CHAPTER 1

INTRODUCTION

1.0   Background

At independence in 1964, Zambia was considered to be one of the most prosperous countries in Sub-Sahara Africa (SSA), having inherited very generous foreign reserves from the British Colonial government.   However, after political independence the Zambian government adopted a commandist/state controlled type of economy in order to accelerate development. The Socialist policies were characterized by nationalization of industries and the country witnessed the mushrooming of state controlled/run enterprises under Zambia industrial and mining corporation (ZIMCO), the industrial Development Corporation (INDECO), the mining Development Corporation (MINDECO) and Financial Development Corporation (FINDECO). Since most of "these" state enterprises were funded by the government using Taxpayers money, fundamentally this did not require the services of a capital market.   Most of "these" state enterprises started making losses, leading to the decline of the Zambian economy, mainly due to government intervention, mismanagement and inefficiency. As a result, Zambia's economy since the 1980s was characterized by growing foreign debt burden, balance of payments difficulties and lack of resources to support these state enterprises and to fund new investments.

In 1992 the second republic government privatized most of the state enterprises as part of economic reforms under structural adjustment programme. Now that the state enterprises were privatized, the government was no longer obliged to fund "these" enterprises but to find other alternative sources of funding. Hence, the government with the support of collaborating partners, found it necessary to form a capital market as an intermediation organization through which eligible companies would raise capital funds for investment in order to restore economic stability and growth.

LuSE which initially started as a financial and capital market development project UNDP/IFC/World Bank was opened for business on 21st February, 1994. Thus LuSE is relatively new and developing emerging capital market by international standards.

This is evident from African Stock Market Statistics in 2001 (Appendix: D). Since LuSE is a developing capital market, it may not be informationally efficient.

The stock market brings together various economic agents in its core function of moving resources from surplus units of the economy to deficit units. Economic agents raise long-term funds for financing new projects, expanding and modernizing industrial/commercial concerns by raising equity capital through issuing shares; and raising debt capital by issuing bonds, Osinubi(1998). The stock market gives investors the dual advantage of easy liquidity and better information gathering. This makes it easier for financial resources to be mobilized because the investors are willing to commit to long-term projects under these conditions. The investors quickly and cheaply alter their portfolio thereby reducing the riskiness of their investment and facilitating investments in projects that are more profitable though with a long gestation period.

The dual advantage of easy liquidity and better information gathering by the stock market can effectively be realised by the stock market if the stock market is informationally efficient . A stock market is informationally efficient if security prices adjust rapidly to the infusion of new information, Reilly and Brown (1997). The efficient market hypothesis is based on the "random walk hypothesis". The proposition of the random walk hypothesis is based on the premise that share prices or market returns do not follow any systematic pattern overtime but rather follow a random walk. This is to say that the direction of change as well as the size of change in market returns is random and cannot be predicted from past information about the share prices.

The fundamental economic functions of a capital market which is informationally efficient are as follows:

i) The capital markets channel funds from savers to firms, which use the funds to finance projects. Informational efficiency is necessary if funds allocated through the capital market are to flow to the highest valued projects.

Shareholders want management to maximize stock prices by ensuring that management undertakes only projects that increase the value of their

stock. However, maximization of stock prices can result in the capital market directing funds to the most valuable projects only if stocks are efficiently priced, in the sense of accurately reflecting the fundamental value of all future cash flows.

ii) Efficient capital markets make it easier for firms to raise capital because the markets determine the prices at which existing and potential security holders are willing to exchange claims on a firm's future cash flows.

iii) Investors who do not have the time or the resources to do extensive analysis, will be more willing to invest their savings in the market if they believe the securities they made in are accurately priced by providing accurate signals for resource allocation. This in turn helps the capital market to perform its function of translating savings into productive projects.

iv) There is a greater level of participation in the stock market. High participation in the market makes the market more liquid and increases the benefits of diversification for investors, leading to the development of the stock market.

Therefore, LuSE has to be informationally efficient if it has to optimally perform its fundamental economic functions.

1.1 Statement of the problem:

LuSE can be described to be a pre-emerging/emerging market by Global standards. Emerging markets are characterized by soaring returns and prospects of economic growth. However, emerging markets are prone to volatility.

The major problem is that certain emerging markets are not informationally efficient. The stock prices in "these" capital markets exhibit considerable serial correlation (price trends), non – random walk and evidence of manipulation by certain capital market participants with privileged information fundamental to the determination of stock prices, such that the classical economic role of channelling capital funds to

most productive sectors of the economy is not optimally performed by "these" capital markets.

The importance of the LuSE being informationally efficient cannot be over emphasized. This is depicted in LuSE brochure entitled "understanding the stock exchange (P1)" and reads "By bringing together all of the sellers and the buyers of a particular share, the LuSE ensures that both sellers and buyers get the best possible price. The LuSE is therefore an **efficient**, orderly and transparent market for shares and other securities." However, people cannot rely on self proclamation of being "efficient," but the "efficiency" has to be determined empirically. Hence the purpose of this research is to test the informational efficiency of the LuSE empirically.

1.2 General objective

To determine the informational efficiency of the Lusaka Stock Exchange

1.3 Specific Objectives

Principally and most important to test informational efficiency of the LuSE relative to money supply

To determine if there is any causality relationship between stock prices at LuSE and money supply in Zambia

1.4 Hypothesis

Stock market participants at the LUSE do not statistically significant incorporate the information contained in money supply into stock prices.

1.5 Justification and significance of the study

If LuSE is not informationally efficient with respect to relevant information such as money supply, then this has important implications at both the micro and macro level as follows:

  i) At the micro level this implies ability by certain LuSE participant individuals with access to privileged fundamental information in stock price determination to earn consistently higher than normal rates of return at the expense of those participants without access to such information.

ii) At the macro level, it raises serious doubts about the ability of the LuSE to perform its classical economic role of channelling funds to the most productive sectors of the economy.

Therefore, the results of the study will be useful in the following manner:

a) If LuSE is informationally efficient with respect to relevant information, then this will give assurance to LuSE stakeholders that it's channelling the scarce resources (funds) to the most productive sectors of the economy. This may lead to growth in activities at LuSE leading to the growth of the country.

b) If LuSE is found to be informationally inefficient, then the key stakeholders such as SEC and other policy authorities will have the task to re-organize the capital market in such a manner as to make LuSE informationally efficient in order to address (i) and (ii) above.

c) Researchers and academics may benefit from the findings as may form part of their reference material. If need arises, the findings may trigger further research

CHAPTER 2

LITERATURE REVIEW

The "efficient market hypothesis (EMH) assets that financial markets are "informationally efficient," or that prices of traded assets already reflect all known information and therefore are unbiased in the sense that they reflect the collective beliefs of all investors about future prospects. Thus it is not possible to consistently outperform the market by using any information that the market already knows, except through luck. Information or news is defined as anything that may affect prices that appears randomly in the future, Fama (1970).

The EMH assumes that agents have a rational expectation; that on average the population is correct and whenever new relevant information appears; the agents update their expectations appropriately.

When faced with new information, some investors may over-react and some may under-react. All that is required is that investors reactions be random and follow a normal distribution pattern so that the net effect on market prices cannot be reliably exploited to make an abnormal profit, especially when considering transaction costs, Fama (1965, 1970).

Efficient capital markets are commonly thought of as markets in which security prices fully reflect all relevant information that is available about the fundamental value of the securities because a security is a claim on future cash flows, this fundamental value is the present value of the future cash flows that the owner of the security expects to receive. The cash flows anticipated for stocks consist of the stream of expected dividends paid to stockholders plus the expected price of the stock when sold. In the present value calculation, future cash flows are discounted by an interest rate that is a function of the riskiness of those cash flows. The riskier the cash flows, the higher is the rate used in discounting, Rozeff (1974).

Theoretically, the profit opportunities represented by the existence of "undervalued" and "overvalued" stock motivate competitive trading by investors that move the

prices of stocks toward the present value of the future cash flows. Thus, investors search for mispriced stocks and their subsequent trading make the market efficient.

Due to technological innovation, information is now relatively cheap to obtain and process. It is in this environment and active security analysis that the theory of efficient capital markets has developed. As fama (1991) notes, market efficiency is a continuum. The lower the transaction costs in a market, including the costs of obtaining information and trading, the more efficient the market. In the United States reliable information about firms is relatively cheap to obtain (partly due to mandated disclosure and partly due to technology of information provision) and trading securities is cheap. For those reasons, United State security markets are thought to be relatively efficient.

The study of capital market efficiency examines how much, how fast and how accurately available information is incorporated into security prices. Fama (1970) classified efficiency into three categories based on what is meant by "available information." These categories are: the weak, semi-strong, and strong forms.

i) Weak – form efficiency: This exists if security prices fully reflect all the information contained in history of past prices and returns (the return is the profit on the security calculated as a percentage of an initial price. If capital markets are weak – form efficient, then investors cannot earn excess profits from trading rules based on past prices or returns. Therefore, stock returns are not predictable and so called technical analysis (analyzing patterns in past prices movements) is useless.

ii) Semi strong – form efficiency: Under this type of efficiency, security prices fully reflect all public information. Thus, only traders with access to non public information, such as some corporate insiders, can earn excess profits. Under weak form efficiency, some public information about fundamentals may not yet be reflected in prices. Thus a superior analyst can profit from trading on the discovery of, or a better interpretation of public information. Under semi-strong form of efficiency, the market

reacts so quickly to the release of new information that there are no profitable trading opportunities based on public information.

iii) Strong – form efficiency; under this efficiency, all information - even apparent company secrets is incorporated in security prices; thus no investor can earn excess profit trading on public or non public information.

A simple way to distinguish among the three forms of market efficiency is to recognize that weak form precludes only technical analysis from being profitable, while semi-strong form precludes the profitability of both technical and fundamental analysis, and strong form implies that even those with privileged information cannot expect to earn excess returns. Grossman and Stiglitz (1980) recognize that an extremely high level of market efficiency is internally inconsistent: it would preclude the profitable opportunities necessary to motivate the very security analysis required to produce information. Their main point is that market frictions, including the costs of security analysis and trading, limit market efficiency. Thus, we should expect to see the level of efficiency differ across markets, depending on the cost of analysis and trading. Although weak-form efficiency allows for profitable fundamental analysis, it is not difficult to imagine a market that is less than weak-form but relatively efficient in some sense. Thus, it can be useful to define the efficiency of a market in a more general, continuous sense, with faster price reaction equating to greater informational efficiency.

While most of the empirical research of the 1970s supported semi-strong market efficiency, a number of apparent inconsistencies arose by the late 1970s and early 1980s. These so called anomalies include, the "small-firm effect" and "January effect," which together document the tendency of small capitalization stocks to earn excessive returns, especially in January.

Fama and French (1988) found that stocks earn larger returns during more difficult economic conditions when capital is relatively scarce and the default-risk premiums in interest rates are high.

Shleifer and Vishny (1997) noted that, while market efficiency requires traders to act quickly on their information out of fear of losing their advantage, mispricing can persist because it offers few opportunities for low-risk arbitrage trading.

A large amount of empirical research has been directed at answering whether capital markets are efficient. Most research has used stock price data for two reasons:

 i)   Stock prices are easily available.

 ii) The stock market is likely to be less efficient than other securities markets (such as the bond market) because cash flows paid to stockholders are relatively uncertain, and there is no terminal payoff as in a bond. Therefore, stocks are relatively difficult to value, and evidence of stock market efficiency would be compelling evidence of efficiency in securities markets in general.

Some economists, and market practitioners however cannot believe that man made markets are "informationally efficient" when there are prima- facie reasons for inefficiency including the slow diffusion of information, the relatively great power of some market participants, and the existence of apparently sophisticated professional investors. The way that markets react to surprising news is perhaps the most visible flow in the efficient market hypothesis as news is not instantaneously taken account of in stock prices, but rather takes time.

The debate on how well security prices reflect fundamental values remains unsettled. There is however, overwhelming evidence that on average the initial stock price response to new information is at least in the correct direction. This means that the theory of efficient capital markets provides a useful framework for analyzing many problems.

There is evidence of strong relationship between money supply and stock prices [Brunner (1961), Friedman (1961), Friedman and Schwartz (1963). Changes in monetary variables do result in stock price changes and changes in monetary variables, on average do lead changes in stock prices, Sprinkel (1964), Palmer

(1970), Homa and Jaffee (1971), Keran (1971), Reilly and Lewis (1971), Hamburger and kochin (1972), and Meigs (1972)].

Past studies of money supply and stock prices agree that stock returns lag behind changes in money supply. Sprinkel (1964), Palmer (1970), Reilly and Lewis (1971) and Homa and Jaffee (1970) explicitly reach this conclusion with Sprinkel (1964) and Homa and Jaffee (1971) attempting to develop profitable trading rules using the Lag. Keran (1971) implicitly assumes market inefficiency. All these studies are inconsistent with the efficient market model (EM model).

In the efficient market model, stock returns do not lag behind growth rates of the money supply and that no profitable trading rules using past values of the money supply exist, Rozeff (1974).

Other advantages of an informationally efficient capital markets are as follows:

i)   An informationally efficient market leads to high participation by investors. High participation in the market makes the market more liquid by reducing the sensitivity of market prices to the sale of equity and increases the benefits of diversification for investors and companies contemplating to enter the market, pagano (1989).

ii) High participation and liquidity of the stock market lead to the development of the stock market (Hargis (1997, 1998) and Hargis and Ramanlal (1997).

iii) Levin and Zervos (1995) show that stock market development, particularly in stock market liquidity, is significantly positively correlated with future economic growths and they further demonstrated that even after taking into account the role of the banking system, stock market development still remained significant in economic development.

Bencivenga et al (1992), Levin (1991), Saint Paul (1992) and Greenwood and Jovanovic (1990) in an attempt to explain the empirical findings of Levin and Zervos, show how liquid secondary capital markets help to allocate funds to projects

with the highest marginal product that stimulate economic growth. Thus, stock markets increase the productivity of capital by improving liquidity, enhancing portfolio diversification opportunities and gathering information on the profitability of the concerned projects whose stocks are traded on the stock exchange.

Stock market investments tend to have higher returns in the long-term than in the short-term. In the short-term, the investor may face unanticipated liquidity shocks and may be forced to sale the intended long-term investments prematurely. Liquidity is the easiness and quickness with which one has to sale the asset. Liquidity in the capital market can be enhanced by way of the marketability of the asset on one hand, and the price stability of that asset on the other.

However, significant price changes of the asset may take place if substantial new information is released into the market. The availability of liquid capital markets help in lowering the cost of capital that may arise from the risk of not liquidating an asset as fast as possible and it increases investment in more productive assets and leads to higher rates of economic growth.

A stock market encourages portfolio diversification of the firm.   An economy with a diversifiable equity market is likely to have higher productivity and consequently growth. It must be emphasized that the benefits of the stock market development require an active market. But a market can only be active if the market participants view the market as being "efficient" where they can get the best possible price for their shares.

 An informationally efficient capital market is believed by most financial economists to be a prerequisite for a well functioning securities market. A well functioning securities market is one of the important components of a good financial system that supports economic growth Rousseau and Sylla (2000). It mobilizes savings, allocating capital, exerting corporate control and easing risk management. A well functioning financial system is essential to sustainable economic growth and development Schumpeter (1912), Mc Kinnon (1973) and Shaw (1973). The stock market affects economic growth and development through a number of channels such as: liquidity, risk diversification, acquisition of information about firms, corporate governance and savings mobilization Levine and Zervos, (1996). However Stiglitz (1985) suggests that stock markets can impair economic growth due to

liquidity which leads to a reduction in savings rate as a result of externalities in capital accumulation. Robinson (1952) argues that financial systems do not spur economic growth but rather financial development simply responds to development in the real sector.

In light of the existing theoretical controversy on the relationship between stock markets and economic growth, i am in support of the assertion that financial markets (stock market in particular) do explain economic growth and development. This is because a study of Inanga and Emenuga (1997) shows that development of the stock market provides opportunities for greater funds mobilization, improved efficiency in financial resource allocation and provision of relevant information for productive projects appraisal.

Beginning with the early work of sprinkel (1964), several studies have attempted to gauge statistically the reaction of the stock market to changes in money supply. The money supply-market relationship has been widely tested because of the belief that money supply changes have important direct effects through portfolio changes and indirect effects through their effect on real activity variables, which are in turn postulated to be fundamental determinants of stock prices. Given the importance of money supply changes in the determination of stock prices, an important question to ask is "how efficiently do stock market participants incorporate the information contained in money supply changes into stock prices"? The answer is important because if the market is inefficient with respect to relevant information, then this has important implications at both the micro and macro level. At the micro level this implies an ability by individuals to earn consistently higher than normal rates of return. At the macro level, it raises serious doubts about the ability of the market to perform its classical role of channelling funds to the most productive sectors of the economy.

An efficient stock market is a source of sustainable equity finance for corporations and other investors. It may also offer sustainable benefits to the economy as follows:

- Companies are able to unlock hidden value for their investors via the more active trading of their shares on the stock market like LuSE.

- Listed and quoted companies are able to access commercial credit easily from financial lending institutions because of the known information about the financial standing and performance of such companies through the high disclosure requirements they are subjected to.

  The investors in listed quoted companies have an easy exit mechanism from investing in "these" companies in case they wish to do so.

  Therefore, there is need to determine the informational efficiency of LuSE empirically.

Transmission Mechanism from Money Supply Prices to Stock Prices and vice-versa.

Generally speaking, the monetary transmission mechanism represents the mechanism of transmission of monetary impulses on the financial system and the real economy (goods and services). It is manifested through several types of transmission channels: interest rate channel, assets price channel (shares, real estate and so on), bank lending channel, balance sheet channel and household liquidity channel.

In accordance with the traditional understanding of the concept, the liquidity effect occurs as a result of monetary transmission through the interest rate channel. According to Keynesian interpretations (see for example Dornbusch and fisher, 1987) liquidity growth (a more expansionary monetary policy) decreases normal interest rates and enables more investments and more house hold and government spending. This leads to a two-way stimulating effect between money supply growth and output growth. Money supply growth leads to increases in output and greater output stimulates further growth of the money supply and demand for liquidity.

Monetarists, Friedman and Schwartz (1963) stress the feedback effect through which increased demand for money subsequently stimulates the growth of normal interest rates. As a result, the fisher effect occurs in the long-run related to the growth of inflation expectations and the effect of real money. Speedy development of financial market and a growing degree of liberalisation of international financial transactions increase the importance of the asset price channel and the activity of asymmetric information in the monetary transmission mechanism. As a result, the transmission of

liquidity through the financial system and the economy partially changes as well as the initial and feedback monetary effects on the movement of consumer prices and asset prices. Apart from interest rate movements, changes in the aggregate demand and income effects have been increasingly determined by stock price movements, housing price movements, land price movements as well as the price of foreign money in terms of domestic currency. All this is in accordance with monetary views according to which changes in monetary policy simultaneously influence prices in different markets of financial assets and durable goods and particularly in the stock market and real estate market. Therefore, changes in the prices of these goods can cause major and considerable effects on output and employment through spending. According to Mishkin (2004) there are three types of asset channels: foreign exchange channel, Tobin's Q ratio channel and wealth channel. In the case of expansionary monetary policy and fall in interest rates, the foreign exchange channel reflects depreciation effects on net export growth, and through effects on the prices of imported goods it effects the formation of the aggregate level of prices in the national economy. Tobin's Q ratio channel includes effects of increased money supply on the public demand for different forms of assets and subsequent effects of asset price changes on economic movements.

High stock prices allow businesses smaller costs of financing investments through issuing of new shares. Similar increases in real estate prices, which increase their market value in relation to construction costs, lead to bigger investments in the construction sector, which has a positive effect on national income. The growth of the market value of shares and real estate increases the wealth of their owners in monetary terms Tobin (1969).

Credit expansion triggers money supply growth and generates growth in spending and appreciation of asset prices through the wealth effects. Credit and monetary expansion increases the demand for financial and non-financial forms of assets, which in turn stimulates the increase in asset prices. In the cause – effects relationship an increase in market value of assets used as collateral enables more borrowing by businesses and households and result in periods of continuous growth of banks credits. The credit channel of monetary transmission operates by means of the balance sheet channel, which deepens the relationship between asset price movements and movements in the real sphere of the economy. Companies whose

shares quotes better on the stock exchange and which have better financial standing gain an opportunity to borrow even more and subsequently leading to more money supply.

The definitional statement that in an efficient capital market, share prices "fully reflect" available information is so general that it has no empirically testable implications. To make the model testable, the process of price formation must be specified in more detail, fama (1970). Hence, the need determine informational efficiency of LuSE with respect to monetary policy. However, I must point out that there are many ways of determining informational efficiency of capital markets such as "Expected Return or 'Fair Game' models"; "the sub-martingale model"; "the Random walk model" and so on. In general, the empirical tests of capital market efficiency have not been comprehensive.

The method used in this study was done by Mookerjee (1987). His study tested for "market efficiency" in the following countries: France, Japan, Italy, Canada, Germany, United Kingdom, Netherlands, Switzerland and Belgium. The USA was also included in the sample set of countries for comparison.

To test the information efficiency of the stock market in the various countries in the sample set, the causality test developed by Granger (1969) was used. The period of analysis was from January 1975 to March 1985. For all countries, stock prices we measured as an index of stock prices. Two measures of the money supply were used in the analysis. Narrowly defined money supply (MI) and broadly defined monetary supply (M2). Both measures of the monetary supply were used because there was no priori evidence about which measures of the money supply stock market participants view as the more accurate proxy to gauge the monetary policy actions of the authorities.

Employing the narrow measure of money supply (M1), it was seen that for Japan, Italy and Switzerland, the full hypothesis that money does not cause stock prices can be rejected and the hypothesis that stock price causes money at the 5% level of significance cannot be rejected. This stock market in Canada and the UK can be characterized as informationally efficient because of a finding of unidirectional causality from stock price to money supply. The results for France, the USA,

Germany and Netherlands, however, suggested that money (MI) and stock prices were independent.

The monthly results that employed the broad measure of money supply (M2) again showed inefficiencies in the stock market in Japan and Italy. Interestingly, the Canadian stock market exhibited informational inefficiencies with respect to M2. This suggests that market participants were not fully exploiting the information contained in changes in M2. However, this did not appear to be the case with M1. The stock markets in the UK and Netherlands appeared to be efficient with respect to the broad money.

For the Netherlands, this result when contrasted with the results using M1, suggested that it was the broad measure of money supply that was the more relevant gauge of monetary policy, from the point of view of stock market participants.

The results using quarterly data showed that only the Italian stock market appeared to be inefficient with respect to the quarterly narrow money supply (M1). For all other countries, no temporal ordering could be established with money and stock prices.

This result, when compared with the monthly results, showed that the longer the time period (quarterly as opposed to monthly), the more time the market has to assimilate into stock prices the information contained in the money supply data. The analysis employing the broad measure of money supply again shows that only the Italian stock market is inefficient. Based on the results thus far, it appeared that the Italian stock market was the most inefficient compared to the other stock markets especially since both quarterly and monthly money supply data (M1 and M2) can be used to predict stock prices.

Another interesting finding was that France and the USA, regardless of the time period or the monetary aggregate used, no temporal ordering could be established between money and stock prices.

CHAPTER 3

OVERVIEW OF LUSAKA STOCK EXCHANGE (LuSE) AND BANK OF ZAMBIA (BOZ)

In this section 3.1 to 3.4 is looking at the overview of LuSE and 3.5 is looking at the overview of BOZ.

3.1 Overview of LuSE:

The stock market like LuSE is an economic institution that is common in most developing and developed countries. It brings together economic agents in its core function of moving resources from surplus units of the economy to deficit units. It enables firms and the government in particular to raise long-term funds through equity and debt capital for financing new projects, expanding and modernizing commercial/industrial concerns, Osinubi (1998). The stock market gives investors the dual advantage of easy liquidity and better information gathering. This makes it easier for resources to be mobilized because the investors are willing to commit to long-term projects in an efficient market. It is argued that well functioning stock markets can increase economic efficiency, investments and growth thereby directing capital to investments with good returns Greenwood and Jovanovich, (1990).

Economic literature explicitly identifies two channels through which domestic resource mobilization affects growth and development. These are the money markets and the capital markets. Although in developing countries the common practice was to place emphasis on the money market as the principal source of mobilizing domestic resources and ignore the capital market, the stock market are now booming in developing countries and are beginning to account for a larger share of world stock market boom. In the U.S.A when the stock market capitalization rose from US$ 4.7 trillion to US$ 15.2 trillion in the 1984 to 1995 period, emerging market capitalization as a percentage of world stock market capitalization jumped from less than 4 percent to almost 13 percent in the same period, Levine and Zervos, (1998).

The concept of stock market development is generally defined in terms of activity, liquidity and size of the market. An increase in any of these three measures suggests stock market   development.

LuSE was established in December 1993 and was officially opened for business on 21st February 1994, largely as a result of the financial reforms and privatisation exercise undertaken in the early 1990's.

The international finance corporation (IFC) and the world bank provided the preparation technical assistance for the establishment of the LuSE and in its first two years of operations the LuSE was funded by the United Nations Development Programme (UNDP) and Government of Zambia as a project. The LuSE is incorporated as a non-profit limited liability company owned by stock broking corporate members of the LuSE, with each member having a single share.

LuSE was established with the following objectives: to provide a source of long-term capital mainly to the privatised companies in a fair and transparent process; to encourage the international community to invest in Zambia; to provide an opportunity to the Zambians people to invest in the privatised companies as a way of promoting wealth creation through wide ownership of shares; to facilitate the privatisation of state-owned enterprises as part of economic reforms; and provide an orderly, transparent market for the secondary trading of shares and other marketable securities.

The LuSE is owned by corporate members who are also licensed dealers and stock brokers. A dealer is a market practitioner who is able to transact in LuSE instruments from their own account while a stock broker is a market player that is licensed to act as an intermediary between buyers and sellers in transactions involving the LuSE. To become a member of the LuSE, a firm must meet the Securities and Exchange Commission (SEC) of Zambia's capital requirements as well as pay an initial membership fee. It must also be a licensed brokers/ dealer with the SEC of Zambia.

3.2 Market Regulation

The operations of the LuSE are governed by the Securities Act (No 38) of 1993 Cap 354 of the Laws of Zambia and all subsequent statutory instruments that have been passed to assist in the implementation of the Securities Act. The implementations of the Securities Act are in the hands of Securities and Exchange Commission (SEC) Zambia which regulates the activities of LuSE.

SEC regulates both primary market offering and secondary market trading of activities. It is responsible for ensuring that all players in the market comply with the existing securities legislation, thus ensuring investors protection and the orderly transaction of business in the public securities market.

The securities act defines publicly traded securities as those of a public company that has more than 50 shareholders or those that the SEC has by notice declared to be publicly traded. Under the act, all public companies are required to register their securities with SEC. they are required to submit interim and annual reports and accounts to the SEC. they are required to report any facts that may affect the value of their shares.

The main providers of professional services on the LuSE are the securities brokerage firms whose names and addresses are publicised in the LuSE brochures at regular intervals and obtainable from LuSE free of charge. The registered brokers play a dual role of dealers in their own account and also act as principal intermediaries between buyers and sellers in securities at LuSE. Thus, the brokers handle all documentation relating to the buying and selling of securities at LuSE and they play a big role in approving the listing of instruments on the LuSE. Every listing application must be sponsored by a stock broking firms before its listing is approved by the LuSE board.

All transactions at Lusaka stock exchange central securities depository (LuSE CSD) which is 50% owned by LuSE and 50% by sub-custodian banks (Barclays Bank (Z) PLC and Stanbic Bank (Z) PLC. All orders to buy and sell securities traded on the LuSE are entered into the computer. When there is a match between a buy and a sell, a transaction takes place for the security in question. This is believed to be an efficient way of transacting orders as the price reflects the wishes of both buyers and sellers in question. Trading on the LuSE takes place without certificates being transferred when a change of ownership of a security takes place. Instead the transactions are recorded on the accounts of the buyers and sellers maintained at LuSE CSD which every holder of a security is required to open. Thus, the account of the selling party is debited and the account of the buying is credited. This system has an advantage over the issuance of certificates in that certificates are prone to fraud because they can be forged or manipulated to indicate that a party owns a given

amount of securities when it does not. This makes the CSD system more full proof than the certificate based system.

Lusaka Stock Exchange (LuSE) is simply a market place for people to buy and sell shares in companies and deal in debt instruments like bonds.

LuSE is a two-tier market for both listed and quoted companies. A listed company is one which has a presence on the top tier of the LuSE, the listed tier. The listed tier is composed of Public Limited Companies (PLCs) that have met the minimum requirements for that firm to be listed on the LuSE and have had their listings approved by the LuSE Listing Committee and the full LuSE Board, and have paid the listing fee commensurate with the market value of their issued capital.

For a company to get a LuSE listing it must have recorded profits for three consecutive years prior to the application for listing and that it should have a minimum of three hundred shareholders, among other requirements.

A company that has registered its issued equity securities with the Securities and Exchange Commission (SEC) Zambia will automatically be quoted on the LuSE although a quoted company has not met the requirements to be listed on the LuSE, it is expected that this company will work towards being a listed company.

Listed companies enjoy a number of advantages over quoted companies. The most important one being that they get a 2 percent reduction in the level of corporate tax applied on them from 35 percent to 33 percent. They also do not attract a 2.5 percent capital gains tax when a transaction takes place.

Table 1: Listed companies and their line of business.

Name	Activity
African Explosives Zambia Plc	Manufacture of explosives
British American Tobacco Zambia Plc	Marketing and distribution of cigarettes
BP Zambia Plc	Oil marketing and distribution
Cavmont Capital Holdings Zambia Plc	Holding company for a number of banks in Zambia
Copperbelt Energy Corporation Plc	Distribution of hydro-electric power to the mines
Farmers House Plc	Real estate company
Investment Bank Zambia Plc	Commercial bank
Lafarge Cement Zambia Plc	Cement producing company
National Breweries Plc	Production, distribution and marketing of beer
Pamodzi Holdings Zambia Plc	Holding company for a number of hotels in Zambia
Primer Re-insurance Zambia Plc	Insurance company
Standard Chartered Bank Zambia Plc	Commercial bank
Shoprite Holdings Zambia Plc	Super market chain
Zambian Breweries Plc	Production, distribution and marketing of beer
Zain Zambia Plc	Mobile communications company
Zambia Consolidated Copper Mines Plc	Holding company for a number of mines in Zambia
Zambeef Plc	Agriculture company
Zambia Metal Fabricators Plc	Manufacture of copper wires and related products
Zambia National Commercial Bank Plc	Commercial bank
Zambia Sugar Company Plc	Production, distribution and marketing of sugar

Source: Lusaka Stock Exchange

The LuSE has since grown in terms of both the number of listing and the market capitalisation. The number of listed companies had increased from 4 companies at inception in 1994 to 20 companies as at 31st December 2009.

Table 2: Trends in LuSE Performance

The performance of the market can be examined through a number of traditional indicators such as the size of market, liquidity and the number of listings.

Table 2: Stock Market Indicators

Year	Market Capitalization (Kbil) (1)	Total Value of Shares Traded (Kbil) (2)	GDP (3)	Market Capitalization Ratio (4) = (1 ÷ 3)	Share Traded Ratio (5) = (2 ÷ 3)	Turnover Ratio (6) = (2÷ 1)
1995	412.892	0.217	2,176.903	18.967	0.010	0.053
1996	297.013	3.428	2,328.057	12.758	0.147	1.154
1997	1,006.674	11.588	2,404.904	41.859	0.482	1.151
1998	706.004	5.871	2,360.203	29.913	0.249	0.832
1999	767.267	32.990	2,412.729	31.801	1.367	4.300
2000	978.480	25.292	2,499.044	39.154	1.012	2.585
2001	966.084	189.829	2,621.311	36.855	7.242	19.649
2002	1,060.554	10.886	2,707.889	39.165	0.402	1.026

2003	3,438.189	49.444	2,846.511	120.786	1.737	1.438
2004	7,754.893	33.527	2,999.206	258.565	1.118	0.432
2005	8,594.606	68.527	3,155.901	272.334	2.171	0.797
2006	13,072.466	86.555	3,351.704	390.024	2.582	0.662
2007	18,872.945	293.064	3,542.467	532.763	8.273	1.553

Source: Lusaka Stock Exchange

Market capitalization is often used as a measure of the size of the market. It equals the total value of all listed shares. In terms of economic significance, the assumption is that market size and the ability to mobilize capital and diversify risk are positively correlated Osinubi, (1998). Table 2 shows that the LuSE market capitalization has increased significantly over the period under study, from 412 billion Kwacha in 1995 to 18,872 billion kwacha in 2007.

LuSE facilitates the raising of capital by companies through its primary and secondary market functions. The primary market function is done when securities are offered for sale to the public for the first time. The secondary market, on the other hand is a mechanism through which the already issued and bought issues are resold and bought by other investors. The secondary market is the most active one given the low number of Initial Public Offerings and other debt issues placed in the primary market of LuSE. The trading activities on LuSE are on daily basis which are perceived in a way to give LuSE a fairly liquid market.

  Many economists have been claiming that the development of financial markets is a critical factor that stimulates economic growth.

3.3 LuSE Trading Rules and Procedures

This section is outlining the basic rules and procedures that facilitate the promotion of informational efficiency of the LuSE so that the trade participants bargain for the best possible price of their stock price trades.

Members must execute all transactions in listed securities and exchange traded securities only during trading sessions on the LuSE **Order Entry Forms.**

The LuSE trades on business days Monday to Friday excluding public holidays. The first trading session of the day is between 10:00 and 11:00 and the second and last session is from 12:00 to 13:00 hours.

The exchange trading facility shall be open for receipt of orders for 60 minutes before the commencement of the trading session and for 60 minutes after the end of the session.

A shareholder or would be shareholder does not deal directly with LuSE. One must use a licensed broker that is a member of the LuSE. The first step is to contact one of the LuSE member stockbrokers and open an account with that stockbroker. Once your account is opened, you may buy or sell shares through your broker upon your instructions to your broker by either telephone, facsimile or in person and the broker executes these instructions as either buy or sell orders on the exchange.

The broker charges 1.375% of the value of the transaction for transacting on the LuSE. For big transactions, the amount can be negotiated down.

Prospective buyers and sellers of shares make orders through their stock brokers indicating clearly which shares and the volume of shares they are intending to buy or sale and their preferred buying prices and selling prices respectively. These stockbrokers then lodge these orders with LuSE exchange staff during trading sessions. The LuSE staff then key in these orders from stockbrokers to produce a single summary for the session which matches these orders on a price, client and time priority basis. At any time prior to execution a member may change or cancel an order. This is accomplished by retrieving a copy of the original order entry form

and adding "CFO" (Change Former Order) or "CXL (cancel) to the heading. This is important so that buyers and sellers have the opportunity to change their earlier preferred buying and selling prices respectively in the light of new information in the market.

At regular intervals, LuSE during each business day, a summary of the best bids and offers for all securities are disseminated to members and the media. Prior to the start of trading, only the "indicated opening price "will be revealed and not the overlapping- limit prices. At no time will the identity of the members submitting the orders or their client/non – client status be revealed, either before or after execution. A member's own order status in a queue may be revealed by exchange staff.

Using the matching order summaries from LuSE, the stockbrokers link the buyers and sellers whose orders match for possible execution of the trade. As the trades are executed, the stock prices of different shares are established for the daily and the last prices to be transacted become the closing stocks prices for the day which effectively become the opening stock price balances for the following day.

A trade is the action of transacting in securities on the LuSE. A trade is affected when buyers and sellers orders match at a given price.

Client orders shall have priority over non-client orders at the same price, regardless of time of entry into the market, except in the case where a non – client order was the first to establish a new market prices. For instance, when the member's non client order is the first to submit the highest bid (lowest offer) for a security. A non-client order is any order for an account controlled by an employee of a member firm.

No person shall use or knowingly participate in the use of any manipulative or deceptive method of trading in connection with the purchase or sale of any security, listed or unlisted, which creates or may create a false or misleading appearance of trading activity or an artificial price for the said security.

Short sales are prohibited unless permitted by the Board on a case – by – case basis and in accordance with the act. A short sale is any sale of a security which the seller does not own.

Members must disclose to clients where there is an actual or potential conflict of interest in the solicitation, acceptance or execution of a client order. Such disclosures must be made when the order is received, or if not known at the time, as soon as practicable thereafter.

To ensure that necessary information is available to stock participants, LuSE has put in place the following measures:

At the completion of a trade, a trading record is completed by exchange staff. The trading reports are either transmitted via facsimile to the parties involved or put in a pick-up box. Members must check the exchange produced reports for accuracy as soon as possible and report errors or omissions to the exchange no later than 10:00hrs on the next trading day.

Closing share prices can be obtained freely from the LuSE or the LuSE website (www.LuSE.com.zm). They are also published during weekdays in the Times of Zambia Newspaper – business section and are aired daily on the Zambia National Broadcasting Corporation (ZNBC) Television main evening News. The LuSE also has value added subscription services in the form of the Daily Stock News, weekly stock news and the monthly news flash.

All companies that have their securities listed or quoted on the LuSE are required to publish in the National print media, information that can materially affect the value of the price of one's securities. Failure to publish such information in the press can result in severe penalties for the directors and management of such companies. In addition, all companies are to abide by the LuSE's corporate governance code which has strict guidelines.

The LuSE has no restrictions on foreign participations implying that investors can participate freely in all secondary market as well as all non privatisation new listings.

Therefore, the establishment of the LuSE has made it easier for foreign capital to flow into the country.

Table 3: **Foreign Portfolio Investment**

ANALYSIS OF FOREIGN PORTFOLIO INVESTMENT ON THE LuSE				
	Buying(US$)	Selling(US$)	Total Turnover	Net Position
YEAR	Inflows	Outflows	US$	US$
1997	3,801,540	(2,368,497)	6,170,037	1,433,043
1998	1,719,529	(900,758)	2,620,288	818,771
1999	13,151,800	(608,692)	13,760,492	12,543,108
2000	6,529,591	(7,439,005)	13,760,492	(909,414)
2001	39,219,858	(31,695,715)	70,915,573	7,524,143
2002	477,930	(739,963)	1,217,893	(262,033)
2003	4,577,321	(2,326,223)	6,903,544	2,251,098
2004	4,752,958	(4,827,514)	5,430,842	(74,556)
2005	8,255,606	(2,947,514)	11,203,481	5,307,731
2006	11,691,163	(3,729,399)	15,420,562	7,961,764

Source: Lusaka Stock Exchange

Lastly, investors who are aggrieved can lodge a complaint with the SEC Zambia, which is empowered by the securities Act to ensure that the interests of investors are adequately protected.

Note that from inception LuSE has been using a manual system in its trading activities until November 2008 when it was automated.

3.4 Challenges facing the LuSE

Despite the increased level of activity, the LuSE still remains largely illiquid and inaccessible to many members of the public. It is inaccessible not only because most of the people are unable to invest as a result of weak domestic savings base, but also because most people in Zambia are not yet acquainted with the operational mechanism of the LuSE as a result of inadequate publicity. Therefore, the LuSE faces a number of challenges in its quest to be a modern stock exchange and to contribute fully to the well being of the economy. Some of the challenges are discussed below.

3.4.1 Low Liquidity

The trend in the market performance in Table 1 shows that the LuSE is a small and illiquid market. This is evidenced by the low turnover ratio, caused by the limited number of floatation. This problem is common in most markets in developing countries as noted by Senbet and Otchere (2008). There is usually a huge gap between buy and sell orders, which results in few trades taking place in the market. Two reasons account for this; the first one being that there are insufficient numbers of shares available for trading (usually called free float) there were only 21 listed companies as at the end of 2009 as indicated in table1 above. Most companies on the LuSE have a free float of less than 30 percent while the remaining 70 percent of their shares is held by majority shareholders and is not available to trade. This results in lack of shares on the sell side even in cases where the bid offer is significantly higher than the market price. The second reason is that the large institutional investors such as pension funds and insurance companies have a buy and hold strategy because they want to match their investments with their long term liabilities. Therefore, there is need for the LuSE to increase the number of listed companies in order to increase trading.

3.4.2 Public Awareness

There is inadequate public awareness on the role, functions and operations of the LuSE among potential investors and firms. The percentage of savers holding shares on the LuSE is low and a majority of firms which are not listed on the exchange are just not fully aware of the proper functions of the LuSE. There is therefore a need for

the LuSE and the capital market as a whole to embark on a massive sensitization campaign. Educating potential investors is crucial for increasing the general investor base and empowering investors to perform the analysis of risk and return in the investment process. The lack of adequate knowledge of the majority of the interested investors about the LuSE operations could be a major hindrance to participation on the stock market.

3.4.3 Competition from Money Markets

Money markets are markets mainly for short-term finance, usually a year or less, unlike capital markets which are mainly for longer term finance exceeding one year. The money markets for short-term loans are functioning fairly well in Zambia and quite a good number of people can purchase short-term assets like treasury bills and certificates of deposits. This creates a significant amount of competition for the capital market as some people will want to purchase the short-term assets. The result is that the LuSE becomes limited in terms of number of investors and hence hindering its speed of development.

This chapter has provided an overview of the Lusaka Stock Exchange. As noted, the LuSE is still in its development phase and it faces a number of challenges in realizing its full potential. It is also noted that the LuSE has had significant positive impact on the economy since its inception. Foreign capital inflows have increased owing to the establishment of the LuSE and other positives like increased market capitalization or value of the listed companies is noted and is actually paralleled by increase in the GDP as indicated in tables 1, 2 and 3 above.

3.6 Overview of the Bank of Zambia

Monetary policy in Zambia is the responsibility of the Bank of Zambia. It involves the manipulation of money supply and interest rates in the management of the economy. The money supply is the stock of money existing at any particular point in time. Money supply in any economy is a very important part of monetary policy.

According to BOZ, narrow money (M1) is made up of currency with non- banks, kwacha demand deposits, and bills payable; broad money (M2) is made up of M1,

Time and Saving deposits and forex demand deposits and M3 is made up of M2 plus foreign currency deposits.

The money supply M1, M2 and M3 data are published fortnightly by BOZ on its website. However it is not publicised in the print media for general public consumption. This makes it difficult for most capital market participants to incorporate information contained in money supply in the determination of stock prices.

The effectiveness of monetary policy depends on its ability to alter the behaviour of economic agents. Such monetary policy has important influence on macroeconomic variables such as real gross domestic product (GDP) consumption, investment general level of prices or inflation, earnings and so on. Through changes in money supply, some dominant macroeconomic variables, both direct and indirect, are likely to influence stock prices on the capital market like LuSE, by influencing stock market participants' expectations of future economic activities. Monetary policy is thought to play an important role in determining equity returns. It is also believed that the behaviour of equity markets influences monetary policy decisions Rigobon and Sack (2003).

However, due to inability by most investors at LuSE to analyse financial data that include money supply, they may not be incorporating the information contained in financial data in stock price determination. This inability to analyse financial data by most investors at LuSE is worsened by the fact that most of these investors are computer illiterate and do not possess the appropriate qualification to undertake financial analysis.

CHAPTER 4

METHODOLOGY

This study used desk research, largely to run a regression model developed by Granger (1969) using monthly and quarterly secondary time series data from BOZ on money supply and stock price index from LuSE for the period from January 1999 to December 2009.

The quantitative analysis in this study was complemented by qualitative insights to be derived from interviews with key officials at BOZ money market department and key officials from LuSE and leading stock broking firms. The regression analysis used ordinary least squares (OLS) method.

All measures of the money supply are used because there is no priori evidence about which measure of the money supply stock market participants view as the more accurate proxy to gauge the monetary policy actions of the authorities.

I have used the whole stock price index data as they are representative of stock price changes for all the companies listed and quoted on LuSE.

Model specification

The analysis in this study is based on the model developed by Granger (1969) and as used by   Mookerjee (1987).

Causality from stock prices to money supply and vice-versa.

$$SP_t = \sum_{j=0}^{n} a_j \, SP_{t-j} + \sum_{i=0}^{m} b_j \, M_{t-j} + U_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$M_t - \sum_{j=0}^{n} c_j \, SP_{t-j} + \sum_{i=0}^{m} d_j \, M_{t-j} + v_t \ \dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

Where:

- u and v are not correlated and

- $E(u_t, u_s) = 0, E[v_1, v_s] = 0, for$ all $t \neq s.$

- $SP_1 =$Stock prices index for the time t

- $M_t =$ Money supply for the time t.

➢

$$\sum_{i=0}^{n} a_j \, SP_{t-j}$$
$$= sum \ of \ the \ product \ of \ lagged \ values \ of \ stock \ prices \ index$$

$$\sum_{i=0}^{n} b_j M_{t-i} = sum \ of \ product \ of \ lagged \ values \ of \ money \ supply$$

$U_t=$ Disturbance term for time period t.

$$\sum_{i=0}^{n} c_j SP_{t-i} = sum \ of \ product \ of \ lagged \ values \ of \ stock \ prices \ index$$

$$\sum_{i=1}^{m} d_j M_{t-j} = sum\ of\ product\ of\ lagged\ values\ of\ money\ supply$$

- $V_t = Disturbance\ term\ for\ time\ period\ t.$
- a_j = Coefficient in the j th year for stock price.
- b_j = Coefficient in the j th year for money supply.
- c_j = Coefficient in the j th year.
- d_j = Coefficient in the j th year.
- n represents the end period of Stock Price index series
- m represent the end period of Money Supply series

The Granger's definition of causality relies on the predictability of a time series. Formally the proposition can be stated as follows, Mookerjee(1987):

If $6^2(^x/_x ,y) < 6^2 (^x/_x)$ then y is said to cause x. The term $6^2(^x/_x ,y)$ is the prediction error variance of x derived from the information set that includes past values of x and y. The term 6^2 (x 1x) is the variance of the prediction error of x based on information contained only in the past values of x.

If however, $6^2(^y/_y ,x) < 6^2 (^y/_y)$, then x is said to cause Y Bi-directional causality is said to occur when the above outcomes occur simultaneously. Finally it 6^2 (x/x) < 6^2 (x 1x, y) and $6^2 (^y/_y)< 6^2(^y/_y ,x)$, then the two series are not temporally related overtime, and are therefore, independent.

> Causality from money to stock prices would be implied if the estimated coefficients on the lagged money supply variables as a group are significantly different from zero in equation 1, and the coefficients of the lagged stock prices variables as a group in equation 2 are not significantly different from zero. This finding would suggest informational inefficiency.

From equations 1 and 2, unidirectional causality from stock prices to money supply can be established if the estimated coefficients on the lagged money supply variables as a group are not significantly different from zero in equation 1 and the estimated coefficients on the lagged stock prices variables are significantly different from zero in equation 2. This finding would imply informational efficiency.

> If however, the estimated coefficients of the lagged variables of both stock price and money supply as a group in equations 1 and 2 are significantly different from zero, then bi-directional causality is implied between stock prices and the money supply. This finding would also imply stock market efficiency.
>
> Finally, if the estimated coefficients on the lagged variables of both stock price and money supply as a group in equations 1 and 2 are not significantly different from zero, then no causality is implied between stock price and money and the two series are not temporally related to each other and are independent.

It should be noted that the above outlined method is not the only method for testing market efficiency.

However, in empirical work, the direct test of Granger causality, as outlined above has been found to be the most efficient, see Guilkey and Saleni,(1982), although controversy still pervades the causality literature, and various methodological and philosophical critiques associated with different aspects of causality tests abound, e.g. Zellner(1979; Jacobs et al (1979)

CHAPTER 5

ANALYSIS OF EMPIRICAL FINDINGS

5.1 Procedure for the Regression Analysis

The monthly and quarterly data of stock price index (SPI) and money supply M1, M2, and M3 collected from LuSE and BOZ respectively from January 1999 to December 2009 were entered into Microsoft (MS) Excel sheet, which were then exported to E-views software for analysis purposes. Firstly, the verification of the data entered in excel was done to ensure that data was correctly entered and then the data was imported into E-views. Then unit root (ADF) test was applied to check the stationary status of the data in order to have good analysis. After the unit roots test, the co-integration test was applied in order to establish whether there was a long run equilibrium relationship between the variables after establishing that the used financial market Time series were non-stationary in levels. After establishing that the used financial market time series were first difference stationary, the granger causality test then was applied to measure the causal relationship between stock price index and money supply; and finally used the F-ratio to determine the informational efficiency of LuSE, as the F-ratio can determine the significance of the coefficients of the variables used in measuring model which are important in determining the informational efficiency of LuSE.

5.2 Unit Root Tests

The type of financial data used in this research is time series data. Time series data is a set of observations on the values that a variable takes at different times. Empirical work based on time series data assumes that the underlying time series is stationary.

A time series is stationary if its mean and variance do not vary systematically overtime. If a time series is stationary, its mean, variance and auto covariance at various lags remain the same no matter at what point we measure them, that is, they are time invariant. Such a time series will tend to return to its mean (called mean reversion).

If a time series is non stationary, we can study its behaviour only for the time period under consideration. As a consequence it is not possible to generalise it to other time periods. Therefore, for the purpose of forecasting, such (non-stationary) time series may be of little practical value. If the variables are non-stationary, the residual, U_t, is non-stationary and standard results for OLS do not hold.

The stationarity of a time series has important implication for regression analysis since the classical tests of regression analysis, such as the T-test and F-test are based on the assumption that time series are stationary. Consequently the validity of coefficients on explanatory variables is based on stationary results. If, however, a time series process exhibit non-stationarity, standard test statistics are longer valid and concerns arise over interpreting coefficients that are spurious or non-sense regression results.

Causality tests of granger and Sims assume that the time series involved in analysis are stationary. Therefore, tests of stationary should precede tests of causality.

All the variables included in the model were subjected to the unit root test to establish whether they are stationary or not. Hence, I subjected the variables to the Augmented Dickey-Fuller (ADF) test using E-Views. The results are shown in tables 6 and 7 below. Table 6 and 7 give the results of the ADF unit root tests at levels and at first difference.

Table 4: Results for Unit Root Tests for Variables at Levels

	ADF TEST SPECIFICATION WITH INTERCEPT BUT NO TREND			ADF TEST SPECIFICATION WITH INTERCEPT AND TREND			I(d)	Critical values 5%	CONCLUSION
	ADF	DW	LAG	ADF	DW	LAG			
LnSPI	-0.7428	2.0077	1.0000	-1.2866	2.0153	1.0000		-2.8837	Non stationary in levels
LnM1	-1.6389	2.0364	1.0000	-2.1080	2.0273	1.0000		-2.8837	Non stationary in levels
LnM2	-2.0776	1.9830	1.0000	-2.3660	1.9755	1.0000		-2.8842	Non stationary in levels
LnM3	-1.7592	2.0228	1.0000	-2.5509	2.0280	1.0000		-2.8837	Non stationary in levels

Table 6 reveals presence of unit roots in all the variables at their levels indicating that the variables are non-stationary as the Augmented Dickey – Filler (ADF) estimated values in absolute terms are less than the critical values. Therefore this leads to testing for stationary at first difference of the variables as shown in table7 below.

Table 5: <u>Results For Unit Root Tests For Variables At First Difference</u>

	ADF TEST SPECIFICATION WITH INTERCEPT BUT NO TREND			ADF TEST SPECIFICATION WITH INTERCEPT AND TREND			I(d)	Critical values 5%	CONCLUSION
	ADF	DW	LAG	ADF	DW	LAG			
LnSPI	-7.1197	2.0127	1.0000	--	-	-	I(1)	-2.8838	First difference stationary
LnM1	-8.8952	2.0046	1.0000	-	-	-	I(1)	-2.8838	First difference stationary
LnM2	-8.6072	2.0005	1.0000	-	-	-	I(1)	-2.8838	First difference stationary
LnM3	-8.6375	2.0041	1.0000	-	-	-	I(1)	-2.8838	First difference stationary

The results in the Table 7 reveal that the variables become stationary after the first difference as the Augment Dickey – Filler (ADF) estimated values in absolute terms are greater than the critical values.

5.3 Co- integration Test

The Non-stationary of the variables at their levels compels a test for co-integration to establish whether there is the long-run relationship among the variables. Engle and Granger (1987) argue that it is dangerous to do any kind of estimation prior to testing for co-integration. The problem was that statistical inference associated with stationary process is no longer valid if the time series are indeed realizations of non-stationary processes. This is no longer the case as Clive Granger showed that macroeconomic models containing Non-stationary stochastic variables can be constructed in such a way that the results are both statistically sound and economically meaningful by introducing the concept of co-integrated variables, which has radically changed the way empirical models of macroeconomic relationships are formulated today. The table below shows the co-integration test.

Table 6: Co-integration test

Variables	ADF computed statistic	MacKinnon critical Values @10%	Order of integration
Residual for M1 and SP1	-2.710997	-2.5787	I(0)
Residual for M2 and SP1	-2.838384	-2.5787	I(0)
Residual for M3 and SP1	-3.004112	-2.5787	I(0)

From the table above since the computed ADF statistic is greater than the critical values in absolute terms; it means that money supply and stock prices at LuSE are co-integrated in the long-run. This means that there is a relationship between money

supply and stock prices. Thus changes in money supply causes changes in stock prices and vice-versa in the long-run.

 5.4 Granger Causality Test

Granger causality is a technique for determining whether one time series is useful in forecasting another. A time series X_t is said to Granger cause y_t if it can be shown, usually through a series of F – tests on legged values of X_t (and with lagged values of Y_t also known), that those X_t values provide statistically significant information about future values of Y_t.

Sometimes econometricians use the shorter – terms "causes" as short hand for "Granger causes". You should notice, however, that Granger causality is not causality in a common sense of the word. It just talks about linear prediction, and it only has "teeth" if one thing happens before another-thing and helps predict it and nothing else.

In this case, if money supply "Granger Causes" shares prices, then past values of money supply should contain information that helps predict stock prices above and beyond the information contained in past values of stock price alone. Also if share prices "Granger – Causes" money supply, then past values of share prices should contain information that helps predict money supply above and beyond the information contained in past values of money supply alone.

Often you will have money supply Granger causes share prices and share prices Granger causes money supply. In this case we talk about a feedback system.

In short, Granger (1969) approach to the question of whether x causes y is to see how much of the current y can be explained by past values of y and then to see whether adding lagged values of x can improve the explanation. y is said to be Granger-caused by x if x helps in the prediction of y, or equivalently if the coefficients on the lagged x's are statistically significant. Note that two-way causation is frequently the case; x Granger causes y and y Granger causes x.

It is important to note that the statement "x Granger causes y" does not imply that y is the effect or the result of x. Granger causality measures precedence and

information content but does not by itself indicate causality in the more common use of the term.

5.4.1 Granger Causality Test Using Monthly Money Supply and Share Price Index.

The Granger Causality test assumes that the information relevant to the prediction of the respective variables, share price index (SPI) and money supply (M), is contained solely in the time series data on these variables; taking the first differences of the variables makes them stationary, if they are not already stationary in the level form; the error terms entering the causality test are uncorrelated. The test involves estimating the following pair of regressions:

$$SP_t = \sum_{j=0}^{n} a_j\, SP_{t-j} + \sum_{i=0}^{m} b_j\, M_{t-j} + U_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$M_t = \sum_{j=0}^{n} c_j\, SP_{t-j} + \sum_{i=0}^{m} d_j\, M_{t-j} + v_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where u and v are not correlated

From Equations 1 and 2, unidirectional causality from stock prices to money supply can be established if the estimated coefficients on the lagged stock price variables are significantly different from zero in equation 2 (C≠ 0), and the estimated coefficients on the lagged money supply variables as a group

are not significantly different from zero in equation1 (b=0) this finding would imply information efficiency, Mookerjee (1987).

Causality from money to stock prices would be implied if the estimated coefficient on the lagged money supply variables as a group are significantly different from zero in Equation 1, and the coefficients of the lagged stock prices variables as a group in equation 2 are not significantly different from zero. This finding would suggest informational inefficiency Mookerjee (1987).

If, however, the estimated coefficient of the lagged variables of both stock prices and money supply as a group in equations 1 and 2 are significantly different from zero, then bidirectional causality is implied between stock prices and the money supply. This finding would also imply stock market efficiency Mookerjee (1987).

Finally, if the estimated coefficients on the lagged variables of both stock price and money supply as a group in equation 1 and 2 are not significantly different from zero, then no causality is implied between stock prices and money supply and the two series are not temporally related to each other and are independent Mookerjee (1987).

A related issue regarding tests of causality is the determination of the appropriate finite lag lengths for the two variables. The usual practice is to choose a lag length that ensures white noise residuals, which is a requirement for Granger causality tests. To ensure white noise residuals, a twelve – period lag was used for the monthly series while a four – period lag was used with the quarterly data. However, Thornton and batten (1985) have shown that the rejection of the null hypothesis of no granger causality is sensitive to the lag lengths selection. Therefore, different lag lengths on money supply and stock price index were also used. Specifically, following Geweke's (1978) suggestion, the logs on the dependent variable are kept at twelve and four, and the number of lags on the independent variable is reduced to six and two for monthly and quarterly data respectively. The reduction of the lag lengths on the independent variable not only allows for a test of the robustness of the results but also increases the power of the test.

Following convention, all four series were first converted to growth rates which were generated as the first difference of log of each series. Furthermore in order to induce covariance stationary and ensure white noise residuals, all estimates employed a constant term and a time trend. Note that most multiple regression models include a constant term, since this ensures that the model will be "unbiased", that is to say the mean of the residuals will be exactly zero.

For robustness and consistency of the results the maximum lags tested was 12, 6 and 3.

COMPARING THE F VALUE WITH THE F CRITICAL THERE IS NO GRANGER CAUSALITY IN EITHER DIRECTION IN TABLE 9.

Table 7: GRANGER CAUSALITY BETWEEN SP1 AND M1 FOR MONTHLY DATA

HYPOTHESIS	Lag	F	p-values	Obs	Conclusion
DLNM1 does not Granger Cause DLNSP1	2	0.78824	0.45691	129	NS
DLNSP1 does not Granger Cause DLNM1	2	0.37043	0.6912	129	NS
DLNM1 does not Granger Cause DLNSP1	3	1.07923	0.36062	128	NS
DLNSP1 does not Granger Cause DLNM1	3	0.84575	0.47145	128	NS
DLNM1 does not Granger Cause DLNSP1	4	1.00355	0.40863	127	NS
DLNSP1 does not Granger Cause DLNM1	4	0.44828	0.77347	127	NS
DLNM1 does not Granger Cause DLNSP1	5	0.74767	0.58943	126	NS
DLNSP1 does not Granger Cause DLNM1	5	0.94514	0.45473	126	NS

DLNM1 does not Granger Cause DLNSP1	6	0.94371	0.4669	125	NS
DLNSP1 does not Granger Cause DLNM1	6	1.23709	0.2928	125	NS
DLNM1 does not Granger Cause DLNSP1	8	0.72979	0.66491	123	NS
DLNSP1 does not Granger Cause DLNM1	8	1.18613	0.31431	123	NS
DLNM1 does not Granger Cause DLNSP1	12	0.81805	0.63141	119	NS
DLNSP1 does not Granger Cause DLNM1	12	1.03747	0.42193	119	NS
Critical Values : 1% (2.79), 5%(2.09) 10%(1.77)					

NS=NOT SIGNIFICANT

SINCE THE F VALUE IS LESS THAN THE CRITICAL VALUE OF F AT ALL LEVEL OF SIGNIFICANCE, ABOVE RESULTS SHOWS THAT THERE IS NO CAUSALITY FROM STOCK PRICES TO M1 OR FROM M1 TO STOCK PRICES.

Table 8: GRANGER CAUSALITY BETWEEN SP1 AND M2 FOR MONTHLY DATA.

HYPOTHESI	Lag	F	p-values	Obs	Conclusion
DLNM2 does not Granger Cause DLNSP1	3	1.1613	0.32746	128	NS
DLNSP1 does not Granger Cause DLNM2	3	0.29001	0.83255	128	NS
DLNM2 does not Granger Cause DLNSP1	4	0.82393	0.51244	127	NS
DLNSP1 does not Granger Cause DLNM2	4	0.15857	0.95876	127	NS
DLNM2 does not Granger Cause DLNSP1	5	0.67989	0.63955	126	NS
DLNSP1 does not Granger Cause DLNM2	5	0.19976	0.96197	126	NS

DLNM2 does not Granger Cause DLNSP1	6	1.18936	0.31715	125	NS
DLNSP1 does not Granger Cause DLNM2	6	0.20435	0.97481	125	NS
DLNM2 does not Granger Cause DLNSP1	12	0.74111	0.70799	121	NS
DLNSP1 does not Granger Cause DLNM2	12	0.67962	0.76698	121	NS
Critical Values : 1% (2.79), 5%(2.09) 10%(1.77)					

SINCE THE F VALUE IS LESS THAN THE CRITICAL VALUE OF F AT ALL LEVEL OF SIGNIFICANCE,

ABOVE RESULTS SHOWS THAT THERE IS NO CAUSALITY FROM STOCK PRICES TO M2 OR FROM M2 TO STOCK PRICES

 Table 9: GRANGER CAUSALITY BETWEEMN SP1 AND M3 FOR MONTHLY DATA.

HYPOTHESIS	Lag	F	p-values	Obs	Conclusion
DLNSP1 does not Granger Cause DLNM3	2	0.3323	0.71791	129	NS
DLNM3 does not Granger Cause DLNSP1	3	1.10241	0.35096	128	NS
DLNSP1 does not Granger Cause DLNM3	3	0.21828	0.88355	128	NS
DLNM3 does not Granger Cause DLNSP1	4	0.75393	0.55734	127	NS
DLNSP1 does not Granger Cause DLNM3	4	0.10754	0.97969	127	NS
DLNM3 does not Granger Cause DLNSP1	5	0.58634	0.7104	126	NS
DLNSP1 does not Granger Cause DLNM3	5	0.1442	0.98139	126	NS
DLNM3 does not Granger	6	1.21848	0.30211	125	NS

Cause DLNSP1					
DLNSP1 does not Granger Cause DLNM3	6	0.1462	0.98946	125	NS
DLNM3 does not Granger Cause DLNSP1	8	0.90601	0.51449	123	NS
DLNSP1 does not Granger Cause DLNM3	8	0.22243	0.98619	123	NS
DLNM3 does not Granger Cause DLNSP1	10	0.76955	0.65756	121	NS
DLNSP1 does not Granger Cause DLNM3	10	0.3381	0.96856	121	NS
DLNM3 does not Granger Cause DLNSP1	12	0.78475	0.66473	119	NS
DLNSP1 does not Granger Cause DLNM3	12	0.62265	0.81812	119	NS
Critical Values : 1% (2.79), 5%(2.09) 10%(1.77)					

SINCE THE F VALUE IS LESS THAN THE CRITICAL VALUE OF F AT ALL LEVEL OF SIGNIFICANCE,

ABOVE RESULTS SHOWS THAT THERE IS NO CAUSALITY FROM STOCK PRICES TO M3 OR FROM M3 TO STOCK PRICES.

5.4.2 Granger Causality Test Using Quarterly Money Supply And Share Price Index

Table 12: SP1 AND M1 QUARTELY GRANGER CAUSALITY TEST

HYPHTESIS	Lag	F	p-values	Obs	Conclusion
DLNM1 does not Granger Cause DLNSP1	2	1.39149	0.26176	41	NS
DLNSP1 does not Granger Cause DLNM1	2	0.46073	0.63449	41	NS
DLNM1 does not Granger Cause DLNSP1	4	0.93633	0.45633	39	NS
DLNSP1 does not Granger Cause DLNM1	4	1.26575	0.30520	39	NS

Critical Values : 1% (3.12),   5%(2.25) 10%(1.87)

SINCE THE F VALUE IS LESS THAN THE CRITICAL VALUE OF F AT ALL LEVEL OF SIGNIFICANCE,

ABOVE RESULTS SHOWS THAT THERE IS NO CAUSALITY FROM STOCK PRICES TO M1 OR FROM M1 TO STOCK PRICES.

Table 10: GRANGER QUARTERLY CAUSALITY TEST BETWEEN SP1 AND M2

HYPTHESIS	Lag	F	p-values	Obs	Conclusion
DLNM2 does not Granger Cause DLNSP1	2	1.23948	0.30159	41	NS
DLNSP1 does not Granger Cause DLNM2	2	0.01166	0.98841	41	NS
DLNM2 does not Granger Cause DLNSP1	4	0.70981	0.59165	39	NS
DLNSP1 does not Granger Cause DLNM2	4	1.64401	0.18910	39	NS
Critical Values : 1% (3.12), 5%(2.25) 10%(1.87)					

SINCE THE F VALUE IS LESS THAN THE CRITICAL VALUE OF F AT ALL LEVEL OF SIGNIFICANCE,

ABOVE RESULTS SHOWS THAT THERE IS NO CAUSALITY FROM STOCK PRICES TO M2 OR FROM M2 TO STOCK PRICES.

Table 11: GRANGER QUARTERLY CAUSALITY TEST BETWEEN SP1 AND M3

HYPTHESIS	Lag	F	p-values	Obs	Conclusion

DLNM3 does not Granger Cause DLNSP1	2	1.03264	0.36637	41	NS
DLNSP1 does not Granger Cause DLNM3	2	0.00399	0.99602	41	NS
DLNM3 does not Granger Cause DLNSP1	4	0.52040	0.72138	39	NS
DLNSP1 does not Granger Cause DLNM3	4	1.61309	0.19671	39	NS
5.Critical Values : 1% (3.12), 5%(2.25) 10%(1.87)					

SINCE THE F VALUE IS LESS THAN THE CRITICAL VALUE OF F AT ALL LEVEL OF SIGNIFICANCE,

ABOVE RESULTS SHOWS THAT THERE IS NO CAUSALITY FROM STOCK PRICES TO M3 OR FROM M3 TO STOCK PRICES.

5.4.3 Empirical findings.

From the Granger Causality test results as indicated in tables 9, 10, 11, 12, 13 and 14 using both monthly and quarterly data respectively, the computed F-ratio values at all levels of lags are less than the critical values of F-ratio at 1%, 5% and 10% of levels of significance. Hence the null hypothesis that money supply (M1, M2 and M3) does not cause stock prices (SP) and the null hypothesis that stock prices (SP) do not cause money supply (M1, M2 and M3) is accepted. Thus, no unidirectional or bi-directional causality can be established empirically at LuSE between stock prices and money supply. This suggests that money supply and stock prices are determined independently. Hence statistically, from the empirical results it is difficult to establish if LuSE is informationally efficient or inefficient with respect to money supply as no temporal ordering is established between the series of stock price index data and money supply data. This empirical result from LuSE is similar to the empirical result established by Mookerjee(1987) for France, the U S A, Germany and the Netherlands, which suggested that money (M1) and stock prices were

independent as indicated below under (5.2.6) **comparison with other empirical studies.**

The F-ratio and its exceedance probability provide a test of the significance of all the independent variables (other than the constant term) taken together. If the true values of the coefficients of the independent variables are close to zero (that is to say, if all the independent variables are in fact irrelevant), the F-ratio should be roughly equal to 1(one). This is the case as indicated in Granger Causality test results in tables 9, 10, 11, 12, 13 and 14 above. The insignificance of some of the coefficients of the regression equations are confirmed in Appendices A, B and C. Thus, if the estimated coefficients on the lagged variables of both stock price and money supply as a group in equation 1 and 2 are not significantly different from zero, then no causality is implied between stock prices and money supply and the two series are not temporally related to each other and are independent(Mookerjee, 1987). If the coefficients are really not all close to zero, then the F-ratio should be significantly larger than 1(one). A low exceedance probability (say, less than 0.05) for the F-ratio suggests that at least some of the variables are significant.

Since the result of co-integration test show that there is a long-run relationship between money supply at BOZ and the stock prices at LuSE, but Granger causality test cannot establish this relationship, the following factors are likely to contribute to this contradictory result: (i) the inability to possess the financial analytical skills by most investors at LuSE so that they can be incorporating the information contained in money supply in stock price determination; (ii)the computer illiteracy and inaccessibility by most investors at LuSE which makes it difficult to access money supply data which is electronically publicised so that the information in it can be incorporated in stock price determination; (iii) LuSE is inaccessible not only because most of the people are unable to invest as a result of weak domestic savings base, but also because most people in Zambia are not yet acquainted with its operational mechanism as a result of inadequate publicity. The lack of adequate knowledge of the majority of the interested investors about the LuSE operations could be a major hindrance to participation on the stock market; (iv) The trend in the market performance in table2 above shows that LuSE is a small and illiquid market. This is evidenced by the low turnover ratio, caused by the limited number of floatations. This problem is common in most markets in developing countries as noted by Senbet

and Otchere (2008). There is usually a huge gap between buy and sell orders, which results in few trades taking place in the market. Two reasons account for this; the first one being that there are insufficient numbers of shares available for trading (usually called free float).

There were only 21 listed companies as at the end of 2009 as indicated in table1 above. Most companies on the LuSE have a free float of less than 30 percent while the remaining 70 percent of their shares is held by majority shareholders and is not available to trade. This results in lack of shares on the sell side even in cases where the bid offer is significantly higher than the market price. The second reason is that the large institutional investors such as pension funds and insurance companies have a buy and hold strategy because they want to match their investments with their long term liabilities.   This, by necessity, implies that they will buy stocks so as to hold them for a long-term or up to the time when their liabilities are due regardless of short-term shifts in prices or even fundamentals.   Pension funds in particular subscribe to this kind of strategy because it has been shown in the past that generally, the movement of share prices tends to align with increases in wages and inflation in the long term. Because of this, the stock market in Zambia tends to have a shortage of sellers causing it to be illiquid. This low level of traded shares on LuSE may not be sufficient enough to generate a statistically significant coefficient in the regression model in order to establish causality test between the variables in the regression model; and (v) Money markets are markets mainly for short-term finance, usually a year or less, unlike capital markets which are mainly for longer term finance exceeding one year. LuSE is facing stiff competition from the money markets. The money markets for short-term loans are functioning fairly well in Zambia and quite a good number of people can purchase short-term assets like treasury bills and certificates of deposits from the money markets. This creates a significant amount of competition for the capital market as some people will want to purchase the short-term assets from the money markets. The result is that the LuSE becomes limited in terms of number of investors and hence hindering its speed of development which may hinder its informational efficiency.

The other possible explanation to the contradictory regression results is the inability by BOZ to be publicising the money supply through some media which is easily accessible to the general public for their consumption as opposed to the current

scenario where BOZ posts the money supply to its website only which is difficult to access by the majority of the people in the economy. After all "informational efficiency of the capital market" is based on known information.

5.4.4 Comparison with other empirical studies

A similar study using **the same methodology used in this study was carried out by Mookerjee (1987)**. **The study involved tests for market efficiency in the following countries:** France, Japan, Netherlands, Switzerland, Italy, Canada, Germany, United Kingdom and Belgium. The U S A was also included in the sample set of for comparison. The period of analysis was from January 1975 to March 1985. For all countries, stock prices were measured as an index of stock prices. Two measures of the money supply were used in the analysis. Narrowly defined money supply (M1) and broadly defined money supply (M2).

The results employing the narrow measure of money supply (M1), it was seen that for Japan, Italy and Switzerland the null hypothesis that money does not cause stock price was rejected and the hypothesis that stock price causes money supply at 5% level of significance could not be rejected. This implied informational inefficiency of the stock market in these countries. The stock market in Canada and U K was characterised as informationally efficient because of a finding of unidirectional causality from stock price to money and bidirectional causality between money and stock price. The results for France, the U S A, Germany and the Netherlands, however, suggested that money (M1) and stock prices were independent.

The monthly results employing the broad measure of money supply (m2) again showed inefficiencies in the stock market in Japan and Italy. Interestingly, the Canadian stock market exhibited informational inefficiency with respect to (m2). This suggested that market participants were not fully exploiting the information contained in changes in (m2). The stock markets in the U K and Netherlands, however, appeared to be efficient with respect to (m2). For the Netherlands, the results suggested that it was the (m2) that was the more relevant gauge of monetary policy, from the point of view of stock market participants.

With results using quarterly data, only the Italian stock market appeared to be inefficient with respect to the quarterly (m1). For all other countries, no temporal ordering was established with money and stock prices. This result, when compared with the monthly result, showed that the longer the period (quarterly as opposed to monthly), the more time the market has to assimilate into stock prices the information contained in the money supply data.

5.4.5 Limitations, Gaps and Future Studies

The Granger causality tests can be applied only to pairs of variables, and may produce misleading results when the true relationship involves three or more variables. When for example, both of the variables being tested are "caused" by a third common variable, they may have No true relationship with each other, yet give positive results in a Granger test.

Granger causality tests are a useful tool in ones tool box, but they should be used with care. It will very often be hard to find any clear conclusions unless the data can be described by a simple 2- dimensional system.

Thus, the Granger causality formulation can only give information about linear features of signals. However, extensions to non-linear cases now exist, however, these extensions can be more difficult to use in practice and their statistical properties are less well understood. Hence non linear regressions have not been considered in this research.

Another potentially problem may be the choice of sampling period. A long period may hide the causality and may give measurement errors.

It is beyond the scope of this paper to analyse in detail the LuSE market specific anomalies that may exist leading to the results that LuSE is not information efficient with respect to money supply.

This paper tested for informational efficiency of LuSE using only Granger causality test model and considered only money supply as macro-economic

52

indicators or variable. Hence, recommending that other researchers may test for informational efficiency of LuSE using other alternative econometric testing techniques and may also consider testing the relationship between stock prices index and other macro-economic variables such as inflation rate, exchange rate, interest rates, Gross Domestic Product (GDP) and so on as literature has shown that stock exchange prices have a causal relationship with these other variables apart from money supply, Schumpeter (1912), Fama (1981,1990), Chan (1986), Hamao (1988), Poterba and Summers(1988), Chan (1991), Macdonald and Power (1991), Thornton (1993), Kaneko and Lee (1995), Cheung and Ng (1998), Darrat and Dickens (1999), Maysami and Koh (2000), Kwon and Shin (1999) and so on.

CHAPTER 6
CONCLUSIONS AND POLICY IMPLICATIONS

The objective of this study was to test the informational efficiency of the LuSE relative to money supply and to determine if there is any causality relationship between stock prices at LuSE and money supply in Zambia. The study employed monthly and quarterly data of money supply from bank of Zambia and stock price index from LuSE for the period January 1999 to December 2009. The study used Granger causality test model in running the regression developed in 1969 using Eviews econometric package.

The econometric results of the study shows that money supply M_1, M2 and M_3 in Zambia do not Granger cause the stock prices at LuSE and that the stock prices at LuSE do not Granger cause money supply in Zambia. This means that stock market investors at LuSE do not incorporate the information contained in money supply changes into stock prices. Since the econometric results show that stock prices at LuSE do not "fully reflect" available information contained in money supply and probably in other fundamental economic variables, this suggests that LuSE is not informationally efficient and there is likelihood that LuSE is not channelling the funds to the most productive sectors of the economy. This empirical finding may be attributed to the following: (i) LuSE investors may not have financial analytical skills to incorporate the information contained in money supply and probably other economic variables into stock prices; (ii) most LuSE investors may not be computer literate and may not have access to computers to make financial analysis as most economic variable data that include money supply is electronically accessed ; (iii) there is a huge gap between the buy and sell orders, causing a limited number of

floatations . This limited number of floatations at LuSE is partly caused by " buy and hold strategy" by large institutional investors such as pension funds and insurance companies; (iv) inadequate publicity by LuSE about its operational mechanism;(v) stiff competition from the money market particularly the commercial banks ;(vi) non presence of stock brokers in all provincial headquarters may cause limited number of investors at LuSE which may hinder its development .

The following may improve the informational efficiency and development of LuSE:

The government can put in place a deliberate policy of encouraging institutions like Bank of Zambia, Ministry of Finance and National Planning and Ministry Of Commerce and Industry and other institutions, that generate fundamental macroeconomic information to be publicising such information in the media for public consumption as opposed to the current situation where most of this information is either protected or just posted to their websites where the general public may not have access.

LuSE may consider a deliberate policy of encouraging stock broker firms to be established in all provincial headquarters in order to encourage more investor participation. This may lead to stock market development and lower the transaction costs on the part of would be investors on LuSE.

LuSE may consider abolishing the current rule of allowing stock brokers to be both dealers and brokers as it compromises the informational efficiency of LuSE in the sense that it encourages brokers to practice "buy and hold" strategy to manipulate stock prices in their favour.

Zambia may consider implementing deliberate economic reforms aimed at balancing development of the capital market and the financial market. The reforms may assist in reducing dominance by the financial market. These reforms may have dividends in form of improvement of capital market capitalisation, foreign portfolio investment and market liquidity. The reforms may include: the Government may consider

establishing public companies that will float the majority of the shares on LuSE; the Government to consider giving significant tax incentives to companies that list on LuSE; and the Government through its agencies such as Zambia Development Agency to be giving first priority to foreign investors who commit themselves to float a significant proportion of their shares on LuSE for trade.

Based on the findings discussed above, the Government or its agencies may consider implementing policies that will not only ensure the further development of the stock market in general, but also to encourage policies that can specifically address the bottlenecks mentioned above.

The problem of thin markets or lack of adequate trading on the market is a major cause of the illiquidity on the market. A policy response to this problem by government, particularly the regulator, SEC Zambia, is to encourage more companies to list on the LuSE by relaxing the listing requirements. This, if effected, can result in more buy and sell activity on the LuSE market and hence more liquidity.

The development of the banking sector is important for stock market development in Zambia. Hence, the government should also pursue policies aimed at developing the financial intermediary sector in order to promote stock market development. Liquid inter-bank markets, largely supported by an efficient banking system, are important for the development of the stock market.

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FOR ROBUSTNESS AND CONSISTENCY OF THE RESULTS THE MAXIMUM LAG TESTED WAS 12 LAGS, 6 LAGS AND THEN THREE LAGS

Appendix A: regression of Sp1 on M1 and M1 on sp1

	D(LOG(SP1))	D(LOG(M1))
Date: 06/13/10 Time: 18:21		
Sample(adjusted): 1999:04 2009:12		
Included observations: 129 after adjusting		
Endpoints		
Standard errors & t-statistics in parentheses		
D(LOG(SP1(-1)))	0.119318	-0.060854
	(0.08984)	(0.06907)
	(1.32808)	**(-0.88108**)
D(LOG(SP1(-2)))	0.046389	0.069128
	(0.08983)	(0.06906)
	(0.51639)	**(1.00098**)
D(LOG(M1(-1)))	0.097577	-0.192004
	(0.11622)	(0.08935)
	(0.83957)	(-2.14894)
D(LOG(M1(-2)))	-0.002784	-0.003753
	(0.11416)	(0.08776)
	(-0.02439)	(-0.04276)
C	0.016287	0.023872
	(0.00720)	(0.00554)
	(2.26063)	(4.30999)
R-squared	0.023438	0.051734
Adj. R-squared	-0.008064	0.021145
Sum sq. Resids	0.534420	0.315847

S.E. equation	0.065649	0.050469
F-statistic	0.744008	1.691255
Log likelihood	170.8288	204.7510
Akaike AIC	-2.570989	-3.096915
Schwarz SC	-2.460143	-2.986069
Mean dependent	0.021779	0.020140
S.D. dependent	0.065386	0.051011
Determinant Residual Covariance		1.01E-05
Log Likelihood		375.6796
Akaike Information Criteria		-5.669451
Schwarz Criteria		-5.447760

Appendix B: on M2 and M2

regression of SP1 on Sp1

Date: 06/13/10   Time: 18:29

Sample(adjusted): 1999:04 2009:12

Included observations: 129 after adjusting
    Endpoints

Standard errors & t-statistics in parentheses

	D(LOG(SP1))	D(LOG(M2))
D(LOG(SP1(-1)))	0.129170	0.051074
	(0.08958)	(0.05549)
	(1.44200)	(0.92035)
D(LOG(SP1(-2)))	0.032968	0.003747
	(0.08956)	(0.05549)
	(0.36810)	(0.06754)
D(LOG(M2(-1)))	0.130558	-0.102669
	(0.14483)	(0.08972)
	(0.90146)	(-1.14427)
D(LOG(M2(-2)))	-0.119541	-0.035275
	(0.14355)	(0.08893)
	(-0.83273)	(-0.39665)
C	0.018009	0.021317
	(0.00745)	(0.00462)
	(2.41622)	(4.61668)
R-squared	0.030624	0.017578

Adj. R-squared	-0.000646	-0.014113
Sum sq. Resids	0.530488	0.203602
S.E. equation	0.065407	0.040521
F-statistic	0.979343	0.554673
Log likelihood	171.3052	233.0722
Akaike AIC	-2.578375	-3.536003
Schwarz SC	-2.467529	-3.425158
Mean dependent	0.021779	0.019786
S.D. dependent	0.065386	0.040238
Determinant Residual Covariance		6.49E-06
Log Likelihood		404.3816
Akaike Information Criteria		-6.114444
Schwarz Criteria		-5.892753

Appendix C: Regression of SP1 on M3 and M3 on SP1-MONTHLY

Date: 06/13/10   Time: 18:31

Sample(adjusted): 1999:04 2009:12

Included observations: 129 after adjusting
     Endpoints

Standard errors & t-statistics in parentheses

	D(LOG(SP1))	D(LOG(M3))
D(LOG(SP1(-1)))	0.126956	0.041662
	(0.08959)	(0.05296)
	(1.41701)	(0.78669)
D(LOG(SP1(-2)))	0.035440	0.005905
	(0.08959)	(0.05296)
	(0.39556)	(0.11150)
D(LOG(M3(-1)))	0.122004	-0.038823
	(0.15157)	(0.08959)
	(0.80494)	(-0.43333)
D(LOG(M3(-2)))	-0.116866	-0.065147
	(0.14991)	(0.08861)
	(-0.77960)	(-0.73522)

	C	0.018109	0.021111
		(0.00754)	(0.00446)
		(2.40249)	(4.73812)
R-squared		0.027785	0.010242
Adj. R-squared		-0.003577	-0.021685
Sum sq. Resids		0.532041	0.185891
S.E. equation		0.065503	0.038718
F-statistic		0.885944	0.320802
Log likelihood		171.1165	238.9422
Akaike AIC		-2.575450	-3.627012
Schwarz SC		-2.464604	-3.516166
Mean dependent		0.021779	0.020081
S.D. dependent		0.065386	0.038305
Determinant Residual Covariance			5.94E-06
Log Likelihood			410.0635
Akaike Information Criteria			-6.202535
Schwarz Criteria			-5.980844

Appendix D: African Stock Market Statistics, 2001

Country	GDP (US$ millions)	No. of listed company	Market capitalization (US$ millions)	Market capitalization to GDP	Value Traded (US$ millions)	Turnover (%)
Algeria	54,680	3	199	6.4	3	1.5
Botswana	5,196	16	1,269	24.4	65	5.6
BRVM	10,411	1,110	1,165	11.2	8	0.7
Egypt	98,476	1,110	24,335	24.7	3,897	14.2
Ghana	5,301	22	528	10.0	13.3	2.6
kenya	11,396	57	1050	9.2	40	3.4
Malawi	1,749	7	152	8.7	21	7.2
Mauritius	4,500	40	1063	23.6	112	9.3
Morocco	34,219	55	9,087	26.6	974	10.0
Namibia	3,100	13	151	4.9	8	3.0
Nigeria	41,373	194	5,404	13.1	496	10.2
South Africa	113,274	542	139,750	123.4	69,676	37.4
Swaziland	1,255	5	127	10.1	10	12.7
Tanzania	9,341	4	398	4.3	8	49.8
Tunisia	19,990	46	2,303	11.5	316	12.6
Uganda	5,675	2	34	0.6	0	Nm
Zambia	3,339	9	217	6.5	53	4.1
Zimbabwe	9,057	72	7,972	88.0	1,530	29.4

Source: Emerging stock Markets fact books, 2002, Standards Poor's African Stock Markets Handbook, UNDP, 2003 World Development indicators Data base, World Bank, April 2003

Appendix E: Data of Monthly Share Price Index (SPI), Money Supply (M1, M2 and M3), for the period January 1999 to December 2009.

MONTH	SP1	M1	M2	M3
Jan-99	161.01	4,06,411.00	1061160	1089827
Feb-99	163.35	3,71,357.00	1011956	1039084
Mar-99	168.35	3,73,707.00	1026367	1052104
Apr-99	168.84	3,75,991.00	1044143	1074140
May-99	191	3,89,517.00	1093233	1130034
Jun-99	188.93	3,82,342.00	1090801	1130342
Jul-99	202.32	4,26,208.00	1169267	1208102
Aug-99	192.73	4,15,559.00	1164194	1199827
Sep-99	191.73	4,31,171.00	1190031	1234054
Oct-99	178.79	4,57,508.00	1267969	1305302
Nov-99	181.4	4,73,163.00	1287961	1325361
Dec-99	181.43	5,13,767.00	1351984	1396884
Jan-00	190.72	4,77,363.00	1340049	1383593
Feb-00	197.04	4,97,218.00	1382760	1432992
Mar-00	204.05	4,76,518.00	1375645	1420137
Apr-00	203.98	4,91,712.00	1484198	1502927
May-00	210.29	5,34,880.00	1585867	1606335
Jun-00	236.42	5,80,002.00	1694062	1718558
Jul-00	241.55	5,73,983.00	1799687	1823171
Aug-00	254.97	5,98,651.00	1831576	1853885
Sep-00	280.02	6,36,125.00	1939942	1964084
Oct-00	309.84	6,24,945.00	1916475	1936878
Nov-00	312.18	6,44,756.00	2122479	2152827
Dec-00	305.28	7,95,266.00	2404615	2446377
Jan-01	297.61	7,64,524.00	2122815	2200778
Feb-01	274.48	7,35,807.00	2176193	2204858

Mar-01	303.85	7,64,623.00	2017748	2041857
Apr-01	303.61	7,66,229.00	2049242	2075333
May-01	305.61	8,10,386.00	2172593	2195228
Jun-01	332.72	8,73,254.00	2295980	2323205
Jul-01	301.74	8,80,833.00	2352227	2380295
Aug-01	254.97	9,39,518.00	2530303	2564305
Sep-01	301.5	9,95,935.00	2603865	2632908
Oct-01	277.89	9,56,337.00	2567773	2600962
Nov-01	257.32	9,67,720.00	2575790	2602515
Dec-01	303.41	10,36,645.00	2718602	2747402
Jan-02	313.36	9,64,175.00	2772841	2802568
Feb-02	325.36	9,48,529.00	2708205	2732619
Mar-02	315.83	9,18,572.00	2666184	2691276
Apr-02	310.1	9,38,260.00	2647762	2711062
May-02	323.36	9,71,871.00	2903348	2977520
Jun-02	335.08	10,45,152.00	3032493	3114841
Jul-02	334.56	10,94,873.00	3049768	3129147
Aug-02	332.33	11,21,357.00	3254955	3339874
Sep-02	336.2	11,29,116.00	3124816	3223828
Oct-02	333.8	12,44,864.00	3367424	3451935
Nov-02	334.21	11,97,942.00	3417251	3517489
Dec-02	334.75	13,28,275.00	3515191	3606163
Jan-03	367.53	12,42,929.00	3590598	3682978
Feb-03	382.43	12,38,907.00	3593351	3688272
Mar-03	371.99	12,41,863.00	3568861	3661075
Apr-03	385.26	13,37,274.00	3600643	3688159
May-03	380.26	13,58,773.00	3679751	3764476
Jun-03	388.9	14,16,031.00	3796808	3884008
Jul-03	385.8	13,91,013.00	3730309	3839234
Aug-03	369.79	14,58,497.00	3821460	3904910
Sep-03	379	14,39,856.00	3971563	4052854

Oct-03	370.97	15,30,412.00	3965004	4059291
Nov-03	413	15,32,956.00	3994665	4096963
Dec-03	431.97	16,95,572.00	4340359	4419832
Jan-04	434.45	16,82,911.00	4430646	4515879
Feb-04	436.06	16,67,434.00	4424315	4520737
Mar-04	447.46	16,95,195.00	4472128	4617965
Apr-04	461.98	18,62,260.00	4660020	4833111
May-04	503.71	18,97,654.00	4712396	4930587
Jun-04	605.22	19,97,849.00	5042278	5246417
Jul-04	613.1	20,94,717.00	5089162	5355732
Aug-04	710.13	20,71,511.00	5122784	5399235
Sep-04	715.62	20,09,555.00	5095621	5377877
Oct-04	714.37	20,27,653.00	5091341	5398499
Nov-04	735.15	19,70,935.00	5139255	5431558
Dec-04	765.75	20,41,472.00	5461372	5798833
Jan-05	773.72	20,01,042.00	5304386	5632744
Feb-05	815.31	20,18,483.00	5190304	5531321
Mar-05	833.55	19,61,375.00	5136120	5468543
Apr-05	859.42	20,84,966.00	5174430	5523987
May-05	955.24	21,18,507.00	5368292	5681968
Jun-05	1026.09	22,22,568.00	5565552	5872972
Jul-05	1029.09	23,40,190.00	5735786	6004344
Aug-05	1234.66	22,97,596.00	5566801	5893630
Sep-05	1285.51	22,98,972.00	5644020	6039001
Oct-05	1253.08	21,96,895.00	5558298	5934599
Nov-05	1252.83	22,20,096.00	5311122	5637204
Dec-05	1240.22	22,80,283.00	5527483	5810680
Jan-06	1323.61	23,89,487.00	5570506	5872649
Feb-06	1350.9	23,49,081.00	5514849	5790558
Mar-06	1374.13	22,25,484.00	5462343	5779305
Apr-06	1380.47	24,50,601.00	5378943	5661202

May-06	1373.02	23,15,974.00	5693738	5991157
Jun-06	1478.46	24,42,344.00	5891182	6259542
Jul-06	1482.87	26,10,855.00	6247625	6658551
Aug-06	1540.59	28,76,412.00	6660891	7101900
Sep-06	1592.68	31,23,550.00	7354996	7672030
Oct-06	1664.33	29,64,595.00	6965047	7165802
Nov-06	1765.22	30,86,852.00	7514209	7746765
Dec-06	1837.61	34,64,170.00	8216485	8426872
Jan-07	2114.83	30,82,758.00	7570911	7923967
Feb-07	2097.31	30,41,533.00	7419254	7812057
Mar-07	2077.5	29,61,612.00	7447194	7751960
Apr-07	2321.74	30,14,360.00	7415167	7841560
May-07	2506.79	31,16,648.00	8001094	8346499
Jun-07	3001.54	31,82,803.00	8099465	8532819
Jul-07	3064.58	34,49,105.00	8772620	9104428
Aug-07	3080.91	35,42,075.00	8986673	9505148
Sep-07	3262.21	34,78,506.00	8972593	9518973
Oct-07	3445.83	35,36,603.00	8874983	9393340
Nov-07	3539.44	36,74,810.00	9234104	9776557
Dec-07	3533.52	41,73,144.00	10070486	10634664
Jan-08	3964.85	38,63,017.00	9963497	10665838
Feb-08	4312.93	36,65,475.00	9688663	10282920
Mar-08	4440.46	37,85,285.00	9849115	10258700
Apr-08	4000.16	38,29,854.00	9696289	10198645
May-08	4062	44,15,129.00	10314415	10786316
Jun-08	4169.03	43,97,198.00	10454463	10810162
Jul-08	3900.59	44,55,992.00	10818986	11338214
Aug-08	3686.56	44,88,580.00	10725017	11360475
Sep-08	3620.7	46,50,901.00	10546746	11165223
Oct-08	3345.05	50,03,423.00	12104899	12741599
Nov-08	2797.41	49,02,090.00	11957243	12759834

Dec-08	2505.88	51,01,804.00	12214417	12992125
Jan-09	2420.15	46,44,717.00	12250279	13028690
Feb-09	2381.74	47,78,359.00	12290502	13197154
Mar-09	2182.5	44,75,074.00	11975225	12982007
Apr-09	2143.37	44,10,953.00	11877740	12864534
May-09	2498.32	46,33,977.00	11654004	12580471
Jun-09	2744.57	45,77,467.00	12115621	13040691
Jul-09	2833.47	49,35,825.00	12590537	13440798
Aug-09	2618.51	50,23,586.00	12658565	13402147
Sep-09	2807.26	50,10,380.00	12816173	13527848
Oct-09	2669.18	48,64,925.00	13025716	13745862
Nov-09	2657.62	49,29,558.00	12994455	13850183
Dec-09	2794.89	50,21,565.00	13175872	14029854

Appendix F: Data of Quarterly Share Price Index (SPI), Money Supply (M1, M2 and M3), for the period January 1999 to December 2009.

MONTH	SP1	M1	M2	M3
Mar-99	168.35	373707	1026367	1052104
Jun-99	188.93	382342	1090801	1130342
Sep-99	191.73	431171	1190031	1234054
Dec-99	181.43	513767	1351984	1396884
Mar-00	204.05	476518	1375645	1420137
Jun-00	236.42	580002	1694062	1718558
Sep-00	280.02	636125	1939942	1964084
Dec-00	305.28	795266	2404615	2446377
Mar-01	303.85	764623	2017748	2041857
Jun-01	332.72	873254	2295980	2323205
Sep-01	301.5	9959335	2603865	2632908
Dec-01	303.41	1036645	2718602	2747402
Mar-02	315.83	918572	2666184	2691276
Jun-02	335.08	1045152	3032493	3114841
Sep-02	336.2	1129116	3124816	3223828
Dec-02	334.75	1328275	3515191	3606163
Mar-03	371.99	1241863	3568861	3661075
Jun-03	388.9	1416031	3796808	3884008
Sep-03	379	1439856	3971563	4052854
Dec-03	431.97	1695572	4340359	4419832
Mar-04	447.46	1695195	4472128	4617965
Jun-04	605.22	1997849	5042278	5246417
Sep-04	715.62	2009555	5095621	5377877
Dec-04	765.75	2041472	5461372	5798833
Mar-05	833.55	1961375	5136120	5468543
Jun-05	1026.09	2222568	5565552	5872972
Sep-05	1285.51	2298972	5644020	6039001

Dec-05	1240.22	2280283	5527483	5810680
Mar-06	1374.13	2225484	5462343	5779305
Jun-06	1478.46	2442344	5891182	6259542
Sep-06	1592.68	3123550	7354996	7672030
Dec-06	1837.61	3464170	8216485	8426872
Mar-07	2077.5	2961612	7447194	7751960
Jun-07	3001.54	3182803	8099465	8532819
Sep-07	3262.21	3478506	8972593	9518973
Dec-07	3533.52	4173144	10070486	10634664
Mar-08	4440.46	3785285	9849115	10258700
Jun-08	4169.03	4397198	10454463	10810162
Sep-08	3620.7	4650901	10546746	11165223
Dec-08	2505.88	5101804	12214417	12992125
Mar-09	2182.5	4475074	11975225	12982007
Jun-09	2744.57	4577467	12115621	13040691
Sep-09	2807.26	5010380	12816173	13527848
Dec-09	2794.89	5021565	13175872	14029854