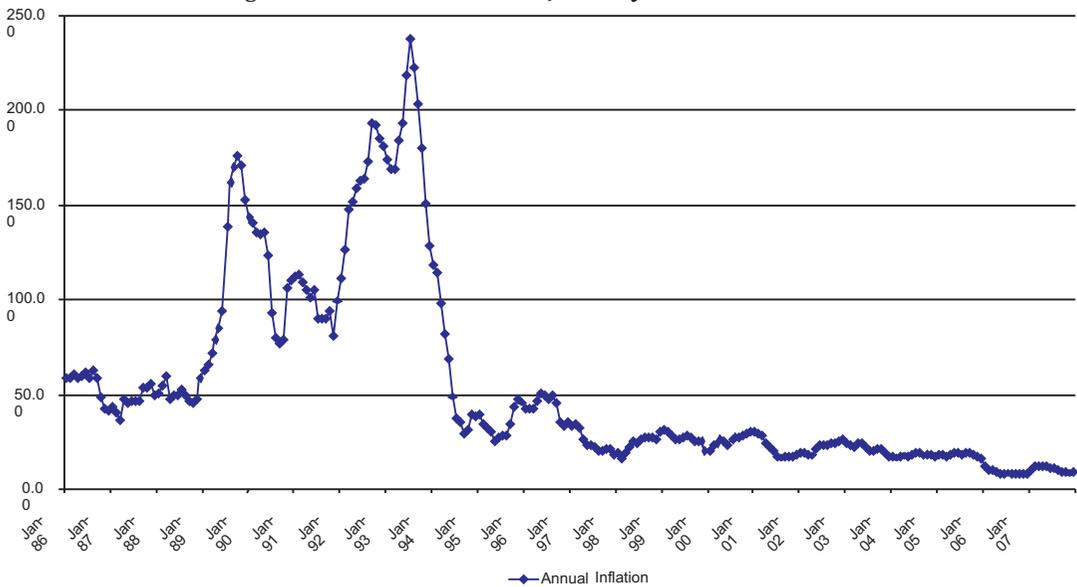


Figure 3: Food Inflation January 1986 December 2007

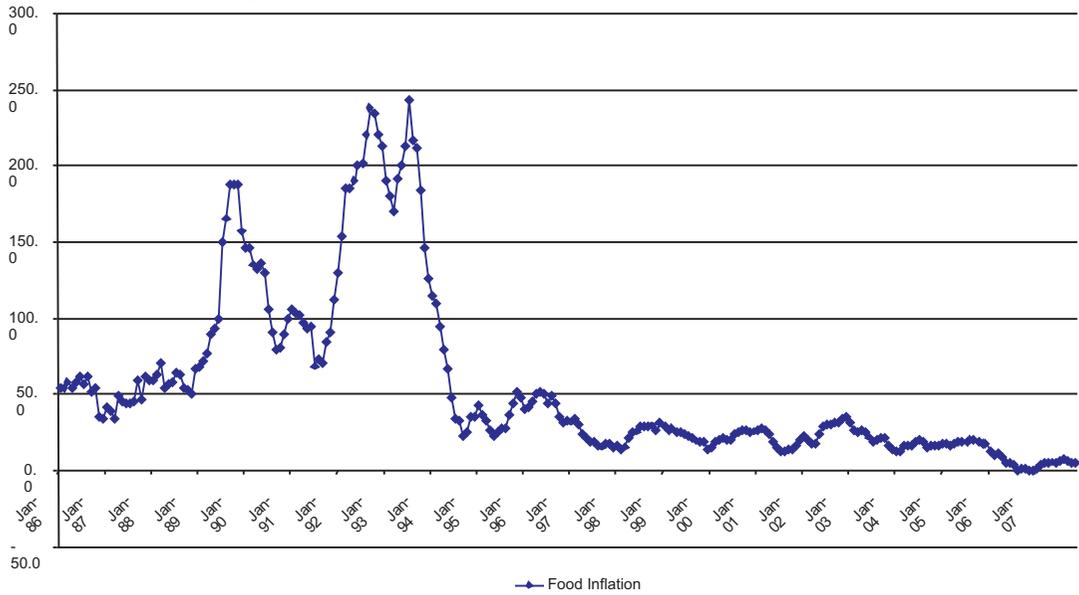
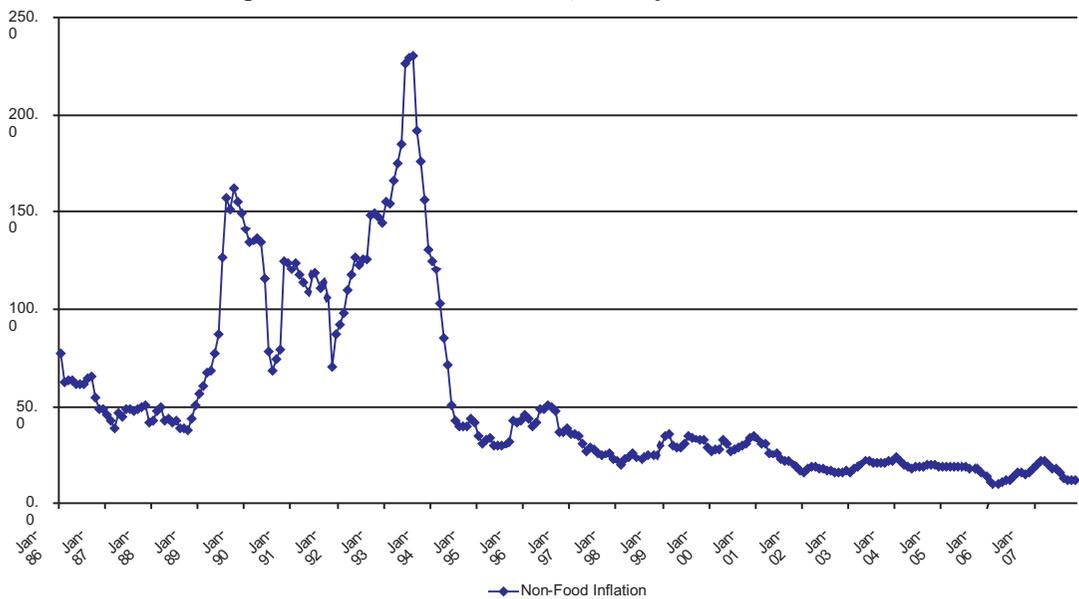


Figure 4: Non-Food Inflation January 1986 December 2007



IV The Rescaled Range Analysis of the Zambia's Inflation Data

This section outlines the results of the rescaled range analysis of the overall inflation, food inflation and non-food inflation data for the period 1986-2007.

Equation (3) is estimated for the overall inflation data as

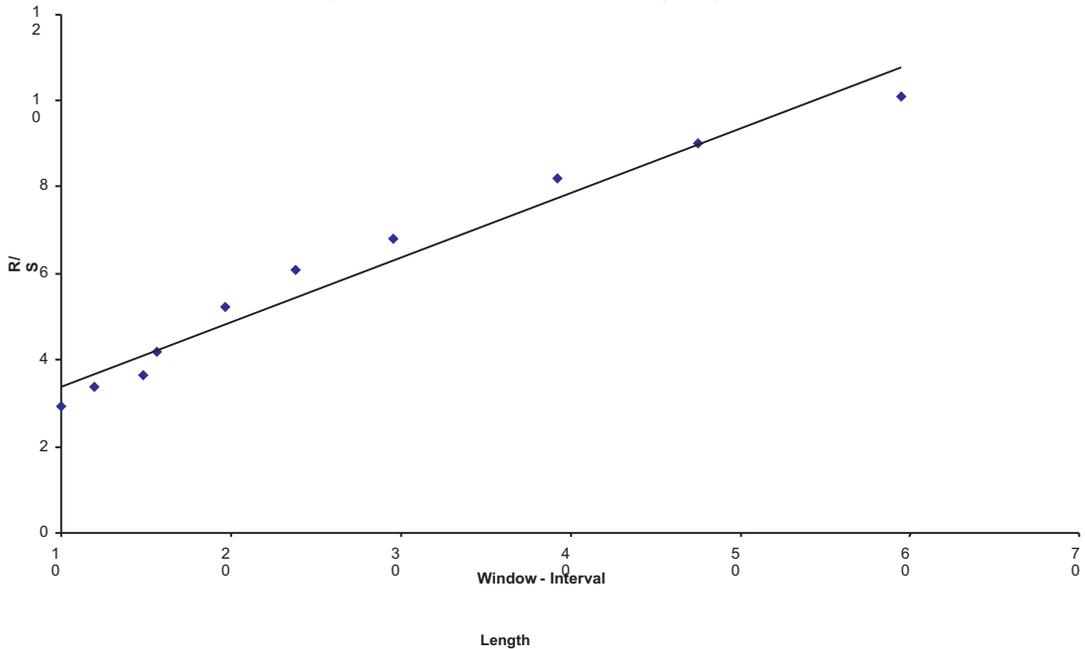
$$R / S(w) = 0.657w^{0.675} \tag{5}$$

This implies that the Hurst exponent for the overall inflation is $H=0.675$ and fractal dimension computed from equation (4) as

$$D_{rs} = 2 - 0.675 = 1.325$$

This implies that overall inflation is a persistence process and is characterised by long memory effects since $0.5 < H < 1$. Figure 5 shows the logarithms of $R/S(w)$ plotted versus the logarithms of w .

Figure 5. Overall Inflation Log-Log Plot



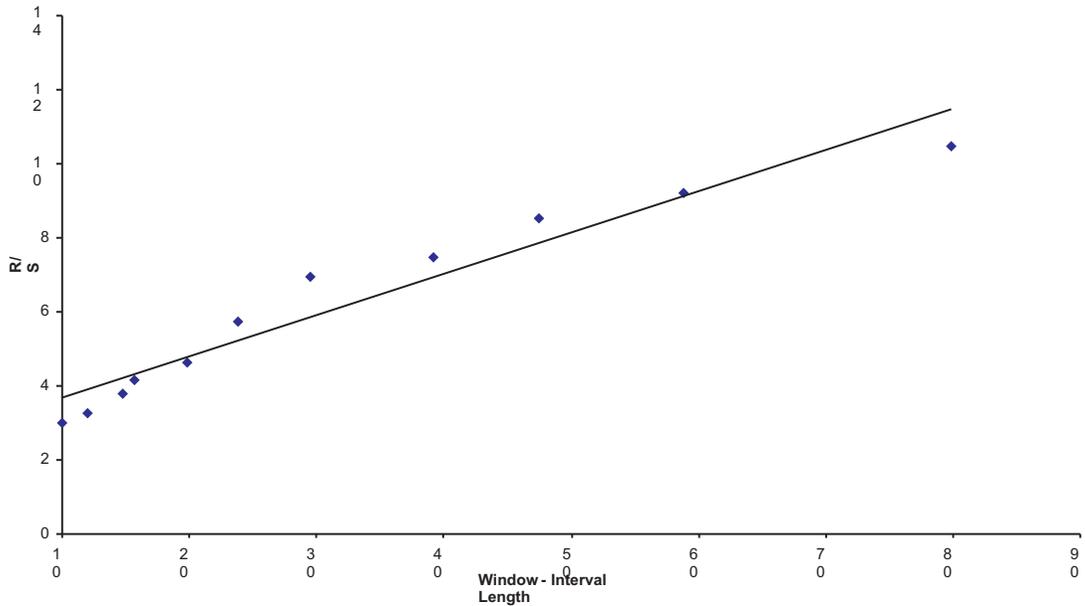
Equation (3) is estimated for the food inflation data as

$$R / S(w) = 0.758w^{0.622} \tag{6}$$

This implies that the Hurst exponent for the food inflation is $H=0.622$ and fractal dimension computed from equation (4) as

$$D_{rs} = 2 - 0.622 = 1.378$$

This implies that food inflation is a persistence process and characterised by long memory effects as . Figure 6 shows the logarithms of plotted versus the logarithms of .

Figure 6. Food Inflation Log-Log Plot

Equation (3) is estimated for the non-food inflation data as

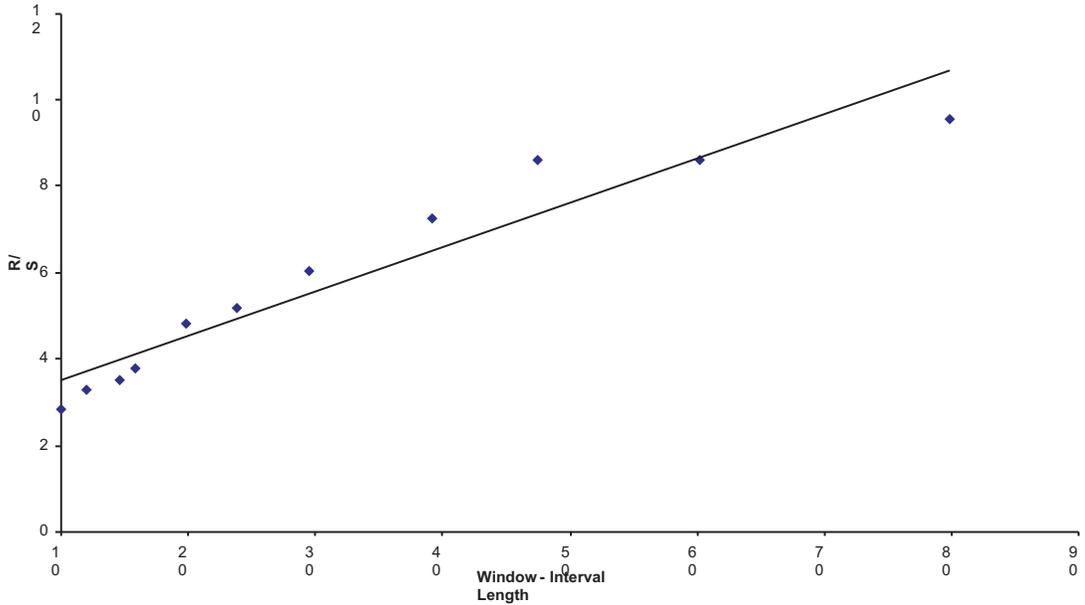
$$R/S(w) = 0.701w^{0.623} \quad (7)$$

This implies that the Hurst exponent for the non-food inflation is $H=0.623$ and fractal dimension computed from equation (4) as

$$D_{rs} = 2 - 0.623 = 1.377$$

This implies that non-food inflation is a persistence process and is characterised by long memory effects since $0.5 \leq H \leq 1$. Figure 7 shows the logarithms of $R/S(w)$ plotted versus the logarithms of w .

Figure 7. Non-Food Inflation Log-Log Plot



Interpretation of the results

The computation of the Hurst exponent show that the food inflation and the non-food inflation have the same level of persistence with $H=0.622$ and $H=0.623$, respectively. This implies that both the food and the non-food inflation are characterised by long memory. Current events affect the evolution the food and the non-food inflation in future. They are affected by their initial conditions.

The overall inflation is more persistent than the food inflation and the non-food inflation with $H=0.625$. Its future structure is also depended on its initial conditions.

An important motivation for the use of Chaos Theory is that it provides an opportunity to describe randomness as a result of a known deterministic process without assuming a distribution of the process.

V Conclusion and monetary policy implications

The Hurst exponent $H = 0.622$ for food inflation and $H = 0.623$ for non-food inflation show that the food and the non-food inflation are persistent or trend-reinforcing processes. They are characterised by long memory and are biased processes and influenced by past events. Their contribution to the persistence ($H = 0.675$) of the overall inflation is the same. The persistency of inflation demonstrates the prospective of timing and forecasting inflation. This phenomenon may also play an important role in measuring Zambia’s inflation expectations. The challenges of accurate prospects of inflation lie in formulating monetary policies that take account of its underlying fractal structure.

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CHAPTER SIX

Local Economic Development Strategies: A Complementary Developmental Approach for Enhanced Economic Growth and Poverty Reduction in Zambia

By

Francis Ziwele Mbao¹

Abstract

The stand taken in this paper is that Local Economic Development can be used as a means for Zambia to successfully implement her Fifth National Development Plan and subsequent ones for Enhanced Economic Growth and Poverty Reduction. Local Economic Development is concerned with wealth creation, job creation and job retention through enterprise development; harnessing various skills and disciplines; and providing economic, financial and physical infrastructure in a given town. Local Economic Development use participatory approaches in its delivery and its focus is the micro level of society. Zambia has developed the Fifth National Development Plan. Its aim is to achieve broad based wealth and job creation under the strategic focus of economic infrastructure and human resources development. This national strategic objective is to be achieved through citizenry participation and technological advancement and thereby contribute to the realization of Zambia's long term vision or developmental objective of becoming a prosperous middle income country by the year 2030. The focus of the Fifth National Development Plan is the macro level of society. Since there are many similarities in approaches between Local Economic Development and what the Fifth National Development Plan wants to achieve, Local Economic Development fits perfectly in Zambia's Fifth National Development Plan and thereby compliment its efforts especially that citizen or stakeholder participation is much more effective at a local (micro)level compared with the national (macro) level.

I Introduction

The position taken in this paper is that Local Economic Development (LED) approach can be a complementary economic development intervention model to the Fifth National Development Plan (FNNDP)² and any future national development plans for enhanced economic growth aimed at realising favourable social conditions in Zambia. The favourable social conditions include wealth and long term job creation and ultimately poverty reduction. This is because LED strategies have an inherent ability to rejuvenate and vitalise a local economy using popular and participatory approaches driven by local leadership in a given local authority's jurisdiction and based on the given local area's opportunities and challenges in the midst of the global economy's dynamics. Local economy in this context refers to the economy of a given township, district, municipality or city. After all it is the collection of local economies that makes up the national economy and therefore growth at a

¹Author is an Economist in the Macroeconomic Analysis Division of the Economics Department at Bank of Zambia

²FNNDP has been officially launched and is now the guiding principle of Zambia's financial planning and developmental activities from 2006 up to 2011.

local economic level feeds into the growth at the domestic level and that poverty at the local level adds to the numbers at the national level.

The basic rationale of LED is to empower the local area with economic capacity. The purpose of this is to improve the local area's future economy and ultimately uplift, on a sustained basis that is, the standard of living of all the inhabitants of that given locality. The LED initiative is a participatory approach to improving a local economy and the targeted areas of intervention in the local economy includes the local economy's competitiveness and sustained local economic growth among others. LED's aim is enterprise development and poverty reduction through pro poor economic growth in a given city.

LED strategies in other words, aim at positioning a local economy to the opportunities and challenges present in the global economy for the purpose of ensuring local economy's job preservation and creation, and poverty reduction. The thinking is that global economic dynamics ultimately affect a given local entity and eventually the town or city in which that entity is located. This is due to the openness of domestic economies and their integration in the global one through regionalism or multilateral trade agreements. LED is an approach that emphasises on strategic economic planning and implementation at the lower tier of government as opposed to central government driven economic planning as the case is with Zambia at the present moment. In fact in many successful LED driven economies, many aspects of the economy with the exception of monetary policy formulation and management are decentralised to the greater extent and does not only include such areas as economic planning but also fiscal management and thereby increase the country's absorptive capacity of the funds it generates and receive abroad through international development assistance etc. LED aims at enabling stakeholders in a given local economy make independent decisions in a participatory manner that are targeted at realising sustainable economic development for their locality and strategically position such a local area within the country as well as in the global context. By sustainable development, this refers to the development that meets the needs of the existing generation without compromising the ability of the future generation to meet its own needs out of the resources the local area is endowed with.

Zambia has FNDP whose aim is to achieve broad based wealth and job creation under the strategic focus of economic infrastructure and human resources development. This national strategic objective is to be achieved through citizenry participation and technological advancement and thereby contribute to the realization of Zambia's long term vision or developmental objective of becoming a prosperous middle income country by the year 2030.

The FNDP was conceptualised on the premise of sustained low economic growth averaging 4.4 percent that Zambia has recorded between 1999 and 2006 given the levels of poverty in the country. The poverty head count level was estimated at 68 percent people living below the national poverty line of earning less than K111,747 per month in the 2004 Living Conditions Monitoring Survey (LCMS) IV of the Central Statistical Office (CSO) 40 years after the country's independence. This economic growth, if no developmental intervention is put in place, has been perceived to be insufficient to rescue many people from the poverty trap since it is only able to marginally reduce the number of people afflicted by the human misery to 62.3 percent of the 2004 figures by 2010.

The poor impact of the sustained positive economic growth Zambia has experienced since 1999 on poverty is attributed to insufficient jobs created during the period of this economic growth. Growth has been mainly driven by mining, wholesale and trade, and construction sectors whose main activities are in the urban setups of Zambia, which account for about 40 percent of Zambia's population. The mining sector is just being recapitalised and only

two mines have been developed since 1999 (with the second mine as a green belt expected to commence its production in the middle of 2008) and therefore only few jobs have been created in the sector. Although the wholesale and trading sector is labour intensive, its labour requirement is comparatively minimal and therefore it has equally not created more jobs given its growth. The construction sector is both capital and labour intensive but the nature of its labour demand is a derived one and is of short term nature. This therefore makes the sector not being in a strategic position to create jobs on a relatively long term basis and impact favourably on poverty reduction on a similar time horizon.

Another factor that has contributed to the poor impact of the recent economic growth on poverty in Zambia is that about 60 percent of the population and accounting for 70 percent of people living in poverty are resident in rural towns and their main source of livelihood is agriculture related activities. The agricultural sector, though being the largest employer, is beset by extreme weather patterns of intermittent moments of drought and flooding- it being predominantly rain fed - and frequent animal disease breakouts that have reduced the stock of animals especially among many peasant farmers. The sector is also inefficient due to the poor state of infrastructure and its delivery in the rural areas of Zambia. These factors have made the sector to have poor returns on labour, capital, and entrepreneurship employed in the agriculture sector and thereby impacting insignificantly on poverty among the farm workers and farm owners particularly the subsistence farmers who make up the majority of producers in rural Zambia.

Complementing the FNDP are the district strategic plans made in respect of each of the 72 districts of Zambia. The district strategic plans benefited from a broad based consultation process but lack a mechanism through which stakeholders at the district can share and balance their interests and expectations in a given district on a continuous basis as the LED based district strategic planning would create.

Given that the FNDP and the district strategic plans are only broad guidelines, the LED initiatives can be used as means of facilitating the implementation of these plans at the local level. In this context, the paper explores the concept of Local Economic Development and its relevance to Zambia in section two with section three presenting information on Local Economic Development Conceptual Framework and Its Implication on Zambia. The conclusion comes up in section four.

II Local Economic Development and Its Relevance to Zambia

The basic rationale of LED is to empower the local area with economic capacity so as to improve its future economy and ultimately uplift, on a sustained basis that is, the standard of living of all the inhabitants of that given locality (Davis, 2006). LED initiative is a participatory approach to improving a local economy and the targeted areas of intervention include increasing local economy's competitiveness and achieve sustained local economic growth as in the context of sustainable development. Participatory economic planning is more sustainable and easier to deliver the outputs needed in poverty reduction since it enjoys the support of the various stakeholders.

LED is based on the thinking that private sector enterprises are necessary in poverty reduction aspects since they provide employment and bear the burden of economic growth. However, private sector enterprises are regarded to be able to contribute to sustainable poverty reduction if they allow an increasing part of the poor population in a given local area actively participate in such private enterprises under acceptable working conditions commonly referred to as decent work. LED's aim is enterprise development and poverty

reduction through pro poor economic growth in a given city. This is achieved by first promoting or providing the necessary infrastructure and other aspects that will induce a proliferation of enterprises that create jobs for the given city's dwellers. Pro poor economic growth in this context refers to the economic growth that is realised by engaging labour under the context of decent work.

Besides being a participatory approach, LED is a multi-discipline and its intervention encompasses such a range of disciplines that include physical, urban and regional planning; economics; business administration; sociology; engineering; project planning and monitoring and evaluation, and other developmental disciplines. In fact project management is a very critical discipline in delivering success under LED interventions.

Major stakeholders in LED initiatives are the respective local authorities and all of the private sector, civil societies, non-governmental organisations and local communities in a given local jurisdiction. LED offers the local authorities, private and not-for-profit sectors, and the local communities to plan and implement together initiatives that are aimed at making the local economy become prosperous to the benefit of the people in that given locality.

There is no perfectly common or precise practice in a way local areas respond to the LED issues. This is because each local area is unique in respect of opportunities and challenges as well as resource endowment. However, the issues that may be universal in terms of LED practices from the strategic and methodological approach include:

- a) Diversification of the local economy from its current major economic activity to other activities such that if the current economic activity was to be created or expanded during the diversification undertaking in a given city will still make the city continue to thrive and thereby preserve the jobs and incomes and other means of livelihood among the town's dwellers;
- b) The need to ensure that the economic environment obtaining in the given local area is conducive for investment by both locals and those from outside the local area. The economic environment should be a market oriented one because market orientation ensures sustainability of businesses. Local investors in this context refers only to those investors that are within the same town the LED intervention is being practiced. The investors from outside the town were the particular LED intervention is being practiced could be those within the country and those from the international community.

In this regard, the local investment climate should facilitate and promote the formation of new enterprises and it should equally support small and medium enterprises already existing in the local area with a view of seeing them expand into bigger ones within a prescribed or identified time range.

The attraction of investment from both nationally and internationally is particularly focused on infrastructure development, which is one area that requires high finance which the local area is likely to be missing. Physical infrastructure intervention is critical in leveraging economically depressed towns such as those that require LED initiatives.

For a local authority to facilitate LED initiatives, and realise an economic environment in its local jurisdiction that is supportive of successful LED intervention, it needs to engage in serious economic planning. In this vein, decentralised economic planning is one of the major primary factors to creating prosperous cities. Local entrepreneurs and other stakeholders through their

respective local authorities will determine the kind of industries as well as the kind of jobs they will need to create in their city/town that will cause sustained local economic growth and have a favourable impact on poverty alleviation given the opportunities and constraints associated with such a local economy;

- c) The local authority in a particular jurisdiction and in collaboration with relevant central government institutions or agencies should invest in what is now called soft infrastructure. This includes skills development, education, institutional support systems and business regulatory issues. The investment in the soft infrastructure should aim at making local businesses competitive and thereby sustain or increase the jobs as they capture market shares in other towns or countries. The skills development should be focused on equipping the workforce in a local area so that it responds to the opportunities and challenges business houses in that local area face. The educational investment is meant to create a pool of future workforce to sustain business inventions and operations in that local economy; and
- d) Deliberately supporting targeted areas and groups for regeneration and growth. In terms of areas, this looks at brown fields and the purpose is to restore them and be environmentally conducive and productive. In terms of groups, this looks at people who are disadvantaged such as the blind etc. and aims at empowering them with a view of reducing human misery in their midst.

The concept of LED is concerned with wealth creation, job creation and job retention through enterprise development; harnessing various skills and disciplines; and providing economic, financial and physical infrastructure in a given town. This makes LED to fit perfectly in Zambia's FNDP and makes our suggestion appealing and valid in terms of Zambia implementing the FNDP through the LED mechanism. For LED to be successfully implemented, there is need to bridge the skills gap identified in a given town by developing the human resource the town is endowed with besides delivering the necessary infrastructure. LED is implemented using project planning, management and monitoring and evaluation approaches and it has been widely used in economies such as those of the United States of America, Australia, Eastern Europe, Brazil and South Africa, among others.

The relevance of LED to Zambia is justified by a number of factors. First, there is little participation in economic planning by our local authorities and this is due to central Government dominance on economic planning and its management. The local government involvement in economic management is mainly restricted to issuance of permits (such as business, manufacturing, trading etc) and most of them are for the respective local authorities' revenue generation and not to strategically alter the economic situation of their respective jurisdictions. Permits to start up a business operation, for instance, are a preserve of the central government and include such as company registration (through an executive agency: Patents and Companies Registration Office), investment licenses (through another executive agency: Zambia Development Agency), mining rights, hotel and tourism licenses etc. Lack of local government participation in economic planning is one of the risks that may hinder the successful implementation of the FNDP and realising some of the millennium development goals.

Second, the low impact economic growth has had on poverty reduction requires an alternative approach to economic development that should have a wider participation at a local level and in turn have a direct impact on local poverty reduction. Resources needed to accelerate economic growth are at local levels and each local area is unique from others in many respects such as resource endowment and levels of poverty. Though from the fractal perspective, Zambia's poverty and natural resource distribution may look similar to a larger

extent, the details of resource and poverty levels in the context of exploitation and reduction, respectively, may not be the same across the districts due to factors such as competitiveness (arising from skill endowment, infrastructure development etc.) and social-cultural factors (such as land rights, level of organisation and awareness by the civil societies operating in respective localities).

Third, as part of Government's continued structural reforms, a decentralisation programme³ is being implemented in which case local authorities are to play a key role in service delivery at a local level on behalf of the central government. This is an opportunity for central government to devolve economic planning to the lower tier of government and thereby ensure that people at the local level participate in determining the economic destiny of their respective localities. The role of central government in economic planning and management should be concentrated in the area of monetary, financial system, international trade, international debt issues and management and some areas of fiscal policy.

Fourth, the enactment of the Citizens' Economic Empowerment Act also makes the case of LED initiative in Zambia relevant. Through the Citizens' Economic Empowerment Act, the Government wants to make as many Zambians as possible participate in the management of economic activities through the corporate ownership route. This is to be done by way of offering concessional finance, supplying opportunities for goods and services to government departments, and other measures aimed at making Zambian owned companies grow and play a significant role in economic growth and poverty reduction. LED can be a natural vehicle through which the Citizen Economic Empowerment Commission can scale up its interventions and realise its objectives because LED will provide the framework and structures at a local level to successfully implement deliver on the commission's mandate.

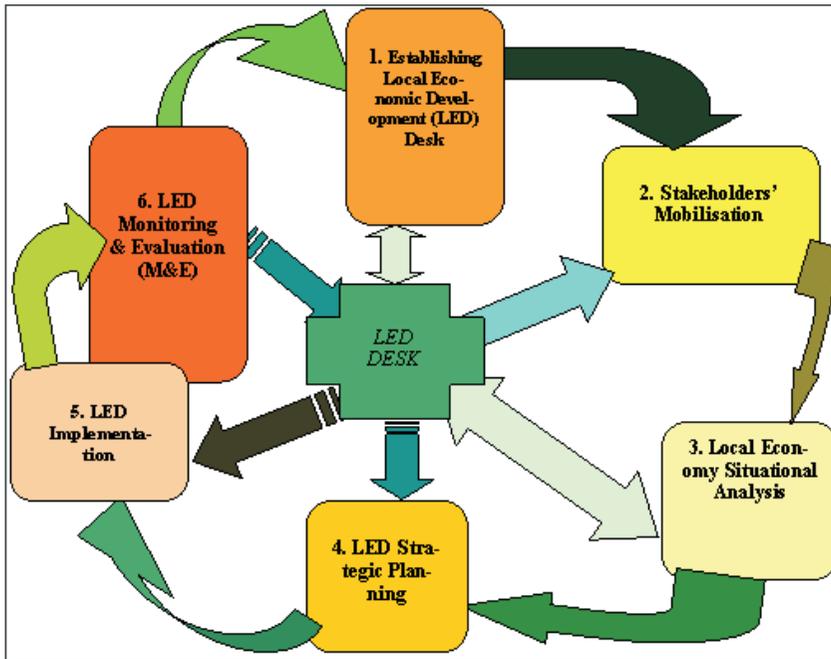
There are isolated cases of LED being undertaken in Zambia such as the one Konkola Copper Mines has facilitated in areas of its operations among its local suppliers and its former employees. The Germany Development Agency-GTZ- has also initiated some LED activities in the Southern Province of Zambia. However, there is need to mainstream LED intervention country wide through the local authorities. This requires some legislation to be passed and make LED a mandate for each local authority if various developmental initiatives Zambia has been and intends to undertake will benefit many citizens.

III The Local Economic Development Conceptual Framework and Its Implication to Zambia

The LED process is part of the broader strategic planning for a given sub-national region, city, Peri-urban, or rural town. Its primary objective is to ensure that priority areas of a given locality are addressed and that its scarce resources are applied accordingly. Generically, the LED planning, management, and monitoring and evaluation effort should involve establishing a LED desk within the local authority of a given district, municipality or city; mobilizing stakeholders in a given locality; undertaking an economic situational analysis of the given area; developing the LED strategic framework of the concerned area; implementing the LED strategies; and monitor and evaluate the LED efforts. The model below - a generic one - depicts the LED planning, management, and monitoring & evaluation process as outlined above. It is generic in the sense that it only describes the major steps that needs to be undertaken subject to the uniqueness of each area of intervention.

³The type of decentralisation adopted in Zambia is in form of devolution of power for selected activities of central government

Figure 1: Local Economic Development Process Generic Model



The model above shows that a LED effort starts with the establishment of the *LED Desk* in the given local authority structures and it is to act as the secretariat of LED intervention programmes and projects in the locality. Its strategic role is to coordinate LED activities in the town of interest and that is the reason why the desk is placed in the middle of the model. In the Zambian context, the desk may be in the planning department of the councils or in the office of the town clerk/council secretary. The former is suggested by virtue of its function in the given local authority and the latter is suggested purely on the basis of strategic purpose especially for networking with stakeholders particularly outside the concerned town/city. As LED activities are scaled up, there may be great need for LED to be a department on its own within the councils.

The second activity is the *Local Economy Stakeholders' Mobilisation* in the cycle of the entire LED process. This activity can be repeated even when the process has reached the second, third, fourth stages, etc and in this case it becomes the starting point of the process as indicated by the arrows leading to its box from the center. For example, it may be discovered at the *Local Economy Situational Analysis* that some stakeholders have been left out in the LED programme based on the information presented on the condition of the local economy. Alternatively, it may otherwise be that at the strategic planning stage, the information being generated and presented shows some missing links concerning the local economy and discover that certain section(s)/grouping(s) or individual(s) are missing to clarify or enrich the information profile about a local economy for its strategic success. At that point, new members are added to the list of stakeholders and thereby enhance the possibilities of the LED initiative deliver on its objectives.

The model also shows that the third stage in the process is the *Local Economy Situational Analysis*. The local economy situational analysis can also be readjusted based on the feedback from the *LED Monitoring and Evaluation (M&E)* efforts as shown by the arrows and this implies that the stage that follows next may also need some adjustments based on the

changes made in the local economy situational analysis as prompted by the M&E feedback.

The model equally suggests that the fourth activity in the LED process is the *LED Strategic Planning* undertaking to come up with the local economy strategic framework with its accompanied M&E system. This activity relies on the information from the local economy situational analysis and can also be influenced by the feedback from the M&E activities (that is, reprogramming the strategic framework).

Further, the model postulates that the fifth stage is the *LED Implementation or Management*. LED implementation or management is done along side the *LED Monitoring & Evaluation*, the sixth activity, and that is why in the model above the two activities are combined. The M&E efforts influence the implementation process greatly and also can influence the stakeholder mobilisation especially at the beginning of the subsequent LED cycles, that during the post first LED cycle of the given town.

Though LED may be initiated by one or a group of organisations including corporate entities (through their corporate social responsibility initiatives); international developmental agencies; local and or international civil societies; or the central government, its starting point should involve appointing one who should take responsibility for coordinating LED activities. Successful LED activities in many countries where it is being practiced suggest that the local government is best suited for this responsibility (World Bank, 2005). The reason is that the local authorities are the focal points of development at the district/town/city level in functional or non-failed states.

The LED desk should be comprised of people with skills in strategic planning, strategic management, and strategy performance measurement; Economics; entrepreneurship management; engineering; and project/programme planning, management, and monitoring and evaluation.

The implication of this is that the LED desk should be the interface of physical and social-economic planning at the district level. This therefore means that local authorities in Zambia should have full fledged units (economics unit) responsible for generating policy relevant information through social-economic research into issues of the local economy with regard to competitiveness, performance, etc. The research information so generated should influence physical and economic planning in a dependent manner especially that physical and economic planning reinforce each other. When physical planning is divorced from economic planning (or otherwise) there is uncoordinated development and this slows down economic development of a given area and consequently high poverty is sustained. For example, the allocation of land to investors by traditional rulers which is not premised on synchronised economic and physical planning is a recipe for sustained high poverty among the rural people of Zambia. The land being allocated is for economic activities such as tourism and or farming but there is no regard to where, for instance schools and other social amenities should be placed for the people who are supposed to be working on those farms and their families. This may ultimately make it difficult for the people in those areas to access education within their proximity. The likely result will be that a good number of people will still not benefit from the spill over effects of economic development in those rural areas.

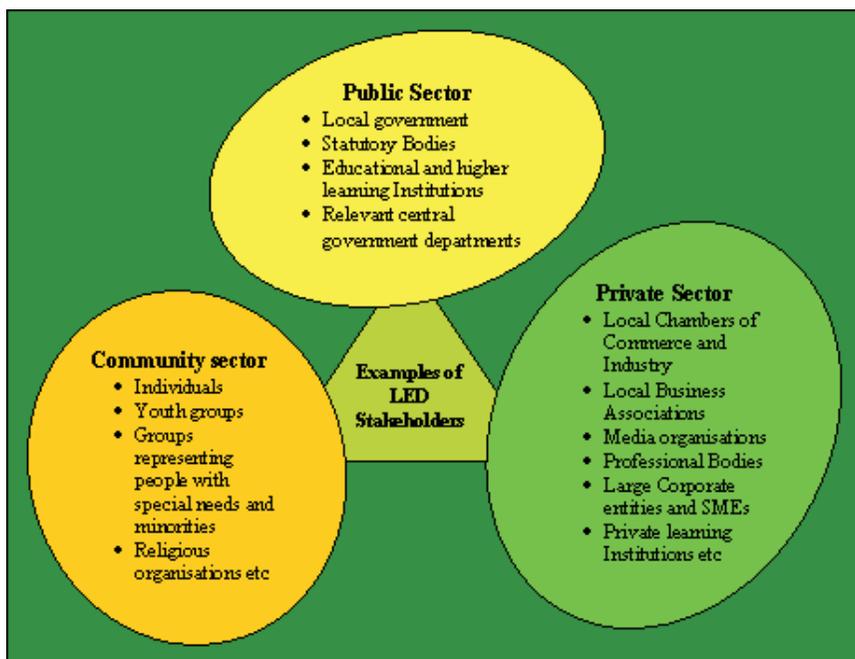
Stakeholders are very critical in the LED. Stakeholders in this context refers to a group of individuals and organisations (in the non-profit, private and public sectors) that have passion and the capacity to start and successfully implement LED programmes and projects in a given locality over a period of time. Stakeholder participation promotes participatory approaches to economic planning.

There are benefits to participatory economic planning especially at the local level and include sharing of diverse and expert experiences on the workings of the local economy. For example, local business women and men will give a better account of the competitiveness of the local business whilst community based organisations will be able to give a better account of the social challenges members of a given town are facing that can be solved or have their negative impacts minimised by LED strategies. Stakeholders also bring with them specialist knowledge and different perspectives. This makes the planning and implementation process exhaustive and easier, respectively.

The other benefit is community-wide support which LED projects are likely to receive since everyone will be identified with such. This may add legitimacy to the process and ensure sustainability.

Local economy stakeholders' mobilisation starts with stakeholder identification and mapping. Examples of stakeholders include those summarised in Figure 2, though it has not given an exhaustive list.

Figure 2: Example of LED Stakeholders



LED initiative creates an opportunity for various interest groups, as indicated in Figure 2 above, and prominent individuals in a given town to have a forum through which their various expectations and interests are balanced and harmonised for the purpose of making the concerned city prosperous. The fact that the economic planning of a given town is truly participatory makes it possible for the majority members in that given city, regardless of their social, political and economic status to participate in the shaping of the social-economic landscape and exploiting the resulting fortunes of their city.

Currently in Zambia, many cities/towns do not have a forum where various interest groups

meet regularly to discuss and strategise how the opportunities as well as the challenges facing their cities/towns can be managed for the betterment of the lives of the inhabitants. This is one of the reasons why there is conflict among state and non-state actors on matters that are of developmental nature. It is common for instance to see one or few interest groups mobilising the masses to oppose a certain developmental project in a given town despite environmental and social impact assessments clearly outlining how such environmental and social concerns will have their perceived negative impacts mitigated in the concerned place.

An LED initiative can create an opportunity for various stakeholders deal with various conflicts of interest among them that are related to the prosperity of a given city/town and its inhabitants. Particularly for Zambia, this will create a forum through which various stakeholders in a given locality will meet and balance their expectations on the prosperity of their local economies and social conditions, something that does not exist at the moment. Different interest groups have different fora where they meet and discuss issues affecting the local economy purely from their own positions of interest, which unfortunately is disjointed and may be in conflict with others and not holistic. This makes one not to really understand the various social economic linkages associated with the economic declines as well as the sustenance of high poverty levels in such localities and how such conflicts of interest perpetuate the problems.

Wider stakeholder participation is equally vital for a successful local economy situational analysis. The starting point in local economy situational analysis is to identify those factors that hinder retention and expansion of business in a given city and this is were experiences of various people matters. Each local economy has a number of factors that can either hinder or propel it and therefore in undertaking the situational analysis, the current state of the local economy should be highlighted in a manner that clearly shows the cause-effect relationship of the state of such a local economy.

IV Conclusion

The concept of LED is concerned with wealth creation, and job creation and retention through enterprise development; harnessing various skills and disciplines; and providing economic, financial and physical infrastructure in a given town. LED is premised on participatory approaches and its focus is at a micro level of society and its delivery is through the local government.

Zambia has developed the Fifth national Development Plan (FNDP). Its aim is to achieve broad based wealth and job creation under the strategic focus of economic infrastructure and human resources development. This national strategic objective is to be achieved through citizenry participation and technological advancement and thereby contribute to the realisation of Zambia's long term vision or developmental objective of becoming a prosperous middle income country by the year 2030. The focus of the FNDP is also micro but its delivery is through the macro level, the central Government.

Since there are similarities in approaches between LED and what the FNDP, wants to achieve, this makes LED to fit perfectly in Zambia's FNDP and further makes our suggestion appealing and valid in terms of Zambia implementing the FNDP through the LED mechanism especially that citizenry or stakeholder participation .is very effective at a local (micro) level compared with the national (macro) level. Besides, other factors such as little participation in economic planning by our local authorities due to central government dominance on economic planning and its management makes LED even more relevant for

making Zambia realise its vision of becoming a middle income country. There are also other factors supporting the relevance of LED in being mainstreamed as a model to realising the virtues of the FNNDP and other future national developmental plans, which include:

- i) The low impact economic growth has had on poverty reduction, which requires an alternative approach to economic development that should embrace wider participation at a local level and in turn have a direct impact on local poverty reduction; decentralisation programme is being implemented, which is an opportunity for central government to devolve economic planning to the lower tier of government and thereby ensure that people at the local level participate in determining the economic destiny of their respective localities; and
- ii) The enactment of the Citizens' Economic Empowerment Act makes the case of LED initiative in Zambia relevant since it aims at making many Zambians participate in economic activities. LED will provide a framework for the effective implementation of the Citizens' Economic Empowerment Act activities.

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CHAPTER SEVEN

The Impact of Mining on Sustainable Development in Zambia

By

Denny Dumbwizi¹

Abstract

This paper attempts to determine whether the Mining Industry in Zambia has a positive impact on sustainable development. In particular, the paper assesses whether the economic policies on mining adopted over the years have had a positive or negative impact on the local livelihood of people through economic growth and the environment and its biodiversity. It is noted that mining has a positive impact on economic growth in Zambia albeit a modest one. The main driver of growth in Zambia is the Manufacturing sector and the Agriculture sector. It is also noted that mining has had a negative effect on the environment and its biodiversity and thus contributing negatively to local livelihood.

I Introduction

Zambia is largely a mining country with its territory possessing significant deposits of copper, cobalt, emeralds, coal, amethyst, lead and zinc. Smaller quantities of gold, diamonds and other gemstones are also present. Recently, preliminary explorations have indicated the existence of natural gas ([Times of Zambia 23 October 2006](#)). The industry has historically been a pillar of Zambia's economy and continues to be a priority today. It is also the country's largest foreign exchange earner, contributing more 65% of the total foreign exchange earnings. However, despite the rich endowment of natural resources, Zambia is considered one of the poorest highly indebted countries of the world.

While many empirical studies ([John Kangwa 2001](#), [Joseph Stigliz 2005](#), and [Laura Skaer 2002](#)) have been conducted on the impact of mining on sustainable development, extensive research carried out on the impact of mining on the local livelihood of the people and its impact on the environment and biodiversity is scant. To the best of information available, none has incorporated macroeconomic trends like economic growth, and the impact of mining on the environment and biodiversity in Zambia.

Mining in Zambia started in the early colonial days under the British colonial government. After attaining Independence in 1964, the new government of Zambia adopted the Import substitution Industrialisation policies. This entailed that most industries were, nationalised and protected, from foreign competition. In the mining sector, the Government took over mineral rights and acquired majority shareholding in the major mining companies. The nationalised mining companies were then merged to form the Zambia Consolidated Copper Mines (ZCCM).

¹The Author is an Inspector in the Bank Supervision Department of the Bank of Zambia. The Author thanks Balakrishna Pisupati and Kalliapa Kallirajan for valuable comments and guidance.

The Government through ZCCM enjoyed massive economic success, as Zambia was one of the largest producers of Copper on the world market in the decade following independence. This enabled the Government to engage in infrastructure development not only on the Copperbelt Province, but all over the country. ZCCM employed about 35% of the country's total labour force and was heavily involved in providing social amenities to the communities through education, health and sports. The company also provided subsidised goods like food and free services like electricity, water and garbage collection among other things.

However, the 1973 oil shock saw copper prices plummeting and thus the revenue from copper declined significantly. This caused an adverse balance of payments and cash flow implications for Government and the economy at large, as copper provided about 90% of the total foreign exchange earnings and more than 50% in Government revenue. This caused the government to seek financial support from International Monetary Fund (IMF) and World Bank on the premise that copper prices would return to its previous high levels shortly. However, the second oil shock of 1979 worsened the situation as copper prices fell to even lower levels. The mining operations, thus, made huge losses and this had an adverse effect on the reinvestment capabilities and working capital financing of ZCCM resulting in low production.

The late 1980s to early 1990s saw the emergence of a new paradigm so called "Washington Consensus" and its liberalization policies. In 1991, with the coming to power of a new government, the country under the guidance of IMF and World Bank adopted the Structural Adjustment Programme (SAP) with the privatisation of the mines high on the priority list. Many Government run public enterprises institutions including ZCCM were unbundled and several parts sold off to foreign investors. The final transfer of ZCCM was concluded on 31 March 2000. The Government privatised many state industries, and maintained positive real interest rates. Exchange controls were eliminated and free market principles endorsed. These measures enabled the country to obtain balance of payments support from the IMF and the World Bank. The privatisation process was followed by high job losses for most Zambians who were employed by government parastatal companies. Miners were particularly hard hit as they could not relocate to other sectors of the economy due to their specialised skills applicable only in mining. Community services, infrastructure development and maintenance and subsidised goods to mining towns ceased compounding the hardships faced by miners.

In 2000, after it was evident that the SAP had failed to foster economic growth in most developing countries including Zambia, the IMF and World Bank introduced a new paradigm "Post Washington Consensus" with emphasis on poverty reduction rather than economic growth through liberalisation as advanced by the Washington consensus. This period also saw a reverse in the commodity market due to increasing demand for commodities metals in fast growing economies like China and India. This has also coincided with an upturn in the mineral production in the country. The volume of copper exports has in recent year's registered sustained growth, increasing from 201,000 metric tons in 2000 to 423,000 metric tons in 2005. The price of copper rose to US \$4,572.0 per metric ton in December 2005 from US \$3,134.79 per metric ton in December 2004. The price of copper has since increased sharply and by May 2006, it had risen to over US \$8,000 per metric ton. Consequently, Zambia's economy has recorded high growth over the last 5 years with Gross Domestic Product (GDP) growth averaging 4.8% per annum.

Mining is by nature a highly disruptive activity. It requires large tracts of land and consumes significant quantities of water. The modern mining techniques prefer open pit mining, which requires a destruction of any vegetation covering and leaves a long-term damage to the physical structure of the land. The mining sector in Zambia is composed of both large

scale and small-scale mining. Due to the large production scale in the big mines on the Copperbelt, large quantities of wastes are produced. One of the most important issues is to manage these wastes to minimise the long-term environmental effects and maximize any long-term benefits. These wastes have a profound effect on the surrounding ecosystem. Erosion of these wastes where they are not physically stable can cause severe long term impact on the environment. Coupled with this, if they are not chemically stable, they can be a permanent source of pollution to the natural water system. This results in alterations in quality, quantity and availability of surface water or ground water. Salination and heavy metal contamination is also common. These impacts can have lasting environmental and socio-economic consequences and can be extremely difficult and costly to address through remedial measures.

Despite the successes scored in the mining industry in the recent past, a majority of Zambians continued to wallow in extreme poverty. As at December 2005 about 67% of the population was said to be living on less than \$1 a day (*Central Statistical Office*). Unemployment has soared to higher levels and was about 50% as at 2005 (*Central Statistical Office*). The economic reforms experienced in the mining sector meant that more than 8,000 miners lost their jobs. It is estimated that these supported at least five other family members. Most of these redundant miners and their households resorted to small-scale farming, small scale mining and charcoal burning for their livelihoods putting more pressure on the forestlands of the Copperbelt. The miners also depended heavily on ZCCM for the provision of social amenities such as health, education and sanitation. As these can no longer be offered, it has become difficult for most of the former miners to meet their basic needs. Furthermore, it has been noted that the economic policies of privatisation has increased foreign direct investment in mining thus leading to a rise in metal production. However, this higher production may come at a heavy cost of environmental degradation and a depletion of biodiversity. This puts the country in a very bad position to attain the Millennium Development Goals by the targeted 2015.

This paper will thus attempt to determine whether the Mining Industry in Zambia has a positive impact on sustainable development and environmental management. In particular, the paper will assess whether the economic policies on mining adopted over the years have had a positive or negative impact on the local livelihood of people through economic growth, poverty reduction and the environment and its biodiversity. This entails assessing the impact of mining in meeting the needs of the present without compromising the ability of future generations to meet their own needs. The findings are expected to have clear policy implications on economic growth and the Millennium Development Goals of the country.

II Literature Review

Economic literature suggests that while the endowment of natural resources is a large asset for economic development, it sometimes harbours a pitfall leading to economic retardation. This phenomenon called “Dutch Disease” is premised on the fact that when there is a resource boom, there is trade surplus, which ultimately leads to a real appreciation of the local currency. The appreciation of the currency undermines the international competitiveness of the other sectors of the economy like agriculture and industry, therefore leading to unemployment. The danger for resource rich countries is that resource export booms vastly increase export prices and earnings but are also abrupt and short-lived (Hayami and Godo, 2005).

The Mining Minerals and Sustainable Development (MMSD), a project of the International Institute for Environment and Development, carried out a number of case studies on the

impact of economic policies in terms of the expected welfare or social gains to specific groups of people. In particular, one such case is “MMSD Breaking New Ground” which observes that over the past decade more than 100 countries have introduced new regulatory regimes which seeks to promote Foreign Direct Investment (FDI). FDI in mining has been growing at a respectable pace in recent years. This has led to concerns that countries are competing with each other on the race to the bottom jeopardising the prospects of sustainable development. In a paper captioned “Making Natural Resources into a Blessing rather than a Curse”, Stiglitz, J.E. (2005) questions the speed of extraction of minerals in resource rich countries. Resources not extracted today are still around tomorrow as they do not disappear. It may not be reasonable to extract minerals at a high rate if a country is unable to benefit from the resources. In this, case it may be more prudent to leave the resources in the ground, increasing in value as resources become scarcer and prices increase.

Furthermore, Alfaro, L (2003) in her paper titled “Foreign Direct Investment and Growth: Does the Sector Matter?” conducted an empirical analysis using cross-country data for the period 1981-1999 for many developing countries. Her findings suggest that FDI in the primary or extractive sector tend to have a negative effect on economic growth. In Zambia, most FDI is in the extractive sector and it is not clear whether the industry contributes significantly to economic growth. In fact, in a paper called “Can the HIPC Initiative Boost Economic Growth - the case for Zambia” this author found that FDI has a negative relationship with economic growth in Zambia (Dumbwizi, D., 2006).

In his case study of 2001, John Kangwa assessed the impact of privatization on the social welfare in Zambia. He concluded that there had been a reduction in the flow of mineral rents after privatisation of ZCCM. The new mine owners' negotiated for maximum concessions from Government as the copper prices were low at the time and government was in a hurry to dispose off the loss making mines. Further, the government was pushed to sell at low prices and rents by IMF, World Bank and donor countries as part of the SAP. Most mining companies thus obtained excessive concessions in terms of taxation, royalty payments and repatriation of profits and ensured that liabilities were shouldered by government. Import duty on mining equipment and consumables were also waived for the initial five years. Further, profits from these mining houses are repatriated and thus it is not clear whether these mining operations contribute significantly to economic growth in Zambia. This paper therefore, tests the hypothesis: *Mining has a negative impact on economic growth in Zambia.*

Diversity of species is a key characteristic of natural ecosystems. These ecosystems, in turn, form the basis of all ecosystem goods and services upon which sustainable livelihoods and food security depend. Historically, the mining sector has not recognized this, and mining activities have often resulted in destruction of or radical alterations to, whole ecosystems. In such cases, full recovery of these ecosystems and their components may take many years, possibly even millennia (Cooke, 1999). Consequently, the impacts on the biophysical environment caused by the mining and minerals processing industry have frequently been accompanied by a significant loss of biodiversity. Generally, biodiversity is more affected by mining in instances when mining projects are located in remote areas that were previously undisturbed. Construction of access roads for exploration purposes also entails great risks to biodiversity as the raised expectations of potential large scale benefits often trigger rapid in migration. Alien pests and diseases can also be brought by settlers who usually also clear vast lands for farming to supplement their income.

Standard international practice requires mining projects to carry out an Environmental Impact Assessment (EIA). This is a process of evaluating the likely environmental impacts of a proposed project or development taking into account inter-related socio-economic,

cultural and human health impacts, both beneficial and adverse. The effective participation of stakeholders like indigenous and local communities is a pre-condition for a successful EIA (Convention on Biological Diversity, 2006). Strategic Environmental Assessment (SEA) is also now widely applied and integrated in national procedures for environmental assessment. SEA is defined as tools that identifies and addresses the environmental consequences and stakeholder concerns in the development of policies, plans and programmes and other high level initiatives. SEA involves structuring public and government debate in the preparation of policies, plans and programmes, assess environmental consequences and their interrelationship with social and economic aspects and ensuring that the results and debate are taken into consideration when formulating decisions and implementing them.

Most national authorities, regional authorities or international agencies have legislation and guidelines on environmental protection and conservation which takes into account EIA and SEA. However, most legislation and procedures on EIA as well as SEA processes do not take into account biodiversity related issues. The United Nations Environmental Programme (UNEP), the International Association for Impact Assessment (IAIA) and the Convention on Biological Diversity have in the recent past been advocating for biodiversity related issues to be incorporated in EIA and SEA. To this end, draft guidance on biodiversity-inclusive strategic environmental assessment was issued in 2006. The guidance intends to facilitate the ability to contribute to Goal 7 of the MDGs, i.e. to “ensure environmental sustainability” and target 9 to “integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources”.

It is imperative for countries to incorporate biodiversity related issues in environmental assessments in order to give a legal protection to ecosystems, habitats, and species which may be endangered. Valued ecosystems like fisheries, forestry activities, recreational areas and game or landscape parks may also be subject to legal regulations and thus the need for environment assessment. These may also be used by indigenous and local communities. International treaties like the World Heritage Convention also mean that countries are party to agreements and are obliged to manage certain areas in conformity with international principles.

By identifying the stakeholders who benefit from ecosystem activities, highlight the needs of the impact of a project on the livelihood of the people who depend on biodiversity. More often than not, these may be the poor and less literate people of the society, thus integrating biodiversity in environment assessment takes the interests of such people into consideration. Biodiversity should be conserved for future generations' sustainability; even though people may attach little value to biodiversity today, it may be worth more to the future generations. It is thus imperative to put in place legal procedures and processes to protect it.

Mining processes themselves also have serious implications. Clearing vegetation, shifting large quantities of soil, extracting large volumes of water, and disposing of waste on land or through water systems often lead to soil erosion and sedimentation and the alteration of the flow of watercourses. This can change the spawning grounds of fish and the habitats of bottom-dwelling creatures. Acid drainage may be the most widespread negative impact on aquatic species. Such effects can instigate extinctions, or they can restrict access to species that local communities depend on, such as snails, mushrooms, medicinal plants, and so on. Local extinctions can be caused by any sectoral activity, but there is one group of plants that is likely to go extinct because of mining activity alone. These plants, metallophytes, which grow in areas where soils are heavily loaded with metals, and are often of very restricted distribution. They often grow on or very near mining deposits, hence mining activities can

easily obliterate them, resulting in the loss of a potentially valuable resource (MMSD chpt 10). According to the Environment Protection Agency of Australia, mining activity may lead to displacement of fauna, loss of ecology, and loss of biodiversity by impacts on endangered or rare flora or fauna and may create new habitats. There is also a danger of spreading plant disease and noxious weeds.

Furthermore, the rock wastes or tailings left after ore extraction and processing contain heavy metals, acid forming minerals and residue from toxic chemicals used in the extraction process. Containing these tailings is technically difficult and the contamination of water, soil and air is often associated with these tailing dams (Christian Aid, 2005).

In Zambia, small-scale mining has been on the rising trend. Usually this is conducted illegally and pose health and safety hazards as they are not monitored. Most of the miners are not accountable for compliance with environmental legislation. This often results in the transfer of materials from the bottom to the surface. Removal of rock and subsurface water frequently, result in surface subsidence and collapse. Frequently no geological assessments of deposits are carried out.

In its volume 1 Report of the Regional Process, (*Earthscan Publication Ltd 2001*) the MMSD notes that by the end of 2000, mine residue deposits on the Copperbelt province of Zambia covered more than 8,000 ha, mine excavations extended over more than 900 hectares while the area covered by natural woodland had almost halved in the thirty years since 1970. *Booth et al (1994)* also notes that in Zambia, the natural vegetation downwind of the now closed Kabwe mine lead/zinc smelter has been damaged extensively by air pollution. Actually this site was voted by the Blacksmith Technical Advisory Board in the top ten worst polluted areas of the world in 2006. Some of the lead concentrations in soil have been recorded at 2400 mg/kg. In one study, the dispersal in soils of lead, cadmium, copper, and zinc extended to over a 20 km circumference from the smelting and mining processes (<http://www.blacksmithinstitute.org>). The soil contamination levels of all four metals are higher than those recommended by the World Health Organization. Copper smelters in the Copperbelt Province emit more than 200,000 tonnes of sulphur dioxide and hundreds of tonnes of dust containing trace metals like lead, zinc and copper annually. It has also been noted that an unusual number of Zambian children suffer from lung diseases largely due to air pollution from the copper smelters. Coupled with this, the pollution in the atmosphere is removed from the air by rainfall and through dry deposition results in soil contamination. Consequently, concentrations of many contaminants build up in the soils near smelters and find their way into food crops in nearby agricultural areas.

IV Analytical Framework

To investigate whether Mining has a positive or negative impact on economic growth in Zambia (Hypothesis 1), the study will use data from 1970-2004 to carry out a time series growth model that estimates growth in real per capita GDP with the level of mining value addition. The other variables include agriculture value addition that measures the value of agricultural products produced by the country. It is worth mentioning here that Zambia is mainly agrarian with agriculture contributing about 23% to GDP and accounting for about 65% of the total labour force. Furthermore, the labour force will be used to capture the levels of employment against economic growth. The Official Development Assistance (ODA) variable gives an indication of the levels of aid the country has had, and whether this has had, any impact on economic growth. Manufacturing value addition will also be used to capture the contribution of the manufacturing sector to economic growth. The mining interactive year dummy reflects the contribution of mining to GDP per capita before and

after privatisation of ZCCM with 2000 being the year after the complete sale of mine assets the cut off. This variable will capture the effects of the policy changes of privatisation to economic growth. The log functional form regression will be used to reduce the absolute size of numbers for all the variables. Using Ordinary Least Squares, the following regression model will be used to estimate the contribution of the respective variables including mining to real GDP per capita:

$$\ln y_t = \alpha_0 + \ln aid_t + \ln \beta_2 Mine_t + \ln \beta_3 agri_t + \ln \beta_4 man_t + \ln \beta_5 lab_t + \beta_6 yd min e_t + \varepsilon_t,$$

Where,

- y is the real GDP per capita growth rate,
- $\beta_1 aid$ is the external assistance as ODA,
- $\beta_2 Mine$, is the mining value addition,
- $\beta_3 Agri$, is the value of agriculture produce in the country,
- $\beta_4 Man$, manufacturing value addition,
- $\beta_5 lab$ is the labour force,
- $\beta_6 Yd min e$ is the interaction dummy of mining value addition and year it takes a value of 1 it period after 2000 and 0 otherwise.
- ε_t Is the error term.

V EMPIRICAL ANALYSIS

Data

Time series annual data on Zambia from 1970 to 2004 have been used. The World Development Indicators 2006 and the World Bank Africa Database 2006 were the main sources of data. Other sources include the Bank of Zambia and the Ministry of Finance and National Planning.

Limitations

Despite the positive economic growth posted in the recent years, the majority of the population in Zambia continues to live below the poverty line. It is estimated that more than 67% of the population lived on one dollar a day as at 2005. It is expected that mining activities should contribute positively to poverty alleviation through provision of employment, infrastructure and other social investments especially in the mining communities. Due to lack of sufficient poverty data, the study is unable to determine the actual impact of mining on poverty.

Estimation

By its nature, time series data always tend to be non-stationary meaning that the variables show some trend over time. This may lead to spurious results and any empirical analysis based on these results may not be meaningful. To avoid this problem, the study follows the following steps when estimating the model:

- Test for stationarity
- Estimate the long run model
- Find the error term in the long run
- Test the stationarity of the error term
- Check for cointegration
- Should the series be cointegrated, run the short run model; otherwise run the long run model.

We therefore tested all variables for stationarity using the Augmented Dickey-Fuller (ADF) test. The null hypothesis for the test was thus:

H₀: There is unit root in the variables (i.e., the variables are non-stationary)

The idea is that if the absolute value of the t-statistic of the variable from the ADF test is higher than the absolute value of the critical value, then the null hypothesis is rejected on the basis that there is no unit root or the variable is stationary. The opposite is true if there is non-stationarity.

It was observed from the ADF test that all variables had a unit root in levels. This meant that all variables were non - stationary in levels. However, all variables became stationary after taking the first difference except labour force which only became stationary after taking the second difference. The labour variable would have lost its explanatory meaning after taking the second difference. Furthermore, after running the regression, it was observed that the labour variable was not statistically significant. As labour is almost certainly captured by other variables like agriculture value addition, manufacturing value addition and to some extent mining value addition, we opted to drop the labour variable altogether. We then observed that even after dropping the labour variable, the value of the adjusted R-squared did not alter significantly, implying that the model did not suffer from omitted variable problem. As represented in Table 1 in the Appendix, all variables had a unit root at level and were all stationary after taking the first difference. The long run model was modified thus:

$$\ln dgdppc_t = \alpha_0 + \beta_1 d \ln aid_t + \beta_2 d \ln Mine_t + \beta_3 d \ln agri_t + \beta_4 d \ln man_t + \beta_5 Yd \min e_t + \varepsilon_t,$$

Table 2 in the Appendix shows the results of the long run model. The error term was then predicted and tested for stationarity. The results as illustrated in table 3 show that the error term was stationary and thus we can confidently infer that the variables are cointegrated. The long run relationship between the variables can then be represented by the error correction model:

$$\ln dgdppc_t = \alpha_0 + \beta_1 d \ln aid_t + \beta_2 d \ln \min e_t + \beta_3 d \ln agri_t + \beta_4 d \ln man_t + \beta_5 Yd \min e_t + \varepsilon_{t-1},$$

Results

From the error correction model results, illustrated in table 4 in the Appendix, the variable of interest mining value addition had a positive coefficient in the review period and was significant at a 1% level. This implies that indeed mining has a positive impact on economic growth in Zambia as a 1% increase in mining value addition increases GDP per capita by 0.15%. Agriculture value addition also had a positive impact on economic growth in Zambia and a 1% increase in this variable increases GDP per capita growth by 0.18% per annum. This is also consistent with the fact that agriculture is the major economic activity in Zambia. Manufacturing value addition was also found to have a positive impact on economic growth in Zambia. A 1% rise in manufacturing value addition results in a 0.34% increase in per capita GDP.

However, the aid variable had a negative coefficient implying that foreign aid has a negative impact on economic growth in Zambia. However, this variable was not statistically significant and it may be recommended to conduct further research on the subject. The mining value addition, interaction year dummy was positive signifying that economic reforms in the mining sector after 2000 (Privatisation) had a positive impact, compared to the economic policies of the preceding period. However, the variable was also not statistically significant and no conclusion can be inferred.

The error term in the error correction model had a negative sign as expected, however it was not statistically significant implying that the economic environment in the country is stifling the short run economic growth to reach its equilibrium. The long term equilibrium is not reached as long as the error term is not significant. To determine the cause of this concern, there is need to conduct further research on the long term equilibrium of the economy in Zambia.

VI Policy Implications and Conclusion

The regression results show that the variable aid or ODA has a negative coefficient meaning as aid increases; it has a negative impact towards economic growth. However, no conclusion can be derived from this coefficient as it is statistically not significant.

Manufacturing value addition has the highest coefficient and is statistically significant at a 1% level. This calls for more investment directed towards the manufacturing sector. An increase in manufacturing will increase trade thus increasing foreign exchange earnings. The sector will also absorb a lot of labour thus cutting down on unemployment in the country.

Agriculture value addition also has a positive impact on economic growth. It is the major engine of Zambia's economy and the country has significant competitive advantage in this sector, due to the vast lands and the existence of many rivers and lakes which can be used for irrigation. However, agriculture depends to a large extent on the vagaries of weather. In times of drought, the country faces major food shortages. It is thus imperative that Government put up deliberate policies to invest in irrigation to take advantage of the available water sources apart from rainfall. This would also increase household incomes for the farmers as they can continue farming in times of drought or in the dry season. Government should also target FDI in the food processing, textiles industries and other agri-processing industries to further increase the sectors value addition which will in turn accelerate growth.

It must be noted, that the manufacturing value addition and agriculture value addition had higher coefficients compared to mining value addition. This signifies that there is more

potential of manufacturing and agriculture sectors to contribute to economic growth in Zambia than there is in the mining sector. As such, more resources should be channelled towards these sectors to enhance economic growth. Institutions and infrastructure should be put in place to create a conducive environment for both local and foreign investors to invest more in these sectors.

Since the variable of interest, mining value addition, has a positive sign and is statistically significant; mining has a positive impact on economic growth in Zambia. Government should therefore adopt policies that encourage the minerals processing sector in the country to further increase the contribution of mining towards economic growth. FDI in mining should thus be encouraged to carry out their processing in the country rather than outside the country and export finished or processed minerals rather than just exporting ore. This will lead to increased taxes, increased employment opportunities for the locals as well as increasing business of other peripheral industries like energy and other supplies. Further, Government should ensure that adequate rents are obtained from the sector which rents can be invested in physical infrastructure to promote the livelihood of the local people, especially in periods when the commodity prices are good.

The mining interaction dummy had a positive sign, implying that economic policies in the mining sector after the year 2000 had a positive impact on mining and thus economic growth, compared to the policies in the period before 2000. This would mean that privatisation in mining has led to a positive impact on economic growth.

From the foregoing it can be inferred that mining has a positive impact on economic growth in Zambia. However, the impact is modest compared to the other economic drivers like manufacturing and agriculture. Furthermore, it is evident from the literature review above that mining has had a negative impact on the environment and its biodiversity. The significance of this negative impact may still manifest in the health and livelihood of the people and its surroundings in future.

Appendix
Table 1: Results of the Augmented Dickey-Fuller test for

Variables	ADF test statistic	Critical Value	Stationarity
gdppc	-7.523***	-3.662	I(1)
oda	-8.074***	-3.662	I(1)
mine	-5.919***	-3.662	I(1)
agri	-13.115***	-3.662	I(1)
man	-5.587***	-3.662	I(1)
yd*mine	-6.128***	-3.662	I(1)

***significant at 1% level

**significant at 5% level

*significant at 10% level

Table 2: Results of the Long Run Model

Explanatory variable	Coefficient	P>t
oda	-0.019	0.041**
mine	0.171	0.000***
agri	-0.181	0.000***
man	-0.280	0.000***
yd*mine	0.0017	0.199
constant	-0.024	0.000
2	0.71	
Adjusted R ²	0.66	
- Stat	16	
Prob >F	0.0000	

***significant at 1%

**significant at 5%

*significant at 10%

Table 3. Results of the ADF stationarity test of the error term from the long-run model

Z (t)	Test statistic	1% critical value	5% critical value	10% critical value
	-7.122	-2.639	-1.950	-1.605

Table 4: Results of the error correction model

Explanatory variable	Coefficient	P-Values
oda	-0.012	0.114
mine	0.146	0.000***
agri	-0.179	0.000***
man.	-0.344	0.000***
yd*mine	0.0017	0.199
e	-0.031	0.863
Constant	-0.024	0.000
R ²	0.77	
Adjusted R ²	0.73	
F- Stat	17.35	
Prob >F	0.0000	

***significant at 1%

**significant at 5%

*significant at 10%

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CHAPTER EIGHT

Operation of the Swap Market in Zambia

By

Dionysius Makunka¹

Abstract

This paper aims to establish the motivation for the operation of the swap market in Zambia following concerns that commercial banks were engaging in swaps with a view to circumventing the foreign currency open position limits. Banks actively involved in this market were interviewed and pertinent documents were reviewed. Contrarily to concerns, it was established that banks were engaging in swap transactions with a view to, inter alia, i) generate liquidity; ii) place funds in situations where they were not allowed placement limits or credit lines; iii) exploit arbitrage opportunities; and iv) escape the bureaucracy associated with interbank placements which require the delivery of collateral in form of Treasury Bills.

I Introduction

The derivatives market plays an important role in domestic and global economics in determining the extent of market completeness. A complete market ensures a pareto optimal equilibrium. In the absence of complete markets, equilibrium conditions can not be said to deliver pareto optimal outcomes and hence can lead to the breakdown in economic efficiency. A complete market can simply be described as one where a market exists for every good, in every state of nature and across all time periods. If these conditions were to obtain, it could easily be seen that market equilibria would be pareto efficient and there would be little cause for public policy concerns regarding government intervention into markets.

The derivatives markets exist to provide future markets for goods and services. Some economists have argued that lack of long-dated forward markets for goods and services has been a cause of recurring business cycles. The rationale behind this thinking is that if industrialists are not guaranteed of future markets for their goods and services, they would then remain open or exposed to price fluctuations of their goods and services in the future. They are, therefore, unable to enter into long-term contracts, especially labour contracts, which fix or lock in their prices, e.g. wages. The simplest way to manage their business risk is to enter into short term labour contracts which are continuously rolled over at terms which are close to market conditions. This way, firms have the option not to renew the contracts when there is an economic recession or business slump. Non-renewal of labour contracts result in layoffs and increased unemployment in economic recessions. If, however, firms would be guaranteed of long-dated futures markets, they would consequently enter into long-dated spot contracts (for the various resources they employ

¹*The author is a Senior Inspector in the Bank Supervision Department of the Bank of Zambia.*

such as labour, land, capital and material resources) and this would work towards minimizing business risk, reducing unemployment, inter temporal smoothening of output and eliminating of business cycles.

The theory of incomplete markets enhances our understanding of the role derivatives markets play in the domestic and global economies. The Zambian economy has characteristics of an incomplete market. This is hardly surprising for an economy which is only over a decade out of financial repression and central planning. The Zambian economy up to date does not boast of a developed derivatives market. Its only a few years ago that banks started selling currency forward contracts. Today, other products are being offered such as options and swaps though these are only traded on foreign currencies. The undeveloped derivatives market has ramifications on the options available to firms to manage their risk profiles and on the overall economic efficiency that can be attained and later on public policy issues regarding market intervention. This paper does not attempt to justify government intervention into the operations of markets. Suffice to mention that undeveloped or non-existence of derivative markets could pose a danger to the smooth running of the economy and could provide justifiable grounds for all forms of public policy prescriptions. It is hoped that the derivatives market can develop quickly to fill this void; one begins to fill anxious about the development of a futures exchange in Zambia.

The swap market has been in existence in Zambia since 2003. The market is still in its infancy and relatively small. Mostly, banks enter into swaps with other banks. From time to time corporate bodies are involved as counter parties.

There have been concerns that banks could be using this product as a way of getting round the foreign currency exposure limits. Currently, the foreign currency exposure limits stand at 10% of regulatory capital for single currencies and 15% of regulatory capital for the overall exposure. In arriving at the net open positions, both spot transactions and forward commitments are taken into account. The general view is that a bank which had positions in excess of regulatory limits would use swaps to transfer the position forward and be in compliance with the limits. A critical examination of this view entails that such reasoning would not necessarily hold. This is because a swap involves exchanging currencies today with a view to exchanging them back at a later date called the settlement date. This essentially involves spot and forward transactions. The forward commitments are already incorporated in the calculation of the net open positions and are reported in the prudential returns.

Swaps are ordinarily used as a risk management tool in the same way that futures, forward contracts and options are used. They are popularly traded in the over-the-counter markets and are mostly used to manage foreign currency risk and interest rate risk. Chance (2003, p. 167) notes that the Bank for International Settlements had estimated the notional principal of the global over-the-counter derivatives market as of 30 June 2001 at \$100 trillion. Of that amount, interest rate and currency swaps account for about \$61 trillion, with interest rate swaps representing about \$57 trillion of that total. From this, it is clear that swaps account for a substantial percentage of the derivatives market.

A visit to some commercial banks revealed that the banks are using swaps to generate liquidity, place funds where there are no placement lines or credit lines and take advantage of arbitrage opportunities.

In section two, the paper explain the use of swaps as a risk management tool, section three highlight the pricing of swaps, section four explore the operation of the swap market in Zambia, while section five concludes.

II USE OF SWAPS AS A RISK MANAGEMENT TOOL

As mentioned above, swaps are used as a tool to manage various types of risks and popular among them being interest rate risk and currency risk. A swap is an agreement between parties to exchange a series of future cash flows. In one vein, swaps can be thought of as series of forward contracts. Hence, the pricing mechanism that applies to forwards contracts is applicable in the swap market as well. Forward commitments, be it forwards, futures or swaps are firm and binding agreements which obligate each party to complete the transaction, or alternatively, to offset the transaction by engaging in another transaction that settles each party's financial obligation to the other. On the other hand, contingent claims allow one party the flexibility not to engage in the future transaction depending on market conditions. Interest rate swaps involve one party to the transaction paying a fixed rate of interest and the other party paying a floating rate of interest. The motivation for parties paying floating and fixed rates to enter into swaps is predicated on the comparative advantage that each party has in the fixed rate market and the floating rate market. This is explained by the fact that the credit market mis-prices credit for one party in different credit markets. Put differently, a company of particular credit rating, for example, AAA, is able to borrow at different rates of interest in the fixed rate market and the floating rate market. The other party may also be exposed to similar credit mis-pricing. Parties with pre-existing credit mis-pricings and which have different preferences over fixed rate versus floating rate credits can come together and take advantage of this situation. Hence, a party which has a comparative advantage in the fixed rate credit market borrows at a fixed rate and equally a party which has a comparative advantage in the floating rate market rate borrows at a floating rate. They then swap their loans and exploit the gains from their trade. These gains are split between the parties. This type of transaction is normally organized through a third party which is usually a bank.

Currency swaps are motivated by similar reasons. Currency swaps involve parties to a transaction borrowing in different currencies and swapping their notional principals. They then pay the interest based on the swapped currencies. The idea of comparative advantage is more appreciated in the currency swap market. Company A, for example, would be domiciled in country X and company B would be domiciled in country Y. Country A would want to raise funds in country Y and to invest in operations in that country. Company B would likewise want to raise funds in country X and invest in that country. If company A borrowed in country Y directly, it would do so at a higher interest rate that company B would in its local market. The reason is that country B is better known in its local market than a foreign company such as company A. This is equally true if company B wanted to raise money in country X. Such companies with need for foreign currency to finance investments in foreign countries would be matched by an investment bank. Each party would borrow in its local currency and swap its principal for foreign currency for a defined period of time normally called the settlement period. The exchange rate at which they swap their principal back is determined on the date of the contract and is a function of the interest rate differential between the local currency and the foreign currency. On the settlement date (or maturity date), the counterparties swap their principals back. Since each company borrowed in its local market, the overall cost of borrowing is lower than would otherwise be the case had each company borrowed directly in a foreign market. The gains from trade are divided between counterparties based on an agreed formula.

The above paragraphs have advanced the rationale for the development of a swap market. In managing risks, a swap market can be used to transform a floating rate loan into a fixed rate loan and vice versa. Suppose a person obtains a mortgage; mortgages are mainly structured as floating rate loans which reprice at defined intervals, say monthly, based on a reference

rate (the commonly used being the London Inter Bank Offer Rate, LIBOR). A borrower or mortgagor may have a view that interest rates are likely to rise in future and would like to minimize the impact that rising interest rates would have on his equity. This is a basic example of interest rate risk management. Such a risk averse borrower and with such expectations would derive greater utility in the fixed rate credit market than a floating rate market. The borrower would then want to convert the floating rate obligations into fixed ones such that if interest rates rise as anticipated, the cost of borrowing would have been locked in at a fixed rate of interest. This borrower would have the option of refinancing the loan at a fixed interest rate assuming market efficiency.

As explained in the introduction, such a borrower would be exposed to credit mispricing in the fixed rate market versus the floating rate market. Simply put, this representative borrower is able to borrow cheaply in the floating rate market as opposed to the fixed rate market. At the same time there would be a borrower that would be asymmetrically exposed to such credit mispricing. A market mechanism exists which matches these two parties. Hence, a party anticipating an upward movement in interest rates but with a comparative advantage in the floating rate market would borrow at a floating rate and swap the obligations with the other party with a comparative advantage in the fixed rate market but with a comparative disadvantage in the floating market. This way the party anticipating an increase in interest rates has transformed floating rate obligations into fixed rate ones in a cost effective way. This example demonstrates the utility of swap markets in interest rate risk management.

III PRICING OF THE SWAP

In section two it was stated that a swap is like a forward contract and similar pricing mechanisms are used for both derivatives. A currency swap, like a currency forward contract, is priced using the no arbitrage valuation principle. The pricing mechanism is based on the interest rate differential between the local currency and the foreign currency. The swap rate or forward exchange rate is expressed as a function of the spot exchange rate and the interest rate differential as follows;

Assuming discrete time;

$$F(0, T) = S_0 \frac{(1 + r_d)^T}{(1 + r_f)^T}$$

Where; $F(0, T)$ is the forward rate determined at time 0 and for a contract expiring at time T

S_0 is the spot rate at time 0

r_d is the domestic risk-free rate of interest

r_f is the foreign risk-free rate of interest, and

T is the time in years.

In continuous time;

$$F(0, T) = \left(S_0 \varepsilon^{-r_f T} \right)^{r_D T}$$

or

$$F(0, T) = S_0 \varepsilon^{(r_D - r_f) T}$$

The above pricing model depends on the following assumptions:

- i) There exists a risk-free rate of interest;
- ii) There are no transaction costs;
- iii) There are no taxes;
- iv) There are no restrictions on arbitrage; and
- v) There are no restrictions on short selling.

The assumptions imply that there exists a frictionless market. The exchange rate is quoted directly as the domestic currency price of a unit of foreign currency. Quoted this way, if interest rates in the domestic economy are higher than in the foreign country, the local currency is expected to depreciate relative to the foreign currency concerned over the relevant investment horizon and the foreign currency in this way is said to be trading at a premium. Conversely, low domestic interest rates relative to foreign currency interest rates indicate that the domestic currency is expected to appreciate relative to the foreign currency concerned over the defined time frame. If this obtains, the foreign currency is said to be trading at discount. The above relationship is also called covered interest rate arbitrage. If the quoted forward exchange rate is outside the bounds of the covered interest rate conditions, arbitrageurs can enter the market and exploit arbitrage profits. If the quoted forward exchange rate is higher than the fair forward exchange implied by the interest rate differential, then an arbitrageur can enter into the forward contract to sell foreign currency forward. To do this an arbitrageur can borrow domestic currency at risk-free rate of interest, buy foreign currency and invest it at the foreign risk-free rate and simultaneously enter into a forward contract to sell the foreign currency after a defined period. At maturity, the arbitrageur sells the foreign currency and pays off her domestic currency loan leaving her with an arbitrage profit.

Example

Suppose that the USA is the domestic economy and the UK is a foreign economy. Let us assume the following;

- One year risk-free rate of interest in the U.K. is 10%;
- One year risk-free rate of interest in the USA is 15% and
- Today's exchange rate is \$1.6/£.

Using the covered interest rate parity, the implied fair forward exchange rate is;

$$F(0,T) = S_0 \frac{(1+r_D)^T}{(1+r_f)^T}$$

$$F(0,T) = 1.6 \frac{(1.15)^1}{(1.10)^1}$$

$$F(0,T) = \frac{1.84}{1.10} = \$1.673$$

The pound sterling is expected to appreciate over one year. Let us further assume two scenarios; a) the quoted forward exchange rate is \$1.8/£ and b) the quoted forward exchange rate is \$1.4/£.

Scenario a

In this scenario, the quoted forward exchange rate is higher than the fair forward exchange rate. The rule is to buy low and sell high. In this case a trader would enter into the forward contract to sell the pound sterling at \$1.8/£. To do this a trader borrows US dollars, say \$1.6 at 15% and buys pound sterling on the spot market realizing £1. He invests £1 at 10% and simultaneously enters into a contract to sell £1(1.10) = £1.10 forward at a rate of \$1.8/£. After one year the following obtains:

- Value of dollar loan is \$1(1.15) = \$1.84;
- Pound investment is £1(1.10) = £1.10;
- Sell the pound asset at contracted rate of \$1.8/£ to realize £1.10 * \$1.8/£ = \$1.98;
- The arbitrageur pays off a loan of \$1.84 and remains with (\$1.98 - \$1.84) = \$0.14; and
- The arbitrageur realizes a rate of return of $\left(\frac{\$1.98}{\$1.60} - 1 \right) * 100 = 23.75\%$.

This rate of return is risk-free which involves no investment of money. This realized risk-free rate is greater than the risk-free rate of return of 15% earned on the US Treasury securities. These arbitrage profits are not sustainable. A lot of such players enter the market to borrow dollars (hence pushing the dollar interest rates up), buy the pound sterling in the spot market and cause an appreciation of the pound in the spot market. The increased supply of loanable funds in the pound sterling market causes the pound sterling interest rates to fall. Traders will at the same time sell the pounds in the forward market causing a depreciation of the pound against the US dollar in the forward market. This price adjustment process continues until an equalization of the quoted price and the price implied by the covered interest rate parity model is attained. This adds credence to the *law of one price*.

Scenario b

Under here the quoted price of \$1.4/£ is lower than the fair forward exchange rate of \$1.673/£. An arbitrageur would engage in short-selling pounds sterling. He borrows say, £1, and simultaneously enters into a contract to pay back £1 with interest after one year. He

contracts to pay back $\text{£}1 * 1.1 = \text{£}1.10$ at the forward rate of $\text{\$/£}1.4$. He sells the borrowed pounds in the spot market realizing proceeds of $\text{\$}1.60$. He invests the dollars for one year at the rate of 15%. After one year the following obtains:

- Value of pound loan is $\text{£}1.10$;
- Dollar value of investment is $\text{\$}1.60(1.15) = \text{\$}1.84$;
- He buys pounds at a rate of $\text{\$/£}1.4$ to get $\text{£}1.31$; and
- The arbitrageur pays off a pound loan of $\text{£}1.10$ and remains with an arbitrage profit of $\text{£}0.21$.

The realized rate of return = $\left(\frac{1.31}{1.10} - 1 \right) * 10 = 19.09\%$.

This realized rate of return is greater than the US risk-free rate of interest. The process of arbitrage will continue until all arbitrage profits have been competed away. At this point, the fair forward exchange rate is equal to the quoted forward rate. This equalization of prices comes about in the following manner. The increased borrowing for pounds pushes pound interest rates up. The sale of pounds in the spot market causes the pound sterling to depreciate. The increased supply of loanable funds in the US money market causes dollar interest rates to fall. The buying of pounds forward causes pound sterling to appreciate in the forward market. This price adjustment process continues until the price equalization is attained.

IV The Operation of the Swap Market in Zambia

The swap market is relatively new in Zambia. Its history goes back to 2003. The market is still small and not very liquid. In 2005, monthly swap transactions ranged from K10 billion to K40 billion. The market has become more active in recent years. The analysis that follows is based on interviews with five key players (banks).

Structure of the Swap Market in Zambia

Liquidity wise, banks in Zambia can be classified in two groups; i) those that have excess (long position) Kwacha liquidity and those with excess dollar liquidity. The active banks in the swap market are categorized in the table shown below.

Based on the results of the interview, two banks had long Kwacha position (or short dollar position) and the rest had US dollar long position (or short Kwacha position). This asymmetrical nature of the liquidity market creates an opportunity for swap transactions.

Motivation for Swap Transactions in Zambia

During the survey, it was noted that the reasons banks enter into the swap transactions are:

- i) Need to generate liquidity;
- ii) Place funds beyond the internal limits set by their credit departments;

- iii) Exploit arbitrage opportunities;
- iv) Need to urgently place funds without the use of the conventional inter-bank collateral arrangements such as registration of Treasury bills with the Lusaka Stock Exchange and delivery of the collateral to the central bank; and
- v) Need to close out net open positions especially those involving cross-currency swaps.

The need for banks to generate liquidity arises from the liquidity mismatches in different maturity buckets. This, coupled with the fact that some banks mostly have excess Kwacha (long Kwacha) and others have most of the times excess dollar liquidity creates an opportunity for the swap transactions to be initiated. Banks with strong dollar positions may have Kwacha needs to cover their liquidity mismatches. On the other side of the market, banks may have excess Kwacha but short dollar positions. These banks can go into the swap arrangement to exchange their currencies and simultaneously enter into a contract to swap their currencies back at a later stage. In the Zambian swap market, the tenor usually ranges from one day to two months.

Swap transactions are also motivated by the desire to place funds which would otherwise not be placed within the context of banks' internal credit limits. Banks, especially foreign owned ones, have set internal credit limits. This essentially entails that a bank can only lend up to certain limits on a clean or unsecured basis and on a basis secured by Treasury bills. Above these limits, the credit functions can not sanction the placements. In instances where the bank has excess liquidity on its books, this may prove to be unprofitable. The way around this problem is to execute a swap transaction wherein the swapped currencies act as collateral for either party. The issue in this instance is the currency risk. This is the risk that the contracted forward exchange rate will differ from the spot rate on settlement date. Most banks interviewed stated that this risk is covered. Put differently, most banks buy or sell forward foreign currencies in swap transactions on a hedged basis.

Banks also enter into swaps to take advantage of arbitrage opportunities that may be offered due to misalignment of the quoted forwards rates from the forward rates implied by the interest rate differential as illustrated in section three.

In some instances, banks use swaps to close out their open positions they have created through cross currency swaps. In this situation, banks enter into opposite sides of the cross-currency swaps to close out their open positions in order to manage foreign currency risk.

Pricing of Swap Transactions

Banks use interest rate differentials between kwacha and foreign currencies and the spot market rate to price the swap. The result of this is the forward exchange rate at which the willing parties will exchange back their currencies at a future stated date. The benchmark yield curve for foreign currencies is the LIBOR. Whereas for Kwacha the benchmark yield curve is government securities. The Treasury yield curve is discontinuous especially in the very short maturity sector. This aspect, therefore, renders pricing of the swap and forward contracts inefficient in this market. In developed markets, pricing of swaps and forward contracts is made easier because of the availability of a continuous Treasury yield curve. Essentially, swaps are priced with reference to swap points. Swap points can simply be thought of as the interest rate differential term structure.

Documentation

Supporting documentation for swaps ranges from Reuters conversations to deal slips. At the moment, the international foreign exchange master agreement is not used to document the swap transaction.

Accounting for, Prudential Reporting of and Marking-to-the-Market of Swap Transactions

Swap transactions can best be looked at as a combination of spot transactions and forward contracts. Essentially, what the banks are doing is to sell or buy the foreign currency on a spot market and simultaneously enter into a forward contract to buy/sell the foreign currency at future date called the settlement date and at the agreed upon rate called the swap rate. The accounting for, prudential reporting of and marking-to-the-market of the swap transaction follow this treatment.

On the contract date, the exchange of currencies is treated as a sale or purchase. The commitment to swap back the currencies is treated as an off-balance sheet item. All the banks which were interviewed demonstrated that they mark-to-the-market their forward commitments and post the exchange gains or losses to the profit and loss account in line with international accounting standards.

The central bank has put in place regulatory limits on the open positions that banks have to carry on their books both in terms of single currency exposures and overall currency exposures. The Statutory Instrument requires banks to add to their foreign currency holdings their forward commitments in foreign currency to arrive at their net open position limits for regulatory purposes. All the banks visited showed that they actually add forward currency commitments arising from swap transactions to their net open positions. The fear that banks may be using swaps as a vehicle to circumvent regulatory requirements is, therefore, no longer warranted. The maturity transformation of the net open positions does not in anyway preclude banks from adding the resulting forward currency commitments to their foreign currency holdings for the purposes of computing net open position regulatory limits.

V Conclusion

The paper has endeavoured to establish the motivation for the existence of the swap market in Zambia. It explored the concern that banks were using this instrument to evade the regulatory requirements as they relate to foreign currency risk; specifically the net open position limits for both single currency exposures and overall foreign currency exposures. Contrary to the earlier concerns, this paper has established that banks are using this product to, among other things, generate liquidity, place funds in excess of internal limits set by their credit functions, exploit arbitrage opportunities and close out net open positions occasioned by the cross-currency swap. Banks are using this product to manage their risk profiles prudently as well as optimizing the deployment of their financial resources. The central bank's position as regards risk management in banks is that the responsibility to prudently manage risks lies with commercial banks. The banks usage of products such as swaps enhances their capacity to manage their risks well and is a welcome market development. The development of the derivatives market in our economy will add to the completeness of our markets and bring about efficiency gains in financial and economic management.

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CHAPTER TEN

Demystifying Basel II: A Case Study of Zambia

By

Ephraim Musilekwa, Mwiza Mbewe and Raphael Kasonde

Abstract

The paper analyses the requirements of Basel II as they relate to the supervisory framework that is in place within the Zambian banking sector. It is noted that the implementation of Basel II is expected to provide significant challenges to the banking sector in Zambia. However, the paper contends that these challenges are not insurmountable. The paper notes that the Zambian supervisory framework has adopted or is in the process of adopting measures and innovations introduced by the Basel Committee on Banking Supervision (BCBS) over the years and thus sees this as setting an adequate platform to migrate to Basel II in the future.

I Introduction

The adoption and implementation of Basel II is expected to provide significant challenges for all jurisdictions. The challenges are primarily expected to be related to the complexities associated with Pillar I, particularly as regards the latitude given to commercial banks to utilise their own models in respect of credit and operational risks measurements. The literature has in many cases pointed out that Basel II will revolutionise the manner in which banks calculate their regulatory capital.

Both the 1988 Capital Accord and Basel II have an underlying assumption that the commercial banks which adopt the capital accord requirements have sound overall risk management frameworks in place. This assumption is on the basis that the commercial banks have access to the many principle-based guidelines on risk management published by the Banking Committee on Banking Supervision (BCBS). There is thus an expectation that the banks follow rational and appropriate procedures in the management of their exposures, particularly as the capital accords are meant for 'internationally active' or 'significant' banks.

In essence, Section 56 (1) (b) (ii) of the Banking and Financial Services Act (BFSA) has the same expectation as that of the BCBS. The section requires that the director's report should contain a discussion on risk management processes and practices during the year and should together with the financial statements be availed to the shareholders. This implies that the risk management processes and practices will effectively be disclosed to the public at large. The reasoning behind public disclosure is to encourage the adoption of appropriate processes and practices by individual bank's management. Furthermore, the Bank of Zambia, stated through CB Circular No. 2/2000 dated 10 April 2000, that all commercial banks must have "in place risk management systems and procedures that address common risks". The circular further stated that the banks should establish risk management policies,

which at a minimum, would define the risks facing each bank, the methods of measuring risk, monitoring and controlling methods in respect of each risk.

It has been argued that unlike Basel I, the comprehensive requirements under Basel II impose a significant challenge for banks in emerging markets. The argument is premised on the basis that the commercial banks in countries such as Zambia are relatively small in terms of capital and asset sizes as compared to banks in the developed markets.

In Zambia, commercial banks are the most dominant and oldest financial institutions. Their dominance is reflected in the size of their total assets relative to other types of financial institutions as well as in their relatively wider role in financial intermediation. Commercial banks also have a wider outreach than other financial institutions and as at end of 2006, the 13 commercial banks had a total branch network of 161. Of the 13 banks, 7 were foreign owned banks, 1 was a joint venture between the Governments of Zambia² and India, 1 was state-owned by the Government of Zambia and the rest were owned by local entrepreneurs. Traditionally, the commercial banks are engaged in the provision of short-term finance whilst specialised banks and other non-bank financial institutions provide long-term finance. With specific regard to Basel II, an appropriate and proficient understanding of credit management and finance is a key requisite to an adequate appreciation of its underlying functionality. Along with this understanding must be the recognition that Basel II is principles and rules-based. There is thus a requirement for extensive data management by the commercial banks which will obviously result in the need for adequate data management systems. Meanwhile, the supervisory authority must have the capacity to verify that the data management systems conform to the parameters spelt out in the framework.

In view of the foregoing, it can be argued that the challenges, associated with the adoption and implementation of Basel II, are not insurmountable given the basic foundation which the current Zambian supervisory framework provides in respect of risk management. However, it is concurred that there are obviously gaps, between the practice in developed financial frameworks and the one existing in Zambia, which need to be bridged.

In view of the foregoing, the primary objective of this paper is to demystify the requirements of Basel II such that it is not perceived as an insurmountable challenge to the Zambian banking sector but rather as a process of development to which the supervisory authorities and the banking sector should progress over time. In doing so, the paper is arranged as follows: the next section identifies how the current supervisory framework relates to areas under the minimum capital requirements (Pillar I); Section III discusses the supervisory review process (Pillar II) and how the gaps between the domestic legal framework and the Core Principles for Effective Supervision have minimised over the years; Section IV discusses market discipline (Pillar III) and how the utilisation of the International Financial Reporting Standards (IFRSs) has introduced market disclosure requirements which need to be reconciled with the disclosure requirements under Basel II; and the last section concludes the paper by charting the way forward.

II The First Pillar Minimum Capital Requirements

The first pillar is considered to be the more complex of the three pillars largely on account of the quantitative needs associated with determining the minimum capital requirements. The minimum capital requirements are calculated on the basis of credit risk (which was the only

²In 2007, 49% of the bank's shares were sold to a foreign financial entity.

factor in the 1988 Accord), market risk or trading book issues (introduced in 1996) and operational risk (a new factor as regards capital requirements).

The revised framework states that the total risk-weighted assets are determined by multiplying the capital requirements for market risk and operational risk by 12.5 (which is the reciprocal of the minimum capital ratio of 8%) and adding the resulting figure to the sum of risk-weighted assets for credit risk. The calculation is complex in respect of the risk-weighted assets for credit risk as a result of the attempts to make this particular factor more sensitive to the individual characteristics of counterparties. Being more sensitive to the individual characteristics of the counterparties has necessitated the recognition of proprietary risk management systems by the BCBS. However, this recognition is within limited strata as the supervisory authorities still maintain regulatory authority in the interest of overall financial stability.

Credit Risk: The Standardised Approach

In order to calculate the risk weights under the Standardised Approach, banks are supposed to use external credit assessment institutions (ECAIs) recognised as eligible for capital purposes by national supervisors in accordance with the criteria defined by the revised framework. The ECAIs should be of the same calibre as Standard and Poor's, Fitch and/or Moody's. The individual claims for which external ratings are supposed to be obtained are sovereigns, non-central governmental public sector entities, multilateral development banks, banks, securities firms, corporates, regulatory retail portfolios, those secured by residential property, those secured by commercial property, past due loans, higher-risk categories, equity and off-balance sheet items.

The first difficulty associated with the Standardised Approach for Zambia is the lack of ratings for any of the borrowers. That being the case, it means that should the approach be adopted, all the claims would be unrated and subject to national discretion. Secondly, the absence of ECAIs cannot be easily resolved with the formation of domestic rating agencies. This is because to be eligible, the ECAI must satisfy the following criteria: objectivity, independence, international access/transparency, disclosure, resources and credibility. Obviously, satisfying the stated criteria requires a significant period of existence and thus would not be resolved by the immediate formation of domestic rating agencies.

All is not lost, as the revised framework provides an alternative Simplified Standardised Approach (SSA) which collects in one place the simplest options for calculating risk weighted assets. In terms of sovereign risk, the SSA allows the use of export credit agencies (ECAs) participating in the 'Arrangement on Officially Supported Export Credits', with the national supervisors given limited discretion on the rating. ECA scores are available on the OECD's website. For example, Zambia's applicable ECA risk weight would be the lowest rating available but due to national discretion, the highest rating would be applied. Thus in the absence of rated organisations, the SSA provides an opportunity to bridging the basic requirements of Basel II and the existing requirements under the 1988 Accord. It must be noted that the SSA also incorporates the Basic Indicator Approach for operational risk. However, under the SSA there is no simpler and specific methodology recommended for market risk.

Credit Risk: The Internal Ratings-Based (IRB) Approach

The IRB approach to credit risk basically provides the framework under which banks may rely on their own internal estimates of risk components in determining the capital

requirement for a given exposure. The exposures are categorised as follows: corporate, sovereign, bank, retail, qualifying revolving retail, equity and eligible purchased receivables. In arriving at the values for risk-weighted assets, the distinctions are found in respect of the rules for corporate, sovereign and bank exposures, the rules for retail exposures, the rules for equity exposures and the rules for purchased receivables.

Generally, the determination of the risk weighted assets takes into account several risk components; namely the Probability of Default (PD), the Loss Given Default (LGD) and the Exposure at Default (EAD). In addition, the rules for corporate, sovereign and bank exposures include the factor of Effective Maturity (M). While under the advanced approach of the IRB, the banks can provide their own estimates of PD, LGD, EAD and M, subject to meeting minimum standards, the supervisory authority provides all the risk components save for PD under the foundation IRB approach.

The risk components are defined as follows:

Probability of default (PD): probability that a particular obligor will default;

Loss given default (LGD): extent of actual loss (minus recoveries) upon default;

Exposure at default (EAD): size of bank's exposure upon default; and

Maturity (M): length of bank's exposure to an obligor.

In essence, the framework provides the significant quantitative determinants for determining the risk-weighted assets, with key differences largely arising in the correlations which the framework provides. For instance, the risk components rules for corporate, sovereign and bank exposures are provided on pages 63 to 70 of the revised framework.

The quantitative determinants as prescribed under the framework necessitate a significant need for data, which the Zambian supervisory framework already requires. *Capital Adequacy Regulation, Regulation 28 of Statutory Instrument 184 of 1995* requires that every bank and financial institution maintain suitable records to facilitate verification of its capital position. Furthermore, *Section 52 of the BFSA* states that every bank or financial institution shall cause to be created and shall maintain in its principal office in Zambia proper credit documentation and any other information concerning its business relations with its customers and other persons that the Bank of Zambia may prescribe. *Section 54* states that the register of records must be retained by the bank or financial institution for a period of at least six years. The *Companies Act* extends the requirement such that information relating to all transactions undertaken by an organisation should be available for a period up to ten years. There is thus enough legal provision for data requirements in the broad sense. The question at hand is whether the information can be adapted in the manner as defined by the new framework.

Classification and Provisioning of Loans Regulation, Regulation 16 (1) of Statutory Instrument 142 of 1996 states that in determining the amount of potential loss related to individual loans and to the aggregate of the loans portfolio of a bank or a financial institution, the following factors shall be considered: (a) the historical loan loss experience; (b) the current economic conditions; (c) the delinquency trends; (d) the effectiveness of the bank's or financial institution's lending policies and collection procedures; and (e) the timeliness and accuracy of the bank's or financial institution's loan review function. It is the contention of this paper that with appropriate re-formatting items (a) and (c) could be re-constituted to suit the definitions of Probability of Default (PD) and Loss Given Default

(LGD), respectively. It must be noted that under the framework both PD and LGD are measured as decimals while the Exposure at Default (EAD) is measured as currency (e.g. Kwacha).

The Basel II framework provides eligibility criteria for the IRB approach whereby a bank must demonstrate to its supervisor that it meets certain minimum requirements at the outset and on an on-going basis. “The overarching principle behind these requirements is that rating and risk estimation systems and processes provide for a meaningful assessment of borrower and transaction characteristics; a meaningful differentiation of risk; and reasonably accurate and consistent quantitative estimates of risk.”

The revised framework recognises that sufficient human judgment and human oversight is necessary to ensure that all relevant and material information in the application of statistical models is also taken into consideration. The framework explicitly states that “the burden is on the bank to satisfy its supervisor that a model or procedure has good predictive power and that the regulatory capital requirements will not be distorted as a result of its use”³. Furthermore, “the bank must demonstrate that the data used to build the model are representative of the population of the bank's actual borrowers or facilities”⁴.

With specific regard to validation, “a bank must demonstrate to its supervisor that the internal validation process enables it to assess the performance of its internal model and processes consistently and meaningfully”⁵. Since the burden is on the bank, it is expected that all critical elements of an internal model and the modelling process are fully and adequately documented. The documentation should include the internal model's design and operational details as well as addressing topics such as “portfolio differentiation, rating criteria, responsibilities of parties that rate borrowers and facilities, definition of what constitutes a rating exception, parties that have authority to approve exceptions, frequency of rating reviews, and management oversight of the rating process”⁶.

Again, *Section 55(1) of the BFSA and CB Circular No. 2/2000* basically endorse the thinking provided in the framework. In addition, *Section 52 (1) and (2) of the BFSA* provide requirements for proper credit documentation and any other information concerning a bank's business relations with its customers. The requirements include current financial statements of borrowers' indebtedness, descriptions of collateral and the terms of credit. It is expected that current information databases maintained by banks in Zambia should be sufficient to develop appropriate models, particularly when contextualised together with *Classification and Provisioning of Loans Regulation, Regulation 16 (1)*

In short, while it is noted that the significant challenge to the Internal Ratings Based Approach is the need for a sufficiently large data pool from which to derive the inputs, it is expected that the statutory requirements for maintaining suitable records to facilitate verification of individual bank's capital positions addresses that need. Furthermore, the broader requirement for all corporate entities to maintain records for not less than ten years also addresses the requirement to have a sufficiently extensive timeframe from which to input data variables.

⁴*Ibid*, Paragraph 417, Page 93

⁵*Ibid*, Paragraph 417, Page 93

⁶*Ibid*, Paragraph 500, Page 109

⁷*Ibid*, Paragraph 418, Page 94

Credit Risk Securitisation Framework

The revised framework identifies two types of securitisation: traditional and synthetic. According to the framework, “a traditional securitisation is a structure where the cash flow from an underlying pool of exposures is used to service at least two stratified risk positions or tranches reflecting different degrees of credit risk⁸.” Meanwhile, “a synthetic securitisation is a structure with at least two different stratified risk positions or tranches that reflect different degrees of credit risk where credit risk of an underlying pool of exposures is transferred, in whole or in part, through the use of funded (e.g. credit linked notes) or unfunded (e.g. credit default swaps) credit derivatives or guarantees that serve to hedge the credit risk of the portfolio”⁹.

The framework lists the securitisation exposures as asset-backed securities, mortgage-backed securities, credit enhancements, liquidity facilities, interest rate or currency swaps, credit derivatives and tranching cover. The framework emphasizes that the list is not restricted to the itemised exposures.

While it could be said that the Zambian financial market is fairly developed as regards the provision of services, the reality is that the commercial banks tend to offer 'vanilla' type of products such that securitisation is a feature that has not shown up as a possibly strong means of financial intermediation. The discussion paper therefore does not dwell on the matter given the lack of empirical evidence to provide any meaningful assessment of the banking sector's capacity to provide this service.

Operational Risk

The framework states “Operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. This definition includes legal risk but excludes strategic and reputational risk”¹⁰. From the definition itself, one can deduce the difficulty associated with incorporating operational risk to the capital charge as it implies that the organisation should provide for potential failure from internal events which under normal circumstances are expected to contribute to meeting the organisation's objectives.

The BCBS has identified three measurement methodologies for calculating operational risk capital charges, namely: the Basic Indicator Approach (BIA); the Standardised Approach; and the Advanced Measurement Approaches (AMA). The three approaches operate in a continuum of sophistication and risk sensitivity whereby the determining factors are provided by the commercial bank along the continuum.

In summary, the Basic Indicator Approach requires that a bank holds capital equal to the average over the previous three years of a fixed percentage of positive annual gross income.

The Standardised Approach extends the requirement under the BIA by requiring that the total capital charge be calculated as the three-year average of the simple summation of the regulatory capital charges across eight business lines in each year. The individual capital charges are calculated by multiplying annual gross incomes of the individual business lines against beta factors provided under the revised framework (which range from 12% to 18%); the business lines being corporate finance, trading and sales, retail banking, commercial banking, payment and settlement, agency services, asset management and retail brokerage. The challenge for the Zambian context is to identify whether the factors are appropriate for

⁸*Ibid*, Paragraph 539, Page 120

⁹*Ibid*, Paragraph 539, Page 120

¹⁰*Ibid*, Paragraph 644, Page 144

the Zambian banking system. It must be noted that both the business lines and the factors were developed with the G10 countries in mind.

The Advanced Measurement Approaches (AMA) essentially let the individual banks determine the regulatory capital requirement subject to supervisory approval and the attainment of both qualitative and quantitative standards. The framework states “a bank's internal measurement system must reasonably estimate unexpected losses based on the combined use of internal and relevant external loss data, scenario analysis and bank-specific business environment and internal control factors”¹¹. The AMA therefore allows for the recognition of variables that correlate more comprehensively with and within the environment in which the organisation operates. In effect, the AMA accepts the difficulty of providing for an industry-wide capital requirement on the basis of operational risk and is thus bound to be of more relevance to the Zambian context.

Market Risk

The revised framework defines market risk as “the risk of losses in on and off-balance-sheet positions arising from movements in market prices”¹². The revised framework also provides a definition of the trading book wherein it is stated as “consisting of positions in financial instruments and commodities held either with trading intent or in order to hedge other elements of the trading book”¹³. The framework states that to be eligible for trading book capital treatment, financial instruments must be either free of any restrictive covenants on their tradability or able to be hedged completely. In addition, positions should be frequently and accurately valued, and the portfolio should be actively managed. It is further required that banks have clearly documented and defined policies and procedures for determining which exposures to include in and from the trading book for purposes of calculating their regulatory capital.

It must be stated that in calculating eligible capital, it will be necessary to first calculate the bank's minimum capital requirements for credit and operational risks, and only afterwards its market risk requirement, to establish how much Tier 1 and Tier 2 capital is available to support market risk¹⁴.

Two methods of measuring market risk are provided: the Standardised Measurement Approach and the Internal Models Approach. The Standardised Measurement Approach provides specific rules as regards the measurement of risk in respect of interest rate risk, equity position risk, foreign exchange risk, commodities risk and the treatment of options. Meanwhile, the Internal Models Approach will be conditional upon explicit approval of the bank's supervisory authority. Minimum conditions are to be established in respect of conceptually sound risk management systems, sufficient numbers of staff skilled in the use of sophisticated models, proven track records of reasonable accuracy in measuring risk and the conducting of regular stress tests.

A key requirement for the Internal Models Approach is that there be processes in place to ensure that the bank's internal models have been adequately validated by suitably qualified independent parties independent of the development process to ensure that they are conceptually sound and adequately capture all material risks¹⁵. The validation processes referred to are expected to be undertaken by external auditors and/or supervisory

¹¹*Ibid*, Paragraph 665, Page 150

¹²*Ibid*, Paragraph 683, Page 157

¹³*Ibid*, Paragraph 685, Page 158

¹⁴*Ibid*, Paragraph 708, Page 166

¹⁵*Ibid*, Paragraph 718(xcix), Page 202

authorities for whom the revised framework provides minimum criteria to be followed during the validation of the models' accuracy.

Given the current state of the banking industry in Zambia, it is likely that the Standardised Measurement Approach will be adopted in the interim. In effect, this should provide a bridge towards instituting an appropriate market risk measurement framework, given the absence of a comprehensive one currently save for foreign exchange risks.

With specific regard to foreign exchange positions, *Statutory Instrument No. 57 of 1996, Foreign Exchange Risk Management and Exposure Regulations*, provides regulations in respect of foreign exchange exposures. The statutory instrument explicitly requires that the commercial banks have comprehensive risk management plans in place for foreign exchange transactions. Meanwhile, the broader perspective of financial instruments is captured by *IFRS 7* which requires the disclosure of the significance of financial instruments for an entity's financial position and performance. *IFRS 7* will obviously have a bearing on the operations of commercial banks with specific regard to market risk. Details in this respect are contained in the appropriate section later.

III The Second Pillar Supervisory Review Process

Pillar II of the New Capital Accord, the Supervisory Review Process, is not only intended to ensure that banks have sufficient capital to support all business risks but is also meant to encourage banks to develop and use better risk management techniques to monitor and manage their risks. Pillar II consists of four principles which ensure adequate bank risk management and internal capital assessment, supervisory assessment of banks' capital, supervisory ability to ensure banks hold capital in excess of the prescribed minimum and supervisory intervention where capital is inadequate.

It is accepted that implementation of Pillar II and Pillar III especially in developing countries should precede Pillar I because of the need for adequate supervisory infrastructure before the new accord is implemented. Andrew Powell recommends that 'the first priority for (developing) countries should be to fully implement Basel II, Pillar II'¹⁶. This is because even before issues of capital measurement are considered, the supervisory infrastructure needs to be adequate. To date, compliance to the 25 Core Principles for Effective Banking Supervision provides the yardstick upon which countries measure the adequacy of their supervisory infrastructure.

This section assesses Zambia's supervisory infrastructure on the basis of the four principles that constitute Pillar II of the New Capital Accord by relating the four principles of Pillar II to the Basel Core Principles (BCP). It examines Zambia's compliance level to the principles of Pillar II and the relevant BCP and identifies the gaps between the principles and the existing regulatory framework. Where there are gaps, recommendations are made to ensure that this is bridged.

Although the new capital accord introduces the concept of three distinct but mutually reinforcing pillars, "Pillar II actually covers very little that is not already in the BCP but is more specific on a number of issues"¹⁷. The BCP and other supervisory guidance issued by the Committee therefore provide a basis upon which Pillar II is built. Under Pillar II, the Committee has identified four key principles of supervisory review, which complement those outlined in the extensive supervisory guidance that has been developed by the

¹⁶ Andrew Powell (2004) in *Basel II and the Developing Countries: Sailing through the Sea of Standards*; Andrew Powell

¹⁷ *ibid.*

Committee, the keystone of which is the Core Principles for Effective Banking Supervision and the Core Principles Methodology¹⁸. It is clear therefore that the BCP to a large extent provides a basis upon which a country could implement Pillar II of Basel II.

Since 1997, Zambia has undergone five assessments for compliance to the 25 Basel Core Principles for Effective Banking Supervision. Four of the assessments were self assessments whilst the one carried out in 2001 was done jointly by the International Monetary Fund (IMF) and the World Bank (WB) as part of the Financial Sector Assessment Program (FSAP). A summary of the level of compliance to the BCP is given in Appendix 1. Particular emphasis has been placed on this assessment because of the participation by external assessors which gave the assessment an objective outlook. It must be noted however that subsequent to the FSAP assessment, two self-assessments have since been carried out and significant progress has been achieved on many of the principles. This was on account of the various actions that were taken under the Financial Sector Development Plan (FSDP) which was formulated by a cross section of stakeholders in the Zambian financial sector to address the weaknesses noted under the FSAP.

A closer scrutiny of the 4 principles under Pillar II together with a detailed description of Zambia's laws and regulations and supervisory practices under the relevant BCP follows.

Principle 1: 'Banks should have a process for assessing their overall capital adequacy in relation to their risk profile and a strategy for maintaining their capital levels'

Principle 1 outlines the responsibilities of commercial banks as regards ensuring that they have adequate capital to support their overall risk profiles. The Principle has five features that need to be satisfied in order to ensure that a banks' overall capital adequacy is sufficient in relation to its risk profile. These are: board and senior management oversight; sound capital assessment; comprehensive assessment of risk; monitoring and reporting; and, internal control review. In general, compliance to Principles 6 and 12-14 of the Basel Core Principles (BCP) purports compliance to Principle 1 of Pillar II.

It must be noted that while Appendix 1 shows that the 2001 assessment rated Zambia as being largely compliant in respect of Principle 6 and materially non-complaint in respect of Principles 12-14, this was strictly from an operational perspective. Significant strides have been made to ensure that this is no longer the case as the supervisory authority has been strengthened to counter the operational weaknesses. Furthermore, the Zambian regulatory framework takes into account the feature requirements of Principle 1 as outlined below.

1. Board Oversight

The BFSA has the following provisions:

Section 7 (c) requires directors and major shareholders to be fit and proper; *Section 23* requires that there is no dominance of control by any one shareholder or group of shareholders; *Section 24* states that the controller of one bank cannot be a major shareholder, director or have executive responsibilities at any other bank in Zambia; *Section 30(1)* places accountability and primary responsibility for the control and performance of a bank or financial institution on the Board of Directors. This is done through the formulation of appropriate policies and procedures to guide the banks operations and, *Section 67* provides for committees of the board, especially for the audit committee to enhance board control on the affairs of the bank and enhance internal controls.

¹⁸Basel Committee on Banking Supervision (June 2006) op cit 7, paragraph 725, pg 205

In addition, the Corporate Governance Guidelines for Banks and Non-Bank Financial Institutions emphasise the board's oversight function and places primary responsibility for risk management in banks and financial institutions on the Board of Directors. In particular, Principle 4 of the guidelines requires the board to use Board Committees to enhance its effectiveness in the execution of its duties and these committees include the Audit Committee, Risk Management Committee, Credit Review Committee and Asset and Liabilities Committee.

During the on-site inspection process, one of the evaluation criteria used to assess the effectiveness of management and board oversight includes an evaluation of the experience and skills of management and board members and a review of board minutes and minutes of other board committees.

2. Sound Capital Assessment

The second feature of Principle 1 is addressed by the provisions of the *Statutory Instrument 184 of 1995 'Capital Adequacy Regulation'* outlined below:

Regulation 6 (3) requires banks to maintain risk weighted capital at levels in excess of the prudential minimum if it has weaknesses in the quality of its assets, diversification of risk, liquidity or earnings; and *Regulation 23* requires that in implementing capital adequacy standards, this should be done on a bank-by-bank basis and that this should rely on the size of each bank, diversification of its assets and liabilities, degree of risk exposure, level of profitability and management strength including liquidity.

The legal framework in its current form has no explicit provision for a capital adequacy assessment framework, although it is implied from the regulations that banks are supposed to maintain capital in relation to their risk exposures. However, under the new capital accord, there is an explicit requirement for banks to establish a framework that assesses all the risks that a bank is exposed to and relates the level of risks to capital levels and a system to monitor compliance to the set targets. This needs to be provided for explicitly in the legislation. It would also be desirable if capital assessment was provided for in the risk management guidelines in order to give further guidance. Guidance for banks is necessary because capital adequacy compliance has mostly been driven by the need to comply with supervisory requirements rather than by a deliberate assessment of risk by the individual banks.

3. Comprehensive Assessment of Risks

The third feature of Principle 1 is catered for by the following regulatory provisions:

Section 67 of the BFS - provides for the establishment of audit committees in banking institutions

Regulation 4, 5 and 6, Classification and Provisioning of Loans Regulations of SI No.142 of 1996 provides for the establishment of a loan policy, loan review system and the loan review committee.

Regulation 4 of the Foreign Exchange Risk Management and Exposure Regulation of SI No. 57 of 1996 requires the management of foreign exchange exposures to be within the framework of a comprehensive risk management plan.

CB Circular No. 2/2000 requires banks to establish risk management systems and mechanisms for the identification, measurement, monitoring and control of major banking risks.

Furthermore, the Bank of Zambia is in the process of fully implementing the Risk Based Supervision framework. This will be complemented by updated risk management guidelines for commercial banks.

4. Monitoring and Reporting

With regard to the fourth feature of Principle 1, the regulatory framework is provided by the regulations outlined below:

Section 67 of the BFSA requires each bank to establish an audit committee and specifies that the audit committee comprise at least three directors. The committee's mandate includes reviewing the bank's financial statements, returns to the regulator, internal control procedures and meetings with the internal auditor to review the effectiveness of the internal control procedures practiced by the bank.

Regulation 6 of Classification and Provisioning of Loans Regulations of SI 142 provides for the establishment of a board loan review committee, whose mandate includes a quarterly review of the quality and collectability of the loan portfolio.

5. Internal Control Review

The fifth and last feature of Principle 1 of Pillar II draws its regulatory support from *Section 67* of the BFSA which requires each bank to establish an audit committee and specifies that the audit committee comprise at least three directors of which the majority must be non-executive directors.

Principle 2: 'Supervisors should review and evaluate banks' internal capital adequacy assessments and strategies, as well as their ability to monitor and ensure their compliance with regulatory capital ratios. Supervisors should take appropriate supervisory action if they are not satisfied with the result of this process.'

Principle 2 outlines the supervisors' responsibility to review and evaluate banks' internal capital adequacy assessments and capital strategies and the ability to monitor and ensure compliance to regulatory capital ratios. This responsibility is executed through on-site inspections, off-site monitoring and meetings with management. In essence compliance to Principles 16-19 of the 25 BCP denotes compliance with Principle 2 of Pillar II and in this regard, the independent assessment undertaken in 2001 showed that Zambia was compliant with regard to Principles 16-19 of the BCP.

The legal framework, as provided under the BFSA, supporting the implementation of Principle 2 of Pillar II is outlined below:

Section 60 requires commercial banks to submit monthly prudential returns; *Section 78* gives the BoZ authority to inspect banks and financial institutions; *Section 79* empowers supervisors to access any information, accounts and records and to obtain representations from management and other employees that are necessary for the conduct of the supervisory process; and *Sections 36* makes it an offence to make false or misleading statements or report to the regulator; and

In addition, *Section 55* of the BoZ Act empowers the Bank of Zambia to carry out periodic

inspections of banks in Zambia.

Principle 3: 'Supervisors should expect banks to operate above the minimum regulatory capital ratios and should have the ability to require banks to hold capital in excess of the minimum'.

Principle 3 outlines the supervisors' responsibility to require banks to operate with a buffer of capital over and above the minimum requirement. Currently, the prescribed minimum capital requirements for banks operating in Zambia are 5% for tier 1 capital and 10% for total capital. Both these ratios are above the levels prescribed by the Basel Committee on Banking Supervision.

The supervisor's responsibility to require banks to operate above the minimum capital ratios and the ability to require banks to hold capital in excess of the minimum is in line with Principle 6 of the BCP which deals with capital adequacy. As noted earlier, Zambia was found to be largely compliant in the 2001 assessment.

The following provisions of the BFSA provide the legal framework for capital adequacy:

Section 83 of the BFSA requires the Bank of Zambia to prescribe the minimum required primary capital for banks in line with internationally accepted guidelines;

Capital Adequacy Regulations in *SI No. 184* outline the capital adequacy requirements including definitions of Primary and Secondary Capital;

Regulation 6 (1) of Capital Adequacy Regulations in SI No. 184 requires all banks to maintain a minimum capital adequacy ratio of not less than 10% which is above that established in the Basel Capital Accord;

Regulation 6 (3) of Capital Adequacy Regulations in SI No. 184 provides for a bank to hold capital in excess of minimum capital and requires 'a bank or financial institution operating at or near a minimum of 5% (Tier I) and 10% (Tier II) to maintain capital well in excess of the above ratios if it has serious weaknesses in the quality of its assets, diversification of risk, liquidity or earnings; and

Regulation 25 of Capital Adequacy Regulations in SI No. 184 deals with capital deficiency especially when read with Regulation 6 particularly the part that requires Bank of Zambia to "direct that such bank or financial institution effect an increase of its capital or a reduction of its assets and off-balance sheet exposures within a period of three months".

Under the current capital computation, capital requirements are calculated only for credit risk. There is no framework for assessing market risk other than foreign exchange risk while other categories of market risk like interest rate risk are monitored internally by the banks and reviewed in the course of on-site examinations. The Bank of Zambia's monitoring of foreign exchange risk is based on foreign exchange open position limits. There is no specific capital charge. However, under the on-going Basel II implementation process, the Bank of Zambia is in the process of introducing a framework for measuring capital requirements for all the components of market risk.

Principle 4: "Supervisors should seek to intervene at an early stage to prevent capital from falling below the minimum levels required to support the risk characteristics of a particular bank and should require rapid remedial action if capital is not maintained or restored".

The supervisors' responsibility to intervene should a bank's capital fall below the minimum level and require the bank to take remedial action is covered by Principle 22 of the BCP. The 2001 assessment rated Zambia as being materially non-compliant in this respect. However, the BFSA has provisions for supervisory intervention as listed below:

Section 37 of the BFSA suspension or dismissal of directors and senior officers;

Section 83 of the BFSA and *Regulation 25 of SI No. 184* provide that if the bank has insufficient capital, the BoZ, in accordance with powers under *Section 77*, shall direct the bank concerned to increase its capital or reduce its assets within a period of three months;

Regulation 26 of Statutory Instrument No. 184 of 1995 (Capital Adequacy Regulations) states that if a bank incurs capital deficiencies (below minimum capital) for a continuous period of 14 days, it shall not grant new loans and issuance of guarantees without the prior approval of BoZ;

Section 77 of the BFSA empowers BoZ to enter into agreement with the bank to establish a program to counteract the unsound and unsafe practices in order to establish or maintain safe and sound practices in the conduct of the bank;

Section 86 of the BFSA specifies that a bank is insolvent when it ceases to be able to meet its liabilities or the amount of its regulatory capital requirement is nil or lower;

Section 87 of the BFSA provides that a bank which is insolvent shall not receive deposits or enter into any new or continue to conduct any existing or banking services except that which is incidental for the preservation of the asset; and

Section 81 of the BFSA enables the Bank of Zambia to impose the following, supervisory actions: taking possession of the bank with powers and procedures as described under section 84 of the Act including sale of the bank, restructuring, or closing of the bank; suspending the bank's license for a period not exceeding six months; restricting the bank's license; and, revoking the bank's license.

IV The Third Pillar Market Discipline

The Basel Committee on Banking Supervision believes that the introduction of disclosure requirements in Pillar III under the Basel II framework will encourage market discipline and in turn promote financial stability¹⁹.

Market discipline is premised on the recognition that markets contain disciplinary mechanisms that can reinforce the efforts of supervisors by rewarding banks that manage risk effectively and penalising those whose risk management is inept or imprudent²⁰.

The keys to market discipline are informational transparency and well-functioning markets. Sound accounting systems are necessary for informational transparency. Therefore, the quality of accounting standards and their effective implementation can contribute to strengthening the banking system and should facilitate market discipline by promoting transparent financial reporting of bank's financial position and performance, risk exposures and risk management activities²¹.

It is important to note from the onset that disclosure refers to publicly available information about a bank's activities, performance, risks and environment. Disclosure is very important because it enhances transparency and enables informed decision making, thereby promoting market discipline.

¹⁹Basel Committee on Banking Supervision J(june 2006) International Convergence of Capital Measurement and Capital Standards, A Revised Framework, Comprehensive Version, paragraph 808-812.

²⁰Banking Systems, Basel Committee on Banking Supervision (September 1998) Enhancing Bank Transparency, Public Disclosure and Supervisory Information that Promote Safety and Soundness.

²¹ Caruana, J (2004): After-dinner remarks of Jaime Caruana, Governor of the Bank of Spain and Chairman of the Basel Committee on Banking Supervision "Accounting, Transparency and Bank Stability workshop" at the Bank for International Settlements, May, 2004.

In Zambia, under the current regulatory and accounting requirements, most of the requisite information should already be captured in the bank's management information systems. The Banking and Financial Services Act requires that financial information and other information such as risk management processes, internal controls, directors' interests, etc., be prepared in accordance 'with generally accepted accounting principles consistently applied'²².

From the accounting regulation perspective, Zambia currently subscribes to the requirements of the International Financial Reporting Standards (IFRSs), which are issued by the International Accounting Standards Board (IASB)²³. The IASB's primary objective is to develop, in the public interest, a single set of high quality, understandable and enforceable global accounting standards that require high quality, transparent and comparable information in financial statements and other financial reporting²⁴.

In August 2005, the IASB issued a comprehensive accounting standard that deals with most disclosures on financial instruments. The standard is called IFRS 7 *Financial Instruments: Disclosures*, and deals with disclosure requirements in relation to all risks arising from financial instruments. The IFRS is effective for annual periods beginning on or after 1 January 2007. IFRS 7 requires an entity to disclose information on the significance of financial instruments to the entity's financial position and performance, the nature and extent of risk exposures arising from financial instruments and the approach taken in managing those risks.

Concurrently, the IASB also amended IAS 1, *Presentation of Financial Statements*, to include disclosure requirements on the entity's objectives, policies and processes for managing capital²⁵.

Pillar III requires banks to provide appropriate disclosures on the bank's capital and capital adequacy. Specifically, banks are required to disclose information on capital structure, capital adequacy and both quantitative and qualitative disclosures regarding the risks to which the banks are exposed and the techniques that banks use to identify, measure, monitor and control those risks.

Both IFRS 7 and Pillar III have many similarities regarding the information to be disclosed. In fact the IASB state that their guidance on implementing IFRS 7 is consistent with the disclosure requirements for banks under Pillar III²⁶. The Basel Committee also expressly acknowledge that a Pillar III disclosure framework should not conflict with the requirements under accounting standards, which are broader in scope²⁷. It is thus expected that in situations where the disclosures are made under accounting requirements, banks may rely on them to fulfil the applicable Pillar III expectations, and should only explain where there are material differences.

²²The Banking and Financial Services Act, Chapter 387 of the Laws of Zambia, s56 (1) and s56 (2).

²³The Zambia Institute of Chartered Accountants (ZICA), a statutory body created under an act of parliament (Accountants Act, 1982), has directed that all entities registered in Zambia should adopt the IFRSs. ZICA among other things is mandated to regulate and govern the conduct of its members in the practice of their business or profession (The Accountants Bill, 2004). The Bank of Zambia generally requires that a bank's CFO be a member of ZICA, or its equivalent.

²⁴Preface to International Financial Reporting Standards, par 6(a).

²⁵IAS 1 Presentation of Financial Statements, paragraph 124A. In order to comply with the principal in paragraph 124 (A), an entity should disclose some of the following disclosures: (a) qualitative information - a description of what it manages as capital; when an entity is subject to externally imposed capital requirements the nature of those requirements and how those requirements are incorporated into the management of capital; and how it is meeting its objectives for managing capital; (b) summary quantitative data about what it manages as capital; and (c) whether during the period it complied with any externally imposed capital requirements to which it is subject; and when it has not complied, the consequences of such non-compliance.

²⁶Basis for Conclusions on IFRS 7 Financial Instruments: Disclosures, paragraph BC41.

²⁷International Convergence of Capital Measurement and Capital Standards, A Revised Framework, Comprehensive Version, June 2006, paragraph 813-816.

The IASB indicates that the reason for issuing IFRS 7 is that 'users of financial statements need information about an entity's exposure to risks and how those risks are managed. Greater transparency regarding those risks allows users to make more informed judgments about risk and return'²⁸. This is similar to the rationale for Pillar III'²⁸. According to the Basel Committee, Pillar III is aimed at 'encouraging market discipline by developing a set of disclosure requirements which will allow market participants to assess key pieces of information on the scope of application, capital, risk exposures, risk assessment processes, and hence the capital adequacy of the institution'.

A comparison of the disclosure requirements of IFRS 7 and those in Pillar III of Basel II reveals the following similarities: (a) disclosures through the eyes of management approach; (b) only material information to be disclosed; (c) proprietary and confidential information is protected; (d) disclosure of both qualitative and quantitative information; (e) disclosure of risk exposure by type of risk; and (f) disclosure of capital (this is included in IAS 1, paragraphs 124A-C, Capital). These similarities mean that when IFRS7 was officially implemented on 1 January 2007, it was to a large extent expected meet the Pillar III disclosure requirements, and therefore negated the argument that the implementation of Basel II for third world countries would be a difficult task due to lack of appropriate disclosure information.

However, while IFRS 7 and Pillar III approach disclosure issues in a similar manner, it is insufficient to simply rely on IFRS 7 alone for the banking industry. This is largely due to conceptual differences between accounting regulation and prudential regulation (Appendix 3 highlights some of these differences). Banking supervisors generally take a more prudent approach than that offered by accounting rules and conventions, particularly with regard to the measurement and disclosure of regulatory capital. The Bank of Zambia can therefore develop a set of regulations on disclosures which should be aimed at reconciling the disclosure requirements from both Pillar III and IFRS 7; so that banks and financial institutions can prepare a single co-ordinated set of disclosures about financial risks and capital adequacy. The Bank of Zambia has sufficient authority to issue the said regulations as provided for under sections 56(b) and 124 of the Banking and Financial Services Act.

IV. Conclusion

The primary objective of this paper has been to demystify the requirements of Basel II such that it is not perceived as an insurmountable challenge to the Zambian banking sector. Granted, the requirements for Pillar I, particularly the Internal Ratings-Based Approaches necessitate the need for statistically cognisant staff resources. This presents a critical challenge to the banking sector in Zambia, given the propensity by the commercial banks to engage persons with skills and qualifications which do not necessarily take into account statistical capabilities.

Notwithstanding the foregoing, it is evident from the discussion on Pillars II and III that the Zambian supervisory framework is to a large extent within the realm of Basel II requirements. It has been noted that there are gaps which will need to be bridged to fully bring the current framework to the requirements of Basel II. However, the key consideration is that the Zambian supervisory framework is on track to bridging the gap. A notable prerequisite will be to ensure that enforcement is ably backed by statutory guidance.

²⁸IFRS 7, Financial Instruments: Disclosures, paragraph IN2.

³⁰Basel Committee on Banking Supervision (June 2006) International Convergence of Capital Measurement and Capital Standards, A Revised Framework, Comprehensive Version, paragraph 809-810.

It is also important to note that Basel II is a development which cannot be ignored. The financial markets are forever evolving and the financial sector is always developing tools and innovations to try and capture the many risks that encompass exposures to the real sector. The end result is that specialisms have developed in the financial industry and the process of monitoring, validating and verification necessitates that the supervisory authorities do the same.

Appendix 1 Summary Compliance with the Basel Core Principles: 2001 FSAP

Core Principle	C ^{1/}	LC ^{2/}	MNC ^{3/}	NC ^{4/}	NA ^{5/}
1. Objectives, Autonomy, Powers, and Resources			X		
1.1 Objectives		X			
1.2 Independence			X		
1.3 Legal framework		X			
1.4 Enforcement powers		X			
1.5 Legal protection	X				
1.6 Information sharing			X		
2. Permissible Activities		X			
3. Licensing Criteria		X			
4. Ownership			X		
5. Investment Criteria			X		
6. Capital Adequacy		X			
7. Credit Policies		X			
8. Loan Evaluation and Loan-Loss Provisioning		X			
9. Large Exposure Limits		X			
10. Connected Lending		X			
11. Country Risk				X	
12. Market Risks			X		
13. Other Risks			X		
14. Internal Control and Audit			X		
15. Money Laundering			X		
16. On-Site and Off-Site Supervision		X			
17. Bank Management Contact		X			
18. Off-Site Supervision		X			
19. Validation of Supervisory Information		X			
20. Consolidated Supervision			X		
21. Accounting Standards		X			
22. Remedial Measures			X		
23. Globally Consolidated Supervision		X			
24. Host Country Supervision		X			
25. Supervision Over Foreign Banks Establishments		X			

^{1/} C: Compliant.

^{2/} LC: Largely compliant.

^{3/} MNC: Materially non-compliant.

^{4/} NC: Non-compliant.

^{5/} NA: Not applicable.

Appendix 2

Basel Core Principles

Principle 1(1): An effective system of banking supervision will have clear responsibilities and objectives for each agency involved in the supervision of banks.

Principle 1(2): Each such agency should possess operational independence and adequate resources.

Principle 1(3): A suitable legal framework for banking supervision is also necessary, including provisions relating to authorisation of banking establishments and their ongoing supervision.

Principle 1(4): A suitable legal framework for banking supervision is also necessary, including powers to address compliance with laws as well as safety and soundness concerns.

Principle 1(5): A suitable legal framework for banking supervision is also necessary including legal protection for supervisors.

Principle 1(6): Arrangements for sharing information between supervisors and protecting the confidentiality of such information should be in place.

Principle 2: The permissible activities of institutions that are licensed and subject to supervision as banks must be clearly defined, and the use of the word “bank” in names should be controlled as far as possible.

Principle 3: The licensing authority must have the right to set criteria and reject applications for establishments that do not meet the standards set. The licensing process, at a minimum, should consist of an assessment of the banking organisation's ownership structure, directors and senior management, its operating plan and internal controls, and its projected financial condition, including its capital base; where the proposed owner or parent organisation is a foreign bank, the prior consent of its home country supervisor should be obtained.

Principle 4: Banking supervisors must have the authority to review and reject any proposal to transfer significant ownership or controlling interests in existing banks to other parties.

Principle 5: Banking supervisors must have the authority to establish criteria for reviewing major acquisitions or investments by a bank and ensuring that corporate affiliations or structures do not expose the bank to undue risks or hinder effective supervision.

Principle 6: Banking supervisors must set minimum capital adequacy requirements for banks that reflect the risks that the bank undertakes, and must define the components of capital, bearing in mind its ability to absorb losses. For internationally active banks, these requirements must not be less than those established in the Basel Capital Accord.

Principle 7: An essential part of any supervisory system is the independent evaluation of a bank's policies, practices and procedures related to the granting of loans and making of investments and the ongoing management of the loan and investment portfolios.

Principle 8: Banking supervisors must be satisfied that banks establish and adhere to adequate policies, practices and procedures for evaluating the quality of assets and the adequacy of loan provisions and reserves.

Principle 9: Banking supervisors must be satisfied that banks have management information systems that enable management to identify concentrations within the

portfolio and supervisors must set limits to restrict bank exposures to single borrowers or groups of related borrowers.

Principle 10: In order to prevent abuses arising from connected lending, banking supervisors must have in place requirements that banks lend to related companies and individuals on an arm's length basis, that such extensions of credit are effectively monitored, and that other appropriate steps are taken to control or mitigate the risks.

Principle 11: Banking supervisors must be satisfied that banks have adequate policies and procedures for identifying, monitoring and controlling country risk and transfer risk in their international lending and investment activities, and for maintaining appropriate reserves against such risks.

Principle 12: Banking supervisors must be satisfied that banks have in place systems that accurately measure, monitor and adequately control market risks; supervisors should have powers to impose specific limits and /or a specific capital charge on market risk exposures, if warranted.

Principle 13: Banking supervisors must be satisfied that banks have in place a comprehensive risk management process (including appropriate board and senior management oversight) to identify, measure, monitor and control all other material risks and, where appropriate, to hold capital against these risks.

Principle 14: Banking supervisors must determine that banks have in place internal controls that are adequate for the nature and scale of their business. These should include clear arrangements for delegating authority and responsibility; separation of the functions that involve committing the bank, paying away its funds, and accounting for its assets and liabilities; reconciliation of these processes; safeguarding its assets; and appropriate independent internal or external audit and compliance functions to test adherence to these controls as well as applicable laws and regulations.

Principle 15: Banking supervisors must determine that banks have adequate policies, practices and procedures in place, including strict "Know Your Customer" rules that promote high ethical and professional standards in the financial sector and prevent the bank being used, intentionally or unintentionally, by criminal elements.

Principle 16: An effective banking supervisory system should consist of some form of both on-site and off-site supervision.

Principle 17: Banking supervisors must have regular contact with bank management and a thorough understanding of the institution's operations.

Principle 18: Banking supervisors must have a means of collecting, reviewing and analysing prudential reports and statistical returns from banks on a solo and consolidated basis.

Principle 19: Banking supervisors must have a means of independent validation of supervisory information either through on-site examinations or use of external auditors.

Principle 20: An essential element of banking supervision is the ability of the supervisors to supervise the banking group on a consolidated basis.

Principle 21: Banking supervisors must be satisfied that each bank maintains adequate records drawn up in accordance with consistent accounting policies and practices that enable the supervisor to obtain a true and fair view of the financial condition of the bank and the profitability of its business, and that the bank publishes on a regular basis financial statements that fairly reflect its condition.

Principle 22: Banking supervisors must have at their disposal adequate supervisory measures to bring about timely corrective action when banks fail to meet prudential requirements (such as minimum capital adequacy ratios), when there are regulatory violations, or where depositors are threatened in any other way. In extreme circumstances, this should include the ability to revoke the banking license or recommend its revocation.

Principle 23: Banking supervisors must practice global consolidated supervision over their internationally active banking organisations, adequately monitoring and applying appropriate prudential norms to all aspects of the business conducted by these banking organisations worldwide, primarily at their foreign branches, joint ventures and subsidiaries.

Principle 24: A key component of consolidated supervision is establishing contact and information exchange with the various other supervisors involved, primarily host country supervisory authorities.

Principle 25: Banking supervisors must require the local operations of foreign banks to be conducted to the same high standards as are required of domestic institutions and must have powers to share information needed by the home country supervisors of those banks for the purpose of carrying out consolidated supervision.

Appendix 3

Notable Differences between IFRS 7 and Pillar III

IFRS 7	PILLAR III
Accounting regulation - overall objective of general purpose financial statements (IAS 1.7)	Supervisory regulation (Framework, par 808 810, and 813, more focused)
Scope: all entities to all types of financial instruments, with limited exemptions (IFRS 7.3)	Scope: applies at the top consolidated level of the banking group (Framework, par 822)
Highly principle-based (based on explicit disclosure principle in IFRS 7.7, however , specific disclosures required to satisfy this principle, IFRS 7, Bc13)	More prescriptive detail some disclosures are qualifying criteria for use of particular methodologies (Framework, par 808-810)
No disclosure of operational risk IASB noted that definition and measurement of operational risk still in infancy stage and are not necessarily related to financial instruments, but included in a research project (IFRS 7, Bc65)	No disclosure of liquidity risk
Market risk: not necessary to analyze each risk factor separate, e.g. where an entity prepares a sensitivity analysis such as VaR (IFRS 7.4)1	Separate disclosure of market risk factors, for banks using SA and IMA; Equities and IRR in the banking book
Market risk: only sensitivity analysis required, including methods and assumptions (IFRS 7.40-42)	Market risk: general qualitative disclosure requirements (Framework, par 824) and the methods used to determine market risk and capital requirements.
Location: financial statements or cross reference	Location: appropriate medium and location to entity's discretion
No disclosure of back testing results	No ageing analysis of assets of past due but not impaired

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Statutory Instrument No. 184 of 1995 (Capital Adequacy Regulations) (can be downloaded from <http://www.boz.zm>)

