THE IMPACT OF THE MULTIPLE CURRENCY SYSTEM ON THE PERFORMANCE OF THE STOCK MARKET IN ZIMBABWE

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DECLARATION

I declare that this thesis is my individual work and is being submitted to the Graduate School of Business at the University of Cape Town in fulfillment of the requirements for the Doctor of Philosophy degree in Business Administration. This thesis has not been submitted before for examination at any other University.

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ABSTRACT

This study investigated the impact of the multiple currency system on the performance of the stock market in Zimbabwe. In particular, the study assessed the major determinants of stock market performance in the multiple currency environment in Zimbabwe, the impact of external factors, as well as the push and pull factors determining foreign investor participation in the Zimbabwean stock market. The study was motivated by the poor performance of the stock market experienced during the multiple currency system, despite some positive developments in the economy such as a positive growth trajectory and low and stable inflation rates of below 5%.

The poor performance of the stock market thus underscores the need to understand whether the multiple currency system had an impact on the stock market. While some studies have looked at the impact of macroeconomic factors on stock markets, there is a possibility that due to the uniqueness of the Zimbabwean economy presented by the multiple currency system, existing studies may no longer be relevant in explaining the impact of the macroeconomic factors on stock market performance. Therefore, a gap exists in the economic literature on the potential impact of the multiple currency system in a dollarised economy such as Zimbabwe. The contribution of this study is therefore to assess the determinants of stock market performance under the multiple currency system in Zimbabwe, given its uniqueness. In addition, it adds to the existing empirical financial markets literature on how the multiple currency system influences the transmission mechanism of macro-economic factors on stock market performamce in Zimbabwe.

The study applied a panel regression model on all the 54 listed companies operating on the Zimbabwe Stock Exchange, using quarterly data from 2009 to 2016. The study estimated the model using the OLS estimation method. For robustness checks, the study also used the Two Stage Least Squares (TSLS) and the General Methods of Moments (GMM) estimation methods. The results indicated that money supply, domestic interest rates and foreign interest rates were significant factors influencing stock market performance in Zimbabwe under the multiple currency regime. Further, in order to ascertain the validity of the results, a

bootstrapping procedure was applied, which confirmed the results obtained in the panel regression model.

On the impact of external factors on stock market performance, the stock market index was regressed against the external shocks, namely foreign interest rates, commodity prices, the volatility index which reflected movements in global stock markets, as well as domestic control variables, including domestic economic growth and money supply. The results indicated that only foreign interest rate had a direct influence on stock market performance whilst other external factors were statistically insignificant. It was found, however, that commodity price had an indirect impact on the stock market through its influence on economic activity and its influence on money supply. The results thus show that the multiple currency system influences the stock market through its impact on money supply in the economy.

With regard to the push and pull factors influencing foreign investor participation, the value of shares bought by foreigners was regressed against the stock market index, the volume of manufacturing index representing economic conditions in Zimbabwe or pull factors, and foreign interest rates, with the volatility index representing the push factors from the global markets. The results indicated that only the stock market index was important in influencing foreign investor participation, while economic growth and foreign factors such as the volatility index and foreign interest rates were not significant. This could be explained by the low liquidity in the economy, which tends to depress stock prices. Overall, money supply is a major factor that influences stock market performance in Zimbabwe; the multiple currency system affects the liquidity conditions and hence money supply in the economy. The study, therefore, recommends the implementation of policies aimed at easing the liquidity conditions in the economy so as to stimulate economic activity. The study also recommends the removal of restrictions that deter foreign investor participation in Zimbabwe.

DEDICATION

This thesis is dedicated to my parents, Mr Johnson Kumirai Mutodi and the late Mrs Vaina Mutodi nee Chipepura, because of their love, support and inspiration over the years. I also find pleasure in dedicating this work to my entire family, including my wife, Faith Mutodi, and my children, brothers and sisters. All the energies and desire to complete this work came from the need to make our family better and positively impact on other people's lives. His Excellency President Emmerson Dambudzo Mnangagwa, the new President of the Republic of Zimbabwe as I thank him for appointing me as a Deputy Minister of Information, Publicity and Broadcasting Services in his government; the Bankers Association of Zimbabwe, Chief Executives and Chief Finance Officers across all economic sectors in Zimbabwe, Reserve Bank of Zimbabwe; Ministry of Finance, particluarly the Minister of Finance Professor Mthuli Ncube, staff at the National Housing Delivery Trust (NHDT), Faculty members at the University of Zimbabwe Graduate School of Management and the generality of Zimbabweans in pursuit for answers to our current financial market crisis also form the broader audience to which this work is dedicated.

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ABBREVIATIONS AND ACRONYMS

ADF	Augmented Dickey-Fuller
AfDB	African Development Bank
APT	Arbitrage Pricing Model
ARDL	Autoregressive Distributed Lag
BRICS	Brazil, Russia, India, China & South Africa
CAPM	Capital Asset Pricing Model
CSD	Central Securities Depository
CBZ	Commercial Bank of Zimbabwe
CPI	Consumer Price Index
DDM	Dividend Discount Model
DCF	Discounted Cash Flow
EF	External Factors
EMBI	Emerging Markets Bonds Index
EMH	Efficient Market Hypothesis
ESAP	Economic Structural Adjustment Programme
EUR	Euro, Eurocurrency of the 11 EU countries which joined the Euro
FDI	Foreign Direct Investment
FE	Fixed Effects
FINT	Foreign Interest Rate
FMOLS	Fully Modified Ordinary Least Squares
GARCH	Generalised Autoregressive Conditional Heteroskedasticity
GDP	Gross Domestic Product
GMM	Generalised Method of Moments
GoZ	Government of Zimbabwe
IMF	International Monetary Fund
IPO	Initial Public Offering
JSE	Johannesburg Stock Exchange
LIBOR	London Interbank Offered Rate
LIC	Low Income Country: World Bank Definition
LSE	London Stock Exchange
MCMB	Markov Chain Marginal Bootstrap

MoF	Ministry of Finance
NASDAQ	National Association of Security Dealers Automated Quotation
NYSE	New York Stock Exchange
NPV	Net Present Value
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
RE	Random Effects
ROI	Return On Investment
RBZ	Reserve Bank of Zimbabwe
SMI	Zimbabwe Stock Market Index
TSLS	Two-Stage Least Squares Model
UNCTAD	United Nations Conference on Trade and Development
USD	United States Dollar
UK	United Kingdom
VAR	Vector Autoregression
VECM	Vector Error Correction Model
VIX	Volatility Index
VMI	Volume of Manufacturing Index
VSBF	Volume of Shares Bought by Foreigners
WB	World Bank
WEO	World Economic Outlook
ZIMSTAT	Zimbabwe Statistical Agency
ZSE	Zimbabwe Stock Exchange

CHAPTER ONE: INTRODUCTION

1.1 Research context

Stock markets play an important role in most economies as they provide unique services and benefits to individuals, corporations and governments. Specifically, stock markets serve as channels through which surplus funds are moved from lenders (savers) to borrowers (spenders) who have shortages of funds (Awan & Iftekhar, 2015). The ability of stock markets to mobilise savings for investments in turn helps to facilitate company growth, redistribute wealth, create investment opportunities for small investors, as well as raise capital for government (Tichiwou, 2010). A company can raise capital through an Initial Public Offering (IPO) on the stock exchange, where it gains access to investors who are ready to supply new capital to the business (Boubakari & Jin, 2010).

Unlike bonds, which are sold at a discount with a fixed rate of return, stocks are generally non-interest bearing securities whose dividend payments are determined by company management based on the performance of the firm (Berk & DeMarzo, 2014). Holders of stocks who are effectually the shareholders expect to get a return on their investment. As such, their decision to hold stocks reflect their expectations about future corporate performance in terms of earnings per share, cash flows and required rates of return (El-Wassal, 2013). In essence, investors looking for capital gains would invest on the stock market in anticipation of an increase in stock prices. Therefore, stock prices constitute an important measure of stock market performance. It reflects how well a company is doing relative to others on the stock market. However, stock prices can also respond differently to changes in macroeconomic factors. Investors, therefore, need to understand how the macroeconomic factors such as economic growth, inflation, money supply, interest rates and commodity prices affect stock prices.

In view of the critical role played by stock markets, several attempts have been made to understand the factors that affect stock market performance, with empirical literature often citing the importance of the economy in influencing the performance of the stock market (Sharma & Roca, 2012; Sharma & Gounder, 2012). Literature has also shown that a declining economy results in falling company revenues and lower-than-expected future earnings, thus

affecting the intrinsic value of companies and causing stock prices to fall significantly (Sharma & Nguyen, 2010; Hearn & Piesse, 2009; De la Torre, Gozzi, & Schmukler, 2007).

There are numerous studies in empirical literature, which point to a positive relationship between stock markets and economic growth (Awan & Iftekhar, 2015; Adjasi & Biekpe, 2006; Tachiwou, 2010; Zivengwa, Mashika, Bokosi, & Makova, 2011; Mehr-un-Nisa & Nishat, 2012; Gan, Lee, Yong, & Zhang, 2006). The world has witnessed visible and rapid developments in the financial systems of both developed and developing economies, by incorporating stock markets into the integral part of financial systems for economies to benefit from the functions of stock markets (Sharma & Roca, 2012). The New York Stock Exchange (NYSE), the National Association of Security Dealers Automated Quotation (NASDAQ), and the London Stock Exchange (LSE) are the most prominent stock markets in the world, whose main function is to raise capital for firms, provide liquidity, as well as determine share prices (Berk & DeMarzo, 2014). In developing countries like Zimbabwe, the stock market has played a key role in raising capital for business (Zivengwa, Mashika, Bokosi, & Makova, 2011).

Kirui, Wawire and Onono (2014) observed that the macroeconomic factors which influence stock market performance are interest rate, economic growth, inflation, money supply, the movement of international capital, changes in exchange rates, as well as political and economic shocks, while Flannery and Protopapadakis (2002) found that the major macroeconomic factors influencing stock markets include money supply, unemployment, trade balance, the number of new residential buildings and the producer price indices. Of these, money supply has been found to be the most important factor influencing stock market performance in the long term (Jamaludin, Ismail, & Manaf, 2017; Sirucek, 2012), yet other studies have found that firm-specific factors are also important in determining stock market performance (Idris & Bala, 2015). While a number of empirical studies have been conducted on the impact of macroeconomic factors on stock market performance in Zimbabwe such as (Zivengwa, Mashika, Bokosi, & Makova, 2011; Sunde & Sanderson, 2009), empirical literature focusing on the impact of the multiple currency system on stock market performance in Zimbabwe is still very limited.

The multiple currency system is essentially a monetary system synonymous with dollarization in the sense that foreign currency is used in place of domestic currency. However, the Zimbabwean scenario is unique in the sense that a number of currencies, namely the US dollar, the South African rand, Botswana pula, British pound, the Euro, and the Chinese Yuan were adopted for official use in domestic transactions, hence the name multiple currency system. This system was introduced in 2009 in response to the hyperinflationary episode experienced in the country from 2007 to 2008 (Reserve Bank of Zimbabwe [RBZ], 2009; Government of Zimbabwe [GoZ], 2009). This hyperinflation episode compelled economic agents to reject the domestic currency in favour of trading in more stable currencies such as the US dollar and the South African rand.

The multiple currency system in Zimbabwe presented a unique scenario compared to other countries that have dollarised, such as Panama and Ecuador. This is because countries such as Panama and Ecuador adopted a single foreign currency, specifically the US dollar, while maintaining their local currencies in circulation albeit in small amounts (Quispe-Agnoli & Whisler, 2006). In the case of Zimbabwe, a basket of currencies was adopted, namely the US dollar, the South African rand, the Botswana pula, the Euro and the British pound in place of the domestic currency (Government of Zimbabwe [GoZ], 2009). Moreover, the country completely abandoned its domestic currency until October 2016, when the Central Bank introduced a new surrogate currency which was backed by a bond secured from the Afrexim Bank, known as the "bond note" (Reserve Bank of Zimbabwe [RBZ], 2016). The bond notes also became part of the basket of currencies used in the multiple currency system, although the US dollar maintained its dominance over other currencies as all transactions are priced in US dollars. The Reserve Bank of Zimbabwe estimated that the US dollar constituted about 90% of total transactions in the multiple currency system (Reserve Bank of Zimbabwe [RBZ], 2015).

The continued weakening of regional currencies such as the rand and the pula against the US dollar also prompted economic agents to prefer the US dollar to such currencies (Reserve Bank of Zimbabwe [RBZ], 2016). Moreover, the country had more US dollars already in circulation before the official introduction of the multiple currency system (Reserve Bank of Zimbabwe [RBZ], 2013). Although the multiple currency system involves use of a basket of currencies, it is often cited as equivalent to dollarisation, not only due to the wide use of foreign currency in

place of domestic currency in transactions, but also because all the accounts and prices, both in the public and the private sector, are in foreign currency (Mpofu, 2015).

This scenario has, therefore, made it necessary to understand how the multiple currency system could have affected the performance of the stock market in Zimbabwe. While existing empirical literature provides some insights on the impact of macroeconomic factors on stock market performance in Zimbabwe, it would be important to try and understand the influence of the multiple currency system on stock market performance in Zimbabwe in order to fully understand why the stock market performance was very poor while the economy registered robust economic growth after the introduction of the multiple currency system in 2009. Following the introduction of the multiple currency system, the stock market was characterised by very low trade volumes, as the market was predominantly associated with low prices, low demand for stocks by investors, a lack of activity on the stock market, and the losses suffered by investors after the conversion from the Zimbabwe dollar to the US dollar (Reserve Bank of Zimbabwe [RBZ], 2015).

The ZSE also realised significant delistings, with the number of companies declining from a peak of 82 counters in 2009 to 54 counters by December 2016. Market capitalisation also declined from a peak of approximately US$6 billion in 2013 to around US$3 billion in 2016. In addition, the participation of foreign investors on the ZSE was subdued, notwithstanding the fact that the economy was relatively stable and that the multiple currency system effectively eliminated the exchange rate risk since trading was being conducted in US dollars as opposed to a domestic currency, which historically has proved to be more prone to depreciation against major currencies.

The poor stock market performance following the introduction of the multiple currency system has therefore been a great concern in Zimbabwe, which requires some further empirical investigation (Sibanda, 2015). Based on the recorded performance of the ZSE, it is possible that the multiple currency system may have been one of the factors that altered the dynamics of the stock market performance and the transmission mechanisms through which macroeconomic variables affect stock market performance. There is thus a gap in the empirical literature on the impact of the macroeconomic factors on the stock market under the multiple

currency environment. This is especially important given the poor performance of the Zimbabwean stock market, despite the firm economic recovery experienced following the adoption of the multiple currency system in 2009.

Since 2009, the economy registered robust growth rates averaging above 10% between 2009 and 2013, while the stock market indicators were all depressed. The economy registered a growth of 5.6% in 2009, compared to a decline of 14.8% in 2008. The economy also continued to strengthen as shown by high growth rates of 11.4%, 11.9% and 10.6% in 2010, 2011 and 2012, respectively (Reserve Bank of Zimbabwe [RBZ], 2013). The moderation in economic growth from 2012, however, mainly reflected an end to the recovery phase, since the economy was emerging from a decade long economic crisis. Whilst the stock market performance was poor following the introduction of the multiple currency system, there were some positive developments in the banking sector and the economy at large. The multiple currency system boosted confidence in the economy, with the banking sector registering phenomenal growth in deposits, from US$400 million in February 2009 to $4.5 billion by December 2015 (Reserve Bank of Zimbabwe [RBZ], 2015). These positive developments, however, did not extend to the stock market, implying that there could be some factors that could have been affecting the stock market performance under the multiple currency environment.

The poor stock market performance following the introduction of the multiple currency system thus generated great interest in the potential factors influencing stock market performance in Zimbabwe (Sibanda, 2015; Musimwa & Kaseke, 2012). Some analysts cited the problem of market liquidity due to the tight monetary conditions in the economy experienced during the multiple currency system as the reason behind the poor performance of stocks (EFE Securities, 2013). The tight liquidity situation was mainly due to low deposit levels in the banking sector coupled with the absence of interbank trading which limited the ability to lend by commercial banks as well as the inability by the central bank to provide its lender of last resort function as the central bank was not issuing any currency until November 2016. Money supply was thus a function of international balance of payments developments since liquidity was dependent on how much the country exported and borrowed from the international community. As a result, the sellers were generally forced to accept lower than desirable prices for their goods, assets and services due to the liquidity crisis. This created an unfair ability by buyers to dictate prices

leading to ‘a buyers’ market’, where sellers are hesitant to sell while buyers are itching to buy at lower prices, thereby creating a stalemate, which gives rise to a lukewarm stock market activity.

As has been cited in the literature, liquidity has been found to be an important factor that influences stock market developments (Akram, 2014), yet in Zimbabwe, liquidity seems not to be an important factor. Zimbabwe has experienced severe liquidity shortages since 2012, which could have impacted negatively on the stock market. These liquidity challenges arose due to the inability of the Central Bank to influence money supply in the economy under the multiple currency regime. This resulted in high interest rates, which negatively affected investments in shares as investors anticipated higher returns in the money market than in the stock market.

The adverse external developments also became important in influencing liquidity in the economy, as the country is dependent on a narrow range of primary commodity exports that are prone to adverse international commodity price movements (Reserve Bank of Zimbabwe [RBZ], 2016). In addition, the country was also reeling under sanctions, which blocked its access to foreign credit from traditional creditors due to its arrears status with the international financial institutions, notably the World Bank, the International Monetary Fund (IMF) and the African Development Bank (AfDB), among others (Reserve Bank of Zimbabwe [RBZ], 2011). The inability to access additional lines of credit severely limited the country’s ability to enhance money supply creation in the economy, as the country was no longer issuing its domestic currency (Reserve Bank of Zimbabwe [RBZ], 2011). This challenge was further compounded by the Central Bank’s inability to influence money supply growth through the interest rate channel.

Interest rates have empirically been found to be the most significant variable affecting the stock market, as they can have a direct effect on cost of capital and therefore company profitability (Nissim & Penman, 2003). In the same vein, money supply is also an important factor influencing stock market developments (Aduda, Masila, & Onsongo, 2012). This is mainly because monetary authorities use money supply and interest rates to influence economic activity. By increasing money supply, authorities seek to reduce the cost of capital and increase inflation thereby making interest bearing assets attractive, while by mopping up excess

liquidity through treasury bill issuances, they seek to lower interest income and inflation thereby making stock markets attractive. However, money supply under the multiple currency system was constrained as the Central Bank ceased to issue domestic currency. The money supply in the economy was therefore determined by the country's ability to generate foreign currency through exports and the attraction of diaspora remittances and foreign direct and portfolio investment into the country (Reserve Bank of Zimbabwe [RBZ], 2013). The country's export performance, however, was very poor as a result of both the domestic and external developments.

The country also witnessed a growing informal sector in the economy, which meant that a significant proportion of the country's money supply was circulating outside the formal banking system, further exacerbating the liquidity challenges in the economy (GoZ, 2016; Reserve Bank of Zimbabwe [RBZ], 2016). Money supply is considered the most important macroeconomic factor that affects stock prices (Aduda, Masila, & Onsongo, 2012). According to Fang and Tice (2009), money supply also acts as the predicting indicator of the development of equity prices. Empirical literature, for instance Sirucek (2012) and Maskay (2007), also supports the fact that money supply growth increases the demand for stocks, and hence their prices.

It has also been noted that unexpected increases in money supply can cause a Central Bank to increase interest rates, the effect of which is that if the return on other fixed income securities like treasury bills and bonds, which are substitutes of equity, go up, stock prices decline (Kirui, Wawire, & Onono, 2014). This means that changes in monetary uncertainty modify stock prices' risk premiums, as investors prefer interest bearing securities such as bonds and treasury bills than profit related assets such as shares, hence they demand a high return on investment (ROI) for assuming the risk of keeping stocks. Adverse international developments such as the global financial crisis experienced in 2008 and 2009 have also become important in influencing stock market performance (Slimane, Mehanaoui, & Akbar, 2013), including in Zimbabwe (Mushure, 2015).

Against this background, this study sought to examine the impact of the multiple currency system on stock market performance in Zimbabwe. Specifically, the study sought to understand

the factors influencing stock market performance and their transmission mechanisms under the multiple currency system in Zimbabwe. Given the important role played by external factors in influencing money supply and domestic interest rates, the study also examined the impact of external variables such as the volatility index and international commodity prices on stock market performance in Zimbabwe. In addition, the study sought to understand the factors influencing foreign investor participation in Zimbabwe under the multiple currency environment. This was especially important in order to inform policy on how best the country can harness its foreign savings in order to improve liquidity in the economy and to raise much-needed capital for retooling, especially given the low savings levels in Zimbabwe.

1.2 Problem statement

Following the introduction of the multiple currency system in February 2009, the country experienced some positive developments including a sharp decline in inflation thus ending the hyperinflation era, positive economic growth trajectory and improved confidence in the banking sector. Notwithstanding these positive developments ushered in by the introduction of the multiple currency system in 2009, the stock market did not respond positively to the favourable economic developments. For instance, during the period February 2009 to December 2015, 15 companies de-listed from the Zimbabwe Stock Exchange, citing viability problems and failure to raise new capital on the market (Zimbabwe Stock Exchange [ZSE], 2015). The local stock market counters also declined from a peak of 82 counters to 54 counters by end of 2016. Notable de-listings in terms of their market capitalisation included African Banking Corporation, Astra Holdings, Tractive Power, Interfresh and PG, while only two firms were listed - TN Holdings and Padenga Holdings. However, TN holdings subsequently delisted as a result of viability problems. Other prominent stock market players such as Dawn Properties and African Sun have also indicated their intention to exit the ZSE. These are mostly blue chip companies, which had a significant influence on the stock market.

Moreover, the ZSE failed to attract foreign investor participation notwithstanding the fact that trading was now done in US dollars, thus eliminating exchange rate risk. It is possible, therefore, that there could be other important factors that were influencing foreign investor participation on the ZSE in Zimbabwe, hence the need to investigate these factors. This is

because foreign investors were necessary as a source of additional capital in the economy since the country was experiencing some liquidity challenges. The poor performance of the stock market following the introduction of the multiple currency system has, therefore, raised important questions regarding the impact of the multiple currencies on stock market performance in Zimbabwe (Sibanda, 2015; Musimwa & Kaseke, 2012).

Against this background, there was need for understanding whether the multiple currency system had any effect on stock market performance in Zimbabwe. There was thus a need for a better understanding of the nexus between macro-economic factors and stock market performance, in order to inform policy-makers and market players about the transmission mechanisms confronting the stock market business under the multiple currency environment. The causal relationships between independent factors such as money supply, interest rates, GDP and firm-specific factors need to be established not only to inform policy but to help investors in making decisions on investment options in Zimbabwe.

1.3 Research questions

This study sought to find answers to the following questions:

i. What has been the impact of macroeconomic factors on stock market performance under the multiple currency regime?
ii. What has been the influence of global or external factors on stock market performance under the multiple currency regime?
iii. How has the multiple currency system influenced foreign investor participation on firms listed on the Zimbabwe Stock Exchange?

Finding answers to the above mentioned research questions would provide a better awareness and understanding of the real impact of the multiple currency regime on the performance of stock exchanges. The first question will assist in understanding the key macroeconomic variables influencing stock market performance under the multiple currency regime, the second will assess the significance of foreign or global factors in the performance of the stock market

in Zimbabwe, whilst the third will assess whether foreign investors still have interest and confidence in the ZSE by looking at the portfolio shift between foreign and local participation, institutional and individual investors.

1.4 Research objectives

This study aimed to assess the impact of the multiple currency regime on stock market performance in Zimbabwe in terms of financial performance, market performance, and non-financial performance. The specific objectives of the study can be summarised as follows:

i. Analyse the impact of macroeconomic factors on stock market performance under the multiple currency regime.
ii. Analyse the impact of external shocks on stock market performance under the multiple currency regime.
iii. Analyse the macroeconomic factors influencing foreign investor participation on the Zimbabwe Stock Exchange (ZSE) under the multiple currency system.

1.5 Significance of the study

Although some studies have analysed the impact of macroeconomic factors on stock market performance in Zimbabwe (Zivengwa, Mashika, Bokosi, & Makova, 2011; Sunde & Sanderson, 2009; Jecheche, 2008), they mainly focussed on the pre-multiple currency era, when government had sovereignty over the major stock market drivers. However, the multiple currency environment is unique in the sense that the country completely abandoned its own currency. This is mainly because under the multiple currency system, the Central Bank does not issue domestic currency and the country uses a basket of selected currencies. Given the unique nature of the multiple currency system, it implies that existing studies may not be very useful in explaining the stock market dynamics in Zimbabwe; as such studies were carried out in a completely different context than the current scenario. There is reasonable belief that the multiple currency system might have altered the dynamics of the stock market performance and the transmission mechanisms through which macroeconomic variables affect stock market

performance. Therefore, there is a gap in the empirical literature on the impact of the macroeconomic factors on the stock market under the multiple currency environment.

Moreover, the evidence coming from the empirical literature indicates that the macroeconomic variables which influence stock market performance vary from country to country, for instance (Khalid & Khan, 2017; Akbar, Ali, & Faisal, 2012; Anokye & Tweneboah, 2008; Gan, Lee, Yong, & Zhang, 2006), hence the need to determine the macroeconomic variables that could be influencing the Zimbabwean stock market performance under the multiple currency regime. This study, therefore, provides further insights into the macroeconomic factors influencing stock market performance under a multiple currency regime in Zimbabwe.

By assessing the major determinants of stock market performance under a multiple currency regime, this study makes a distinct contribution to literature, as it is a factor that has not been used in previous studies. The advantage of this approach is that it combines both macroeconomic variables as well as firm specific variables (Ozlen, 2015). The study also assessed the significance of external factors in stock market performance under the multiple currency environment. The role played by external factors in explaining both money supply and interest rates implies that these factors have become important in explaining stock market dynamics. This is in view of the fact that the literature on how external factors are propagated into the multiple currency system is still very limited. In addition, the study adds to the empirical literature through an assessment of the push and pull factors determining foreign investor participation in a dollarised environment.

Although the multiple currency system eliminated exchange rate risk, this did not help boost foreign investor participation in the stock market and the economy at large, despite the fact that the exchange rate is a key factor in influencing stock market performance (Raheman, 2012; Asaolu, 2011; Lee, 2010; Horobet & Lilie, 2010). Given the importance of foreign investment in the economy, it was important to investigate the factors that influence foreign investor participation in Zimbabwe. The findings from this study will thus assist policy-makers as they consider the sustainability of keeping a multiple currency regime. Furthermore, the study contributes to the literature by providing some evidence of the impact of an appropriate monetary regime on economic performance.

1.6 Research scope

This is a quantitative research study, which covered the period from 2009 to 2016. The research is based on data available through the Zimbabwe Securities and Exchanges Council, which is readily available to the public by virtue of the fact that the firms under study were publicly listed.

1.7 Limitations of the study

The study only considers the period under the multiple currency regime. During hyperinflation, which took place from 2006 to 2008, the ZSE performed well, but due to differences in currencies and the lack of an approved exchange rate to match the multiple currency period, the study could not compare periods. This study is thus limited by the structural breaks in the data as well as the gap created by the closure of the stock market in 2008.

1.8 Organisation of the study

This thesis is organised as follows:

Chapter One provides an introduction, the problem statement, the purpose of the study, the research questions and the significance of the study, also called the contribution to research. Chapter Two provides a narrative on stock market developments in Zimbabwe and the stylised facts. Chapter Three looks at the theoretical and empirical literature, while Chapter Four discusses the methodology used in the study. From Chapter Five to Chapter Seven, the thesis provides a detailed analysis and interpretation of the results for the three research questions. Chapter Five deals with the empirical results and analysis of the transmission mechanisms influencing stock market performance under the multiple currency system, while Chapter Six deals with the results and analysis of the influence of external shocks on stock market performance under the multiple currency regime. Lastly, results concerning the dynamics in foreign investor participation under the multiple currency climate are presented and analysed

in Chapter Seven. Chapter Eight concludes the research and provides study-based recommendations regarding the operation of the stock market in Zimbabwe under the multiple currency economic climate.

1.9 Summary

This chapter introduced this study on the impact of the multiple currency system on the performance of the stock market in Zimbabwe, and examined the research context, which highlighted the growing importance of stock markets in the development of economies. The chapter noted that while there were some positive gains in the economy following the introduction of the multiple currency system, stock market performance was constrained, thus providing the basis for research on the impact of a multiple currency system on stock market performance. The chapter noted that studies on the impact of the multiple currency system on stock market performance in Zimbabwe are limited, as most studies examined the period before the multiple currency environment.

The chapter also highlighted the research questions, purpose and significance of the study. In particular, the study sought to understand what the impact of macroeconomic factors on stock market performance under the multiple currency regime has been; what the influence of global or external factors on stock market performance under the multiple currency regime has been; and how the multiple currency system influenced foreign investor participation on the ZSE. The chapter further discussed the significance of the study, highlighting that studies in the area are limited as most focussed on the pre-multiple currency era. In addition, the chapter highlighted that the multiple currency system ushered in a unique situation for Zimbabwe, as a basket of currencies was used in place of the domestic currency.

CHAPTER TWO: STOCK MARKET DEVELOPMENTS AND STYLISED FACTS

2.1 Introduction

This chapter provides a detailed background to the study and stylised facts on the stock market developments in Zimbabwe. The background on stock market developments in Zimbabwe is critical, as it provides the foundation for this study.

2.2 Development of the Zimbabwe Stock Exchange prior to independence (1980)

The Zimbabwean Stock Market's history dates back to 1896 in Bulawayo in the then Rhodesia, soon after white settlers of mainly British origin colonised the country. The key economic activity amongst the settlers was based on mining, and the stock exchange was an important component of the settlement process as it was aimed at financing mining activities (Muzamani, 1993). Other satellite stock exchanges were also established in Gwelo (now Gweru) and Umtali (now Mutare), again based on mining activities, which required an efficient mechanism for the stock exchange ownership of mining claims and funding.

In Bulawayo, the exchange only survived for six years before the South African Boer war broke out. In other areas of establishment, the stock exchanges also did not last long, mainly due to fewer mineral deposits than expected being found. The mining activities therefore declined, which directly influenced economic activity as well as the stock exchange. As per Tachiwou (2010), a declining economy results in problems in the stock market.

The Bulawayo Stock Exchange was later revived after the Second World War under a new name – the 'Rhodesia Stock Exchange' - and it resumed trading in 1946 (Zimbabwe Stock Exchange [ZSE], 2015b). A second exchange was then established in Salisbury (now Harare) in 1951. Major deals between the two exchanges were conducted by telephone.

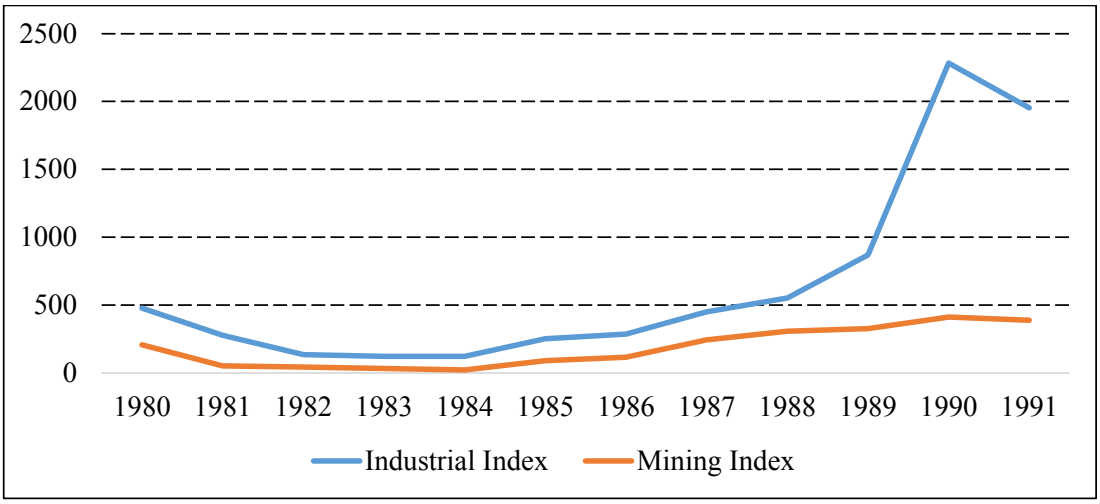
During the Federation period of Rhodesia and Nyasaland, when Rhodesia (Zimbabwe), Zambia (Northern Rhodesia) and Malawi (Nyasaland) became one country under British control, Salisbury was the centre of economic activity. All operations of the exchanges were moved to Salisbury, including the trading floor, the secretaries and the administration. In the same period, it was decided that legislation was necessary to govern the operation of the exchange, which would govern the rights and obligations of the members of the exchange and the investing public.

In the 1970s, the rules of the exchange were revised extensively by a committee within the governing treasury. This resulted in an Exchange Control Act being passed by the House of Assembly in 1974 (Zimbabwe Stock Exchange [ZSE], 2015b), which has become the basis for most operations of the Zimbabwe Stock Exchange today.

2.3 Performance of the ZSE during the period from 1980 to 2008

Following the attainment of independence in 1980, the name of the stock exchange was changed from the Rhodesia Stock Exchange to the Zimbabwe Stock Exchange (Zimbabwe Stock Exchange [ZSE], Zimbabwe Stock Exchange Handbook, 2015b). The Zimbabwean stock market boomed in the 1980s amid renewed confidence in the economy, and the external trading of shares was allowed by the government, resulting in an increase in the number of traders and investors. Trading on the ZSE included equities, preference shares, government bonds, municipal stocks, debentures and warrants, however the strong socialist ideologies of the government led to the stock exchange becoming virtually inactive towards the mid-1980s. The industrial index reached its lowest ebb in 1984 when it dropped to about 122 from 447.8 in 1980, however it improved again in the late 1980s, reaching 869.13 in 1989, as a result of improved investor confidence due to news of successful negotiations for an IMF supported programme, the Economic Structural Adjustment Programme (ESAP), which the government agreed to implement. The volume of shares traded also increased significantly, from 20,914,048 in 1982 to 39,201,638 by 1989 (Zimbabwe Stock Exchnage [ZSE], 2015). Most of this improvement was noticed from 1985. The performance of the ZSE in the first 12 years after independence in the form of turnover and indices is reflected in Figure 2.1.

Figure 2.1: The Performance of the ZSE (1980-1991)



Source: Muzamani, (1993)

The market peaked in August 1990 at an index level of 2700 (industrial and mining combined), and the economic reforms of the early 1990s gave a further boost to activities on the ZSE, however the depreciation of the domestic currency against major currencies, drought, and the general economic downturn squeezed company profits and hit the market badly. As a result, the stock market index plunged by 51 percent to 867 in 1992. In June 1993 the market recovered as short term interest rates declined, and the opening of the ZSE to foreign investors in 1993 and institutional reforms implemented in 1994 also gave the ZSE a major boost. The institutional changes included a reduction in corporate tax from 42.5% to 40%, a reduction in capital gains tax from 30% to 19%, and a reduction in the tax rate on dividends earned on the ZSE from 20% to 15% (Zimbabwe Stock Exchnage [ZSE], 2015). Against this backdrop the industrial index grew by 184% in 1994, with 58% of the traded shares being bought by foreign investors (ZSE, 2016).

From 1995, however, the stock market's performance started weakening. This was due to two main factors, notably the high domestic real interest rates and drought, which kept investors away from the market. International negative emerging markets sentiment following the Mexico debacle also reduced interest in the ZSE's shares. However, from July 1995, the stock market was boosted by renewed interest from international investors, who started investing in selected stocks. This renewed interest was based on the belief that there were some very cheap stocks in the market whose long-term value looked promising. In 1996, the ZSE was rated the

best emerging market performer. Market capitalisation was approximately US$255 million, representing an increase of approximately 240% from 1989 levels (ZSE, 2016).

The stock market witnessed a decline of approximately 60% and 88% in turnover and value of shares traded in 1998 respectively, against the backdrop of positive real money market interest rates, which were above 10%. The stock market remained depressed until mid-year 1999, but started showing signs of improvement towards the end of 1999, with a remarkable growth of 25% in the industrial index at the beginning of 2000. This was attributed to the good performance of some listed companies, together with other favourable export measures. The stock market was given the impetus to go even higher by the low interest rate policy adopted in August 2000.

Zimbabwe experienced high inflation from 2001, subsequently graduating into hyperinflation during the period 2007 to 2008. An unprecedented bull-run dominated the ZSE during this period however, mainly driven by self-fulfilling inflation expectations and unbridled speculation. The hyperinflation decimated the domestic economy and all local currency denominated savings, yet the ZSE, in tandem with the informal market, remained vibrant and did not reflect the then state of the economy and the performance of the underlying counters. Increased liquidity into the equities market due to low and negative real returns on the money market, a lack of alternative investment destinations and adverse inflation expectations made the equities market a lucrative investment haven, but reflected speculative behaviour and inflation developments as opposed to GDP growth, i.e. investors started hedging against inflation by investing in the stock market as the prices were inflation adjusted.

As a result, the industrial index surged to 6.5 quintillion points by the end of November 2008, recording growth rates in excess of 15 billion percent during the year, compared to negative growth rates of 14.2% of GDP (Zimbabwe Stock Exchange [ZSE], 2015b). The mining index also exceeded 18 billion percent growth, reaching 7.5 quintillion points by November 2008 (Zimbabwe Stock Exchange [ZSE], 2015b). However, this increase mainly reflected market distortions in the economy emanating from the hyperinflationary environment; share prices were responding to the exchange rate movements of dual listed companies such as Old Mutual, which became the centre of comparison. The participants were also using unofficial exchange

rates determined by parallel market activities, termed “burning of money”. These rampant, undisciplined and underhanded dealings by market participants compelled the government to suspend trading on the ZSE on 20th November 2008.

2.4 Stock market performance under the multiple currency system

Following the introduction of the multiple currency system in February 2009, trading activity on the Zimbabwean stock market was subdued and share prices were heavily depressed, with some dropping to the levels of fractions of cents. Under the multiple currency regime, the Reserve Bank of Zimbabwe lost its ability to directly influence interest rates through its overnight accommodation window, which is a monetary policy instrument that allows banking institutions in a short position to borrow money on a short-term basis from the Central Bank.

The inability of the Central Bank to determine interest rates also constrained its ability to influence the behaviour of the stock market; central banks usually influence stock market prices through interest rates, since there is an inverse relationship between interest rates and stock market prices. Empirical evidence, however, suggests that interest rate determination under a dollarised environment is mainly influenced by foreign interest rates and country risk premiums (Nyarota, Nakunyada, Mupunga, & Kupeta, 2016). As such, these variables became critical in influencing the dynamics of the stock market performance in Zimbabwe.

The ZSE resumed trading in February 2009 following the official introduction of the multiple currency system, which paved the way for trading in foreign currency. Trading started on a low note as the bourse went through a ‘market correction period’ of two months, at which time all listed shares had traded at least once. Following the resumption of full operations, the ZSE experienced an aggressive recovery, closing 2009 at a global best of 47 percent as it was coming off a relatively low base. By year-end, the total number of companies listed on the ZSE had risen to 79, while the annual market capitalisation reached US$3.8 billion with a monthly average of US$3.5 billion (ZSE, 2016).

The increase in stock prices, however, started to decelerate between 2010 and 2012, registering an average annual return of 2.3% as the limited capital, policy inconsistencies and political uncertainty from the inclusive Government of Zimbabwe partners took its toll on stock prices (Chikoko & Sami, 2012). The problem of policy inconsistencies was mainly reflected in the way the Government implemented the indigenisation and economic empowerment regulations, as it kept changing positions. A lack of clarity on the implementation of the indigenisation regulation also led to foreign investors taking a wait and see attitude, thereby undermining the performance of the stock market (International Monetary Fund [IMF], 2011).

The lacklustre performance of the ZSE was further exacerbated by the country's poor credit rating, which was mainly caused by the continued accumulation of international payment arrears by the government to both multi-lateral and bilateral creditors, as well as the high ratio of non-performing loans, which stood at 16% in December 2014 (Reserve Bank of Zimbabwe [RBZ], 2015). In terms of the Global Competitiveness Report's ease of doing business indicators, the country also had a poor ranking of 146 out of 148 countries in 2013-2014 and 143 out of 144 in 2014-2015 Global Competitiveness Report, (World Economic Forum [WEF], 2015). All these factors negatively affected the perception of investors concerning the attractiveness of the country as an investment destination.

The decline in the mainstream industrial index was mainly driven by losses recorded in the mostly heavily capitalised counters. The drop in the industrial index throughout the year was reflective of persistent economic challenges as well as the tight liquidity situation prevailing in the economy. The performance of the listed companies was also characterised by weakening financial results, with companies experiencing falling revenues and profitability, as well as investors shunning Zimbabwe in preference of other countries with better returns.

In 2013, the equities market performed strongly in the first half of the year but retreated in the last half of the year, owing to uncertainties associated with elections and the delay in the pronouncement of the 2014 National Budget. The industrial index opened the year at 152.40 points, ending the year at 202.12 points. However, despite recovering in the last quarter of 2013, the industrial index tapered off towards year-end, due to tight liquidity conditions and profit taking, which traditionally dominates the last month of the year. Similarly, mining

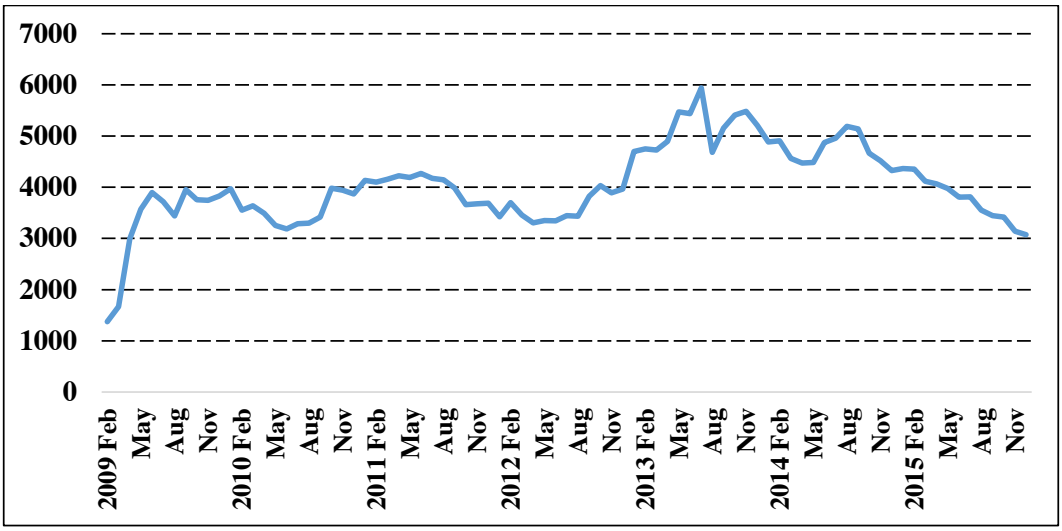
counters realised thin trading, as most mines continued to reel under capitalisation challenges. Consequently, the mining index closed 2013 in recession at 45.79 points, down from 65.12 points in 2012, representing a 29.68% decline.

The challenging macroeconomic and operating environment in 2014, which was characterised by a significant slowdown in economic activity, a liquidity crunch, company closures, and limited access to affordable medium to long-term credit, among other challenges, had spill over effects on the performance of the ZSE, which lost over US$800 million, or 17% in value. The industrial index declined by close to 20% in 2014, from 202.12 points at the beginning of the year to 162.79 points by 31 December 2014.

In line with the bearish sentiments on the Zimbabwe Stock Exchange, cumulative share turnover declined by 8.26%, from US$486.7 million in 2013 to US$446.5 million by December 2014. Share trading was partially affected by the rollover to the Central Securities Depository (CSD) system, during which investors were required to open trading accounts into the system. This notwithstanding, foreign investors' contributions to the bourse remained robust, increasing to 63.11% of total revenue in 2014, compared to 60.32% realised in the previous year.

As a consequence of the subdued trading on the stock exchange, market capitalisation declined by 16.73%, from US$5.20 billion in 2013 to US$4.33 billion by the end of December 2014. This means that more than US$870 million worth of value was lost in 2014. In 2015, the ZSE traded weaker, with both indices displaying a bearish trend throughout the year. Year on year, the industrial index lost 47.94 points (-29.45%) to close at 114.85 points, while the resources index lost 47.99 points (-66.92%) to close at 23.72 points. Figure 2.2 shows the market capitalisation trends.

Figure 2.2: Market capitalisation (US$ million)



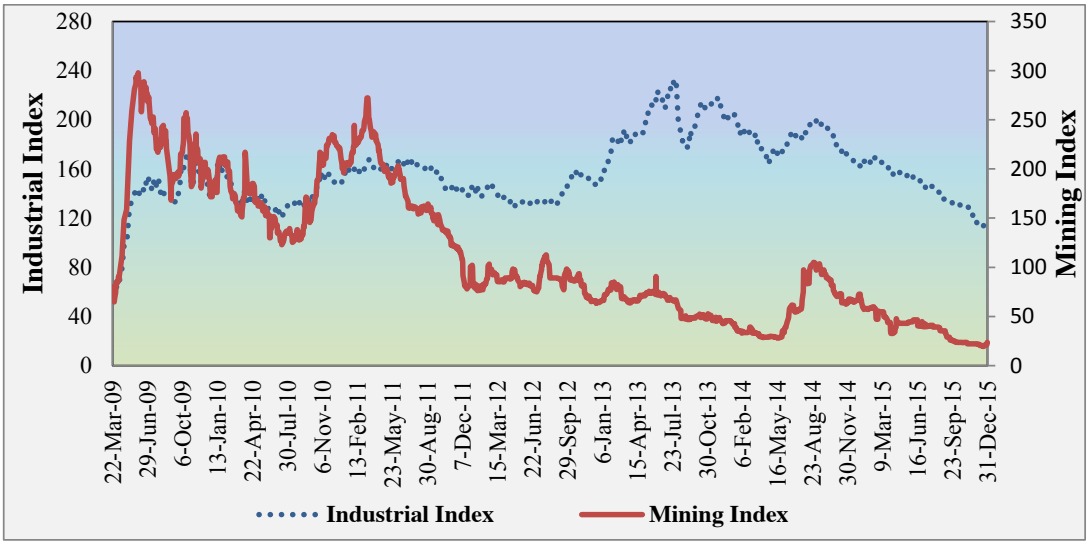
Source: Zimbabwe Stock Exchange (2016)

Figure 2.2 above shows changes in the market capitalisation over the period 2009 to 2015. Foreign investors contributed 42.3% of the total revenue in January 2011, which increased to 51.22% in 2012, while in 2013 and 2014 foreign investors contributed 60.32% and 63.11% respectively, reflecting strong foreign investor interest in emerging markets. Yet in 2015, foreign contributions decreased to 55% of the total revenue and foreign participation was mainly concentrated on selected blue chip counters.

In addition, the number of counters on the ZSE has been declining, reflecting the worsening economic challenges in the economy. The ZSE currently has 54 listed companies - 50 industrial and 4 mining. The number of listed companies was 78 in 2012, showing a decline over the years. The 50 industrial category is further decomposed into real estate, agriculture, printing, construction, insurance, conglomerate, health care, food processing, consumer goods, retail, distribution, spirits and wines. The ZSE is thus well diversified in terms of the economic sectors, which the listed companies represent. Currently, only approximately 17 companies dominate market capitalisation, which include, among others, Delta Corporation, Innscor Africa, Hippo Valley Estate, Barclays Bank, Old Mutual, Econet Wireless, CBZ, Seed Co and Lafarge Cement.

Share prices of major counters have also been on a downward trend since 2009. For instance, Delta Corporation, which arguably is the biggest Zimbabwean company in terms of market capitalisation, experienced a 20% decline in share price between 2009 and 2015. Share prices of other top performing counters such as Edgar Stores Limited and Truworths fell by 29% and 17% respectively over the same period. Similarly, the share price for Barclays fell by 15% (Zimbabwe Stock Exchange [ZSE], 2015b). The stock market was also very inactive due to low volumes of trade. As a result, there were few sellers as investors waited for a suitable time to draw a margin from their investments. Figure 2.3 shows the performance of the ZSE in terms of the industrial and mining index from the adoption of the multiple currency regime in 2009 until 2015.

Figure 2.3: Zimbabwe Stock Exchange indices



Source: Zimbabwe Stock Exchange (2016)

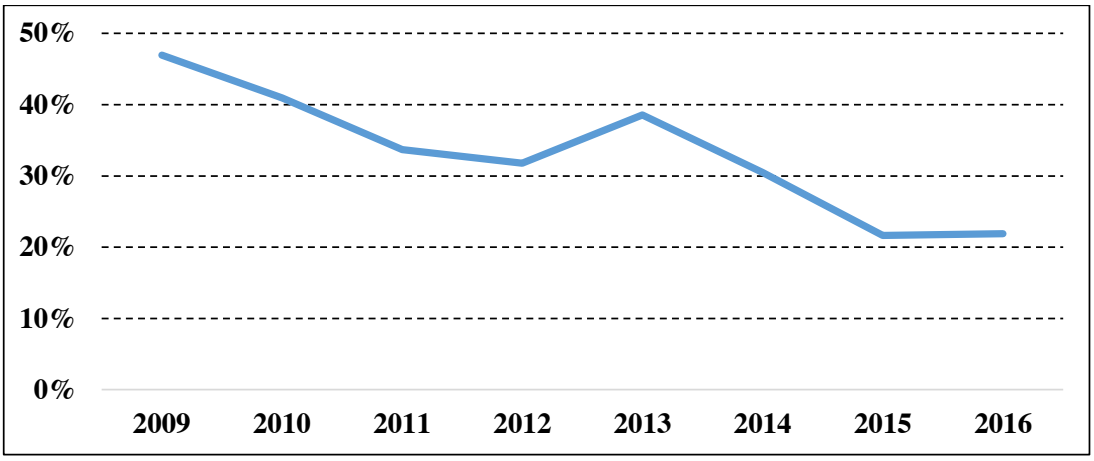
As shown in Figure 2.3, the mining index performed worse than the industrial index from 2011 to 2015, due to unstable international prices of minerals. The improved mining sector performance experienced between 2009 and 2011 was due to diamond mining activities at Chiyadzwa diamond fields. The diamonds were essentially alluvial diamonds and their depletion contributed to the downfall in mining stocks since April 2011, due to lack of investment in the sector to mine underground diamonds. The use of multiple currencies brought some confidence into the industrial sector, which was reflected in the improvement in the index. The industrial index was also influenced by a rebound of the industry from 2009,

registering capacity utilisation of 57.2% by 2011 before deteriorating again to 34.3% in 2015. The capacity utilisation decline effect on the industrial sector was less than that of the mining sector index.

2.5 Stylised facts on stock market developments

Zimbabwe's stock market performance was lacklustre during the multiple currency system, as reflected by the declining listing on the stock market and the ratio of market capitalisation to GDP. In 2009, market capitalisation was at about 47 percent of GDP, however the ratio of market capitalisation to GDP has progressively declined over the years, as has the number of listed companies. These declines reflect the economic challenges facing the economy. Figure 2.4 shows the market capitalisation to GDP ratio.

Figure 2.4: Market capitalisation to GDP ratio



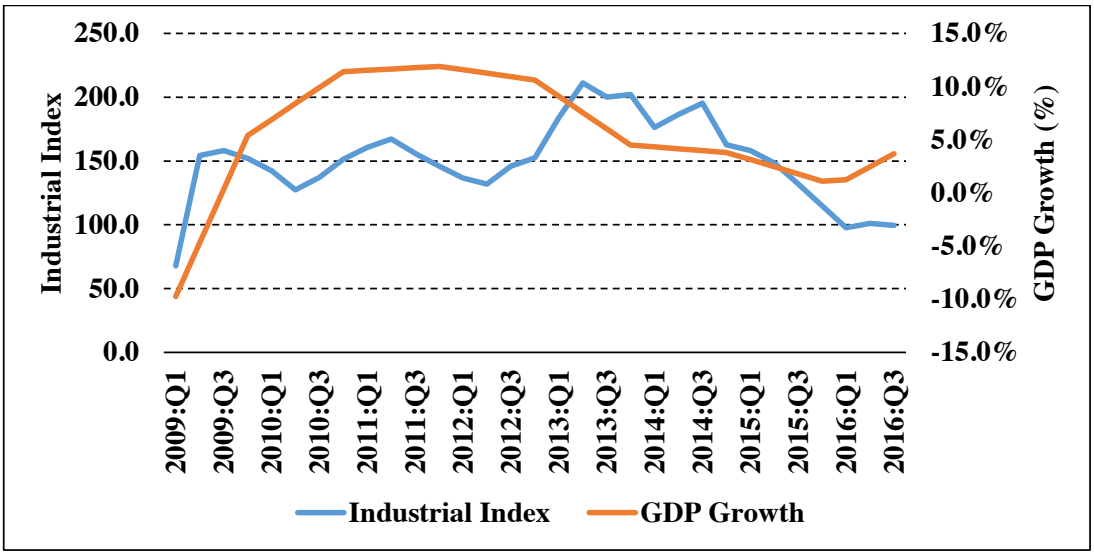
Source: ZIMSTAT (2016) and ZSE (2016)

2.5.1 Association between the industrial index and GDP growth

An appreciation of the association between the industrial index and economic growth is important for understanding stock market performance in Zimbabwe. The relationship between stock market indices and economic performance has been found to be positive in most empirical literature (Adjasi & Biekpe, 2006). The Zimbabwe stock market index (the industrial

index) initially improved following the adoption of the multiple currency system in 2009, reaching a peak in 2013, however 2014 saw a down turn in economic activities in the country, and the stock market index started declining, reflecting what was happening in the economy. The same trend was also observed in the economic growth trajectory when the economy started decelerating in 2013, following a robust growth phase experienced from 2009 as shown in Figure 2.5.

Figure 2.5: Association between industrial index and GDP growth

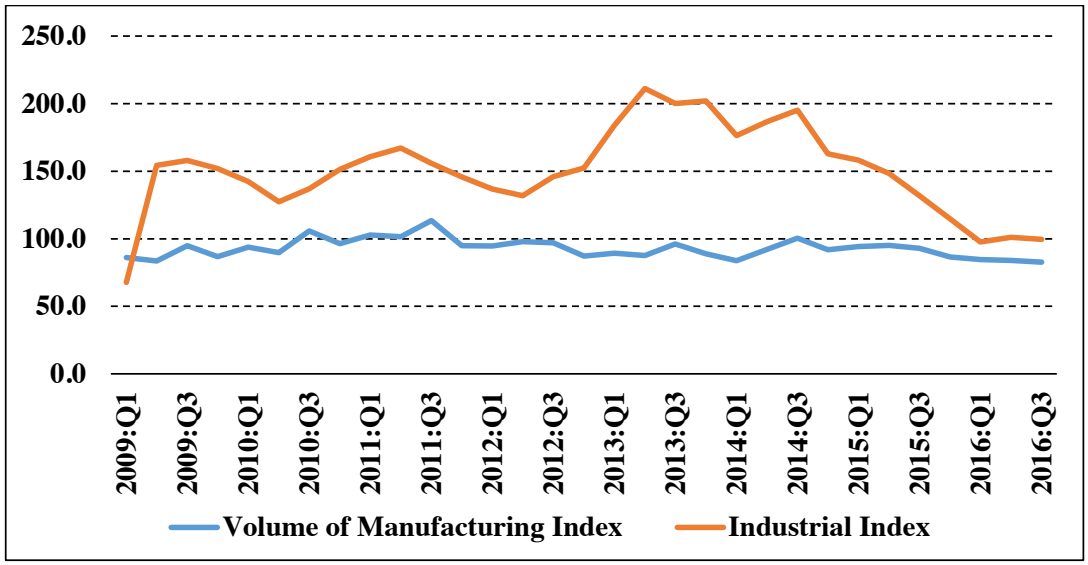


Source: ZIMSTAT (2016) and ZSE (2016)

2.5.2 Volume of manufacturing index and industrial index

The association between the volume of manufacturing index (VMI) and the industrial index has been very weak, as per Figure 2.6. While the industrial index initially increased from 2009 to 2013, before declining in the progressive years, the VMI remained almost flat.

Figure 2.6: Association between VMI and the industrial index

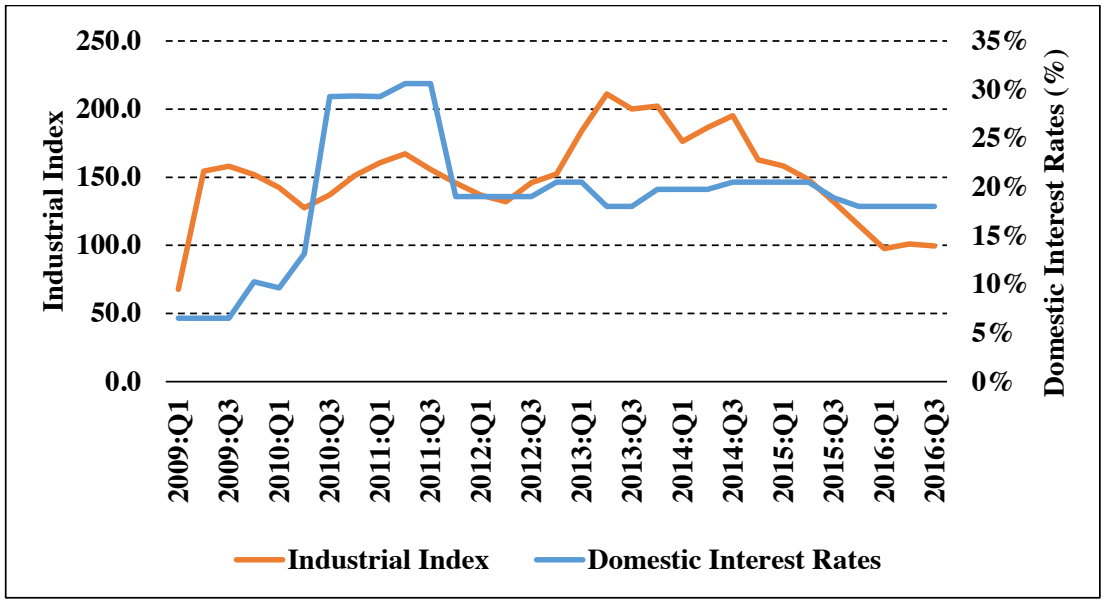


Source: ZSE (2016) and ZIMSTAT (2016)

2.5.3 Association between interest rates and the industrial index

Theoretically, there is an inverse relationship between stock market returns and interest rates. This means that when interest rates are going down, stock prices rise, reflecting a portfolio shift from the financial market to the capital market. The same trend was observed in the behaviour of the industrial index and the interest rate regime in Zimbabwe during the multiple currency era. In 2009, the industrial index was on the rise while interest rates were on the lower side. However, as interest rates began to rise, particularly from 2010, the industrial index began to decelerate. The same trend was also observed between 2012 and 2015, when interest rates declined and the stock market index was on the rise, as shown in Figure 2.7.

Figure 2.7: Association between interest rates and the industrial index

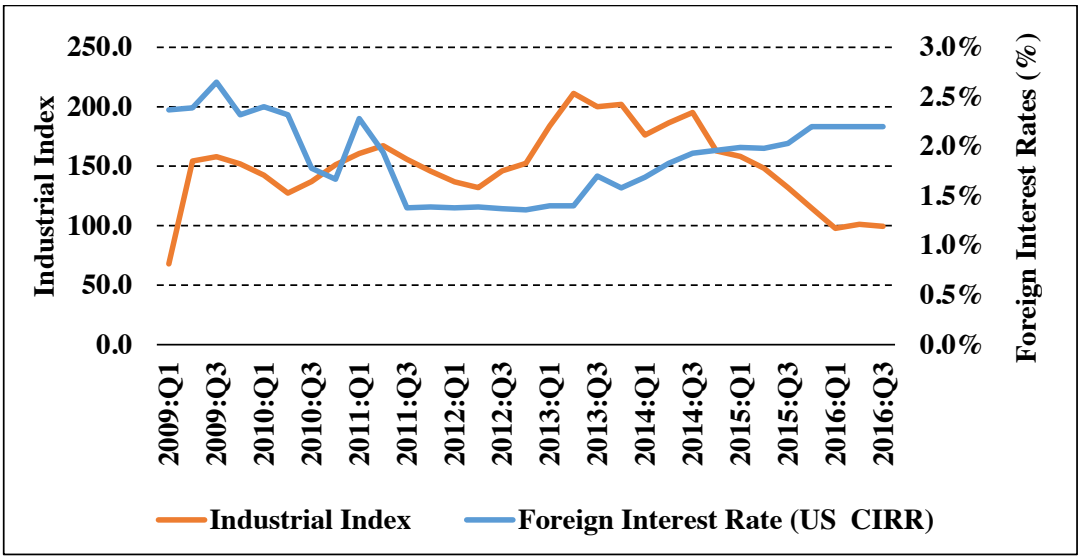


Source: ZSE, 2017 and RBZ, (2017)

2.5.4 Association between the industrial index and foreign interest rates

The trends between the Zimbabwe stock market's industrial index and foreign interest rates do not reflect any association, implying a weak correlation between the two variables, as not many foreign investors were investing on the stock market. Notwithstanding this observation, further investigations on the importance of foreign interest rates on stock market developments in Zimbabwe are still necessary.

Figure 2.8: Association between the industrial index and foreign interest rates

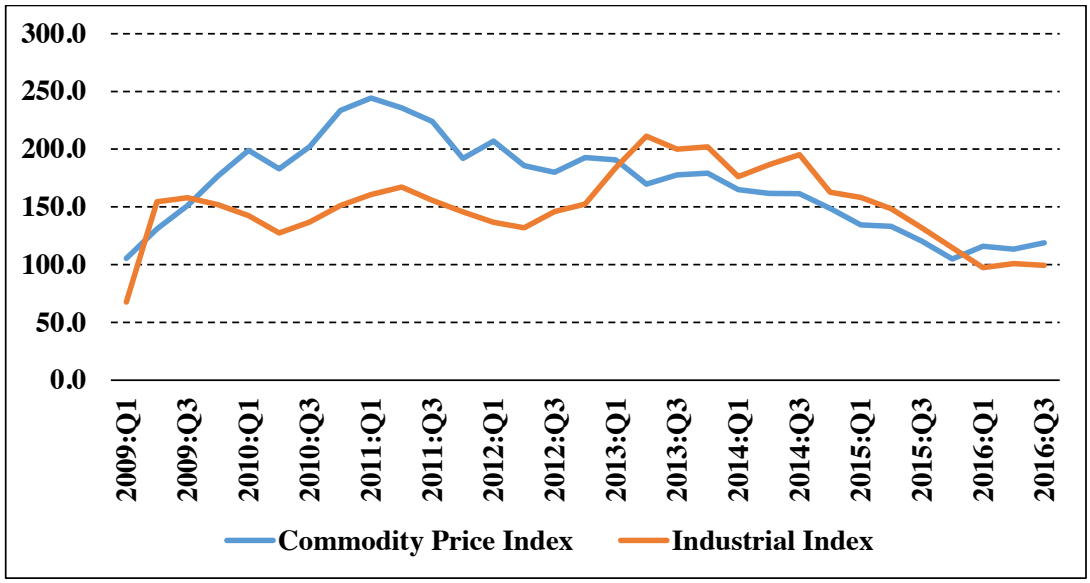


Source: ZSE (2016) and US Fed (2016)

2.5.5 Association between the industrial index and commodity prices

Commodity prices are an important aspect of economic developments in Zimbabwe, given that they constitute over 60% of the country's exports (National Economic Consultative Forum [NECF], 2016). A visual inspection of the commodity price movements and the industrial index reflects some association between the two variables, which implies that either commodity prices have an influence on the stock market performance or on the economy (see Figure 2.9). There is thus a need for a further analysis of this association using econometric techniques.

Figure 2.9: Association between the industrial index and commodity prices

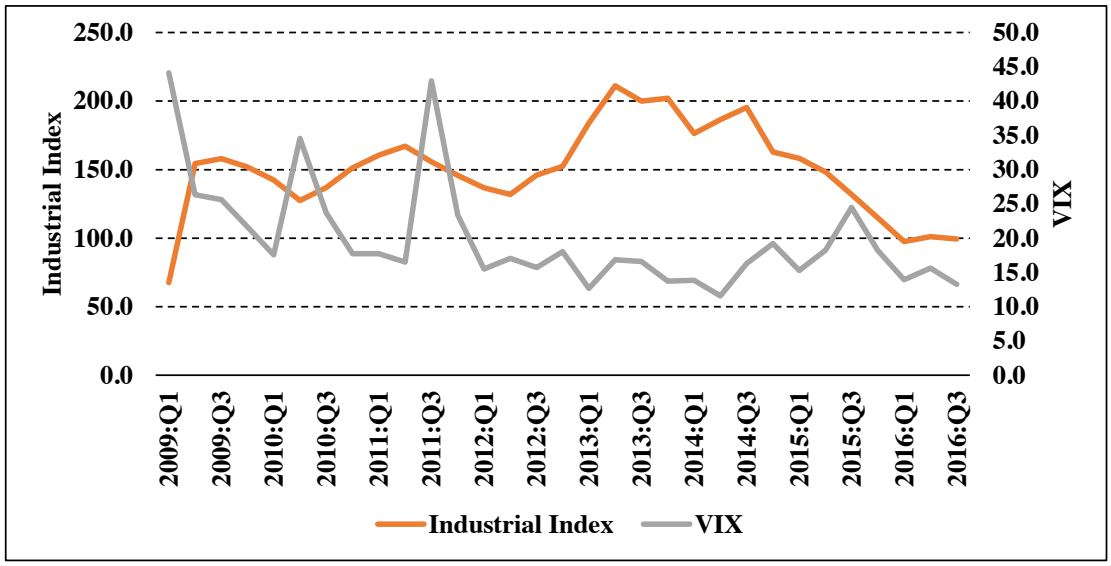


Source: ZSE (2016) and Bloomberg (2016)

2.5.6 Association between the industrial index and the volatility index

The Volatility Index (VIX) measures expectations or near term volatility conveyed by stock index option prices and is usually compiled by the Chicago Board Options Exchange. The VIX is an important external factor as it can be used to analyse how other stock market indices may respond to global market stock indices. From Figure 2.10, it can be observed that there is little connection between the VIX and the Zimbabwean stock market index as a way of ascertaining how much influence larger stock markets have on the performance of small stock markets like Zimbabwe which use the US dollar as a major currency. This may reflect the fact that the influence of global stock market developments on the Zimbabwean stock market performance is limited, if any, although further econometric tests are required to confirm the importance of the VIX on stock market developments in Zimbabwe.

Figure 2.10: Association between the industrial index and the volatility index

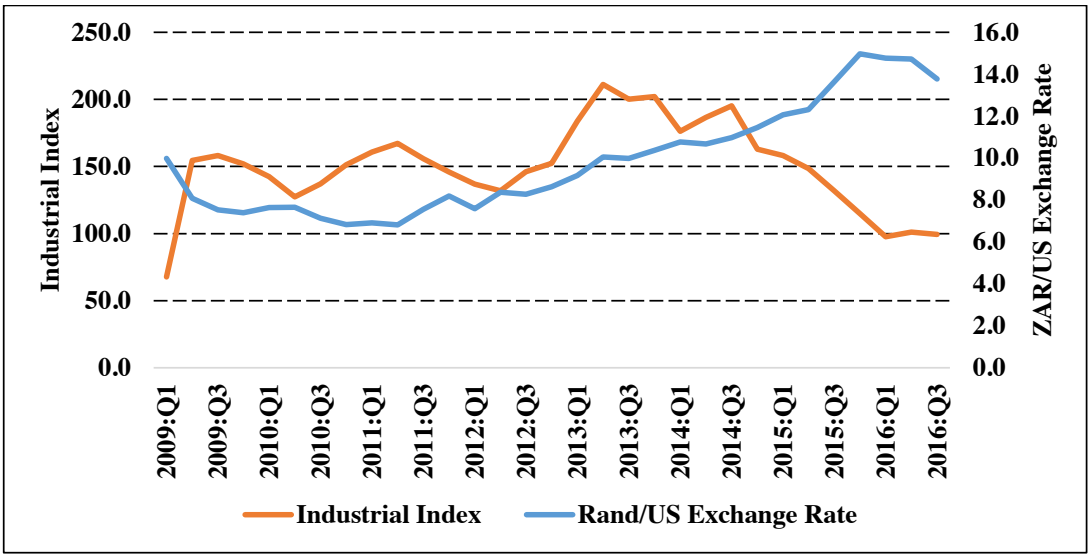


Source: ZSE (2017) and Chicago Board Options Exchange (2017)

2.5.7 Association between ZAR/US Dollar exchange rate and the industrial index

The exchange rate is also a key factor in determining stock market performance, yet Zimbabwe presents a fascinating scenario in that under the multiple currency system, in which the share prices are denominated in US dollars, the role of the exchange rate is limited. However, given the strong trade linkages between Zimbabwe and South Africa, the Rand-US dollar exchange rate is important as it can present some exchange rate risk, yet a visual inspection of the association of the ZAR/US dollar exchange rate reveals that there is limited, if any, association between the two variables. Notwithstanding this development, a further assessment of the association or influence of the ZAR/US dollar exchange rate is carried out in the next chapters.

Figure 2.11: Association between ZAR/US Dollar exchange rate and the industrial index

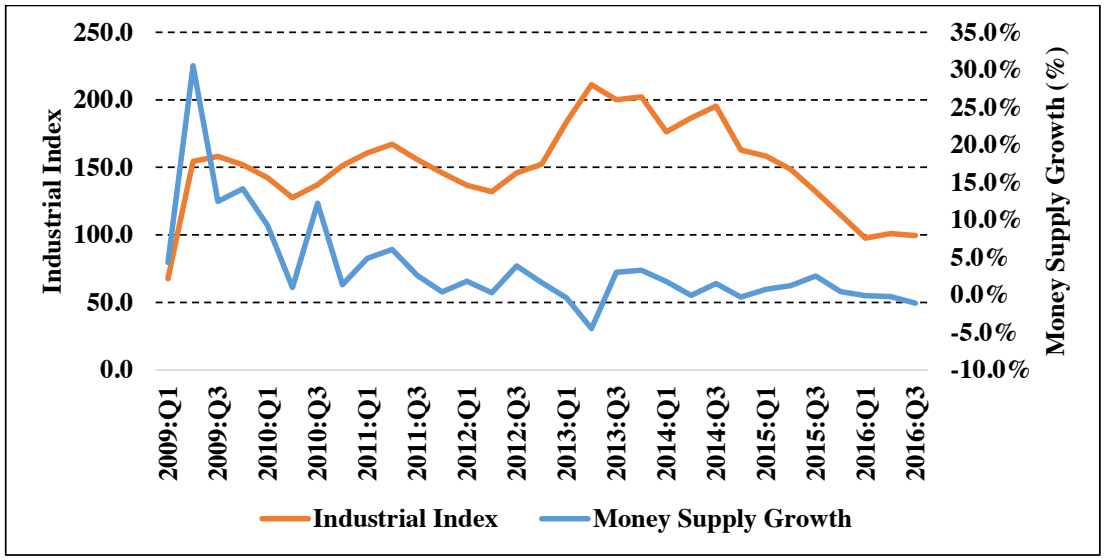


Source: ZSE (2017) and South African Reserve Bank (2016)

2.5.8 Association between money supply and the industrial index

Money supply is considered the most important macroeconomic factor to affect stock prices (Aduda, Masila, & Onsongo, 2012). Authors such as Sirucek (2012) and Maskay (2007) also support the fact that money supply growth increases the demand for stocks and hence their prices. Following the adoption of the multiple currency system in February 2009, the country ceased to issue domestic currency, and money supply became dependent on external sector developments. However, given the country's precarious external sector developments, which are characterised by huge and persistent current account deficits, the country's money supply has been very restricted, resulting in severe liquidity challenges that are believed to have played an important role in shaping stock market developments in Zimbabwe. Figure 2.12 indicates that as money supply growth declined, so the stock market index dipped, reflecting the importance of money supply for the stock market. It has also been observed that the stock market has generally been inactive as a result of the debilitating liquidity challenges facing the economy.

Figure 2.12: Association between money supply and the industrial index



Source: ZSE (2016) and ZIMSTAT (2016)

The correlation between the variables is also important to help explain the trends. Table 2.1 shows the correlations trends between the macroeconomic variables.

Table 2.1: Correlation Matrix for the Macroeconomic Variables (Percentage)

	ZSE Index	Money supply	Inflation	Rand-US rate	Domestic Interest	Foreign interest	Commodity price index
ZSE Index	1.00						
Money supply	-0.03	1.00					
Inflation	0.45	-0.72	1.00				
Rand-US rate	-0.35	-0.37	0.35	1.00			
Domestic Int.	0.25	-0.39	0.43	-0.11	1.00		
Foreign int.	-0.43	0.45	-0.69	0.23	-0.52	1.00	
Commodity prices	0.47	-0.01	0.04	-0.83	0.56	-0.47	1.00

Source: Researcher's Own Computation

The correlation matrix indicates some relatively high correlation with commodity prices and inflation of about 47% and 45%, respectively and a negative correlation of 43% with foreign interest rates. There is also a relatively high correlation between the ZSE index and domestic inflation of 25% and negative correlation with the rand US dollar exchange rate of -35%. The ZSE index, is however, not correlated with money supply. However, these are not conclusive and there is need to analyse the trends using advanced econometric techniques.

2.6 Country experiences of stock market performance in dollarised economies

The experiences of countries that dollarised also provide important insights into the impact of dollarisation on stock market developments, such as Panama and Ecuador. Panama has a vibrant stock market, which was established in 1989 during some of the most difficult political and economic times in the country's history. The Panamanian stock market was created by a group of businessmen who came together to create a centralised trading system where securities supply and demand could operate freely. On June 26, 1990, the Panamanian Stock Market held its first trading session. Throughout the next decade and a half, the trading volume of Panama's stock market skyrocketed from US$3.3 million in its inaugural year to US$2,256.3 million in 2006. Market capitalisation is way above that of Zimbabwe at approximately US$33 billion, and Panama continues to be an attractive market for foreign investors. According to the National Securities Commission, 88.5% of Panama's traded volume comes mainly from international transactions, as opposed to just 11.5% from the local market (Trading Economics, 2017).

Ecuador is another country which is dollarised; its 1993 Capital Markets Law established a modern regulatory structure, opened stock market trading to banks and other firms, and encouraged the development of mutual funds. The bulk of activity on the country's two small stock exchanges currently involves trading in short-term commercial paper, bank obligations, and government debt. The country is yet to develop a vibrant bull and bear culture to rival the more popular investment of real estate.

The value of the market capitalisation of listed companies in Ecuador climbed from US$690 million in 1992 to above US$6.10 billion by 2015, according to data published by Standard

and Poor's. Market capitalisation of listed companies as a percentage of GDP in Ecuador, however, is still very low at less than 15 percent of GDP. Its highest value over the past 19 years was 13.45% in 1994, while its lowest value was 0.58% in 1992 (World Bank, 2017).

2.7 Summary

This chapter provided a background to the stock market developments in Zimbabwe, and described how the stock market evolved over the years, including its performance during the multiple currency era. It was noted, however, that the performance of the stock market in Zimbabwe was not impressive, as market capitalisation plunged as the country's economic challenges deepened. The chapter also provided stylised facts on the association of the Zimbabwean stock market index, with some key macroeconomic variables including money supply growth. It was observed that the liquidity challenges facing the economy were also reflected in the poor performance of the stock market. Other external variables exhibited very little, if any, connection with the stock market index in Zimbabwe. Further econometric analysis is still necessary to ascertain the true impact of the macroeconomic variables on stock market performance in Zimbabwe, which is addressed in the forthcoming chapters.

CHAPTER THREE: LITERATURE REVIEW

3.1 Introduction

This chapter reviews the theoretical and empirical literature on stock markets and economic performance, which is critical for understanding the impact of the multiple currency system on stock market performance. The theoretical literature focuses on the major theoretical strands of literature on stock market performance, the impact of external factors on stock markets, and the determinants of foreign investor participation. The chapter also discusses the empirical literature on the impact of macroeconomic factors on stock market performance and their tramsmission mechanisms.

3.2 Theoretical literature review

There are many theoretical strands of literature on stock markets, which include the Portfolio theory, the Capital Assets Pricing Model (CAPM), the Arbitrage Pricing Theory (APT), the Efficient Market Hypothesis (EMH) and the Value-Investing Model. The Portfolio theory was developed by Markowitz (1952), who looked at the relationship between risk and return in developing his theory, before it was further modified by Tobin (1958) and Sharpe (1963). The theory analyses how, for a given rate of expected return, assets can be combined to minimise total risk. The risk of a portfolio is the probability that an outcome will occur which is undesirable to the investor (Markowitz, 2010). Risks can either be systematic or unsystematic; unsystematic risk can be minimised through diversification because it is asset specific, while systematic risk is universal and therefore cannot be minimised through diversification.

The portfolio theory involves finding a balance between maximising return and minimising risk - the objective is for an investor to select his or her investments in such a way as to diversify risk while maximising expected returns. The expected return of a portfolio is the average earning an asset would get if the investment were repeated at a given probability distribution (Berk & DeMarzo, 2014). A single asset or portfolio of assets is considered to be efficient if no other asset or portfolio of assets offers a higher expected return with the same or lower risk,

or a lower risk with the same or higher expected return. The relationship between the risk and return of a portfolio can be established by analysing the historical data of a stock or asset.

Sharpe (1963) extended Markowitz's portfolio theory by developing a simplified portfolio selection model for the second stage of the portfolio selection process, called the Market Model or Single Index Model. He suggested abandoning the covariance between each security and related each security to the market, thus this model is able to obtain the same results with much larger relationships between securities, using relatively few parameters. The advantage of this model is that it is low cost and requires less information to establish an effective portfolio. In Sharpe's suggestion, the return for any security is given by equation 3.1.

$$R_{it} = \alpha_i + \beta_i RM_t + \varepsilon_i \tag{3.1}$$

Where, $R_{it}$is the return on security i at time (t), $\alpha_i$and (β_i) are fixed parameters, (ε_i) is a random variable and (RM_t) is the return on market. The rate of return on any security is dependent on a constant plus slope coefficient (β) multiplied by market return plus a random element. The benefit of this equation is that the covariance between pairs of assets can be estimated using the beta (β).

The realisation that systematic risk is important in stock market developments has led to investors placing more emphasis on macroeconomic variables as the likely sources of systematic risk (Akbar, Ali, & Faisal, 2012). Subsequent developments in financial theory have also resulted in rigorous economic and financial theories, including the market equilibrium models such as the Capital Assets Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT). These models were developed on the basis that the stock market performance is influenced by specific macroeconomic variables (Perlin, Dufour, & Brooks, 2014). The CAPM states that the return on a single stock is directly related to a single factor, which is the rate of return on the market portfolio. The CAPM is commonly referred to as the single factor model, while the APT is a multifactor model. Ross (1976) developed the APT model, which proposes that the actual return on any security or portfolio is dependent on its expected return, plus a series of factors.

The CAPM and the APT integrated the portfolio theory, which mainly focused on risk and return, with the macroeconomic variables, which are systematic risk factors. The CAPM specifies returns as a linear function of only systematic risk. Although the CAPM has been used extensively in empirical literature, its validity has been questioned. The model says that the risk of a stock should be measured relative to a comprehensive market portfolio, which in principle can include not just the traded financial assets, but also consumer durables, real estate and human capital (Fama & French, 2004). Adenunga, Ige and Kesinro (2016) and Cheng and Tzeng (2011) argued that in addition to the macroeconomic factors, stock market returns are also driven by firm-specific factors such as size, earnings, dividends, book to market value, and capital structure.

The APT model is an alternative asset-pricing model to the CAPM, which differs in its assumptions and explanations of risk factors associated with the risk of an asset. The APT specifies returns as a linear function of more than a single factor; it predicts a relationship between the returns of a portfolio and the returns of a single asset through a linear combination of variables. The idea of more factors became a cornerstone of modern portfolio theory, and many empirical researchers began to incorporate the idea of several variables to explain stock markets (Aduda, Masila, & Onsongo, 2012; Abdul, Mohd-Sidek, & Fauziah, 2009; Anokye & Tweneboah, 2008; Hosseini, Ahmah, & Li, 2011). Ross (1976) developed the APT, while Roll and Ross (1980) provided a more intuitive explanation of the APT and discussed its merits for portfolio management. The APT model takes the form depicted in equation 3.2.

$$R_{it} = E(R_{it}) + \beta_{i1}F1_t + \beta_{i1}F2_t + \beta_{i1}F3_t + \ldots\ldots\ldots + \beta_{iK}FK_t + \varepsilon_i \qquad (3.2)$$

Where R_{it} is the actual (realised) return on security i at time t, $E(R_{it})$ is its expected return, (β_{it}) is the sensitivity of actual return on ith asset to the risk factor (FK_t), and ε_i is the random error term. As shown in the equation, the return on any security or portfolio is dependent on expected return on security plus a series of macroeconomic factors.

Economic literature is replete with studies on stock market performance. However, the empirical studies have demonstrated that the factors affecting stock market performance vary

from country to country. For instance, Kirui, Wawire and Onono (2014) found that the factors which influence stock prices include interest rates, inflation, GDP, money supply, the movement of international capital, changes in exchange rates, and political and economic shocks. Sirucek (2012) posited that money supply is the most important factor influencing stock market performance in the long term; while others have established that country-specific macroeconomic factors influence stock market performance more than global macroeconomic factors (Bilson, Brailsford, & Hooper, 2001). Flannery and Protopapadakis (2002) included money supply among the major macroeconomic factors, as well as unemployment, trade balance, the number of new residential buildings and the Producer Price Index.

The Efficient Market Hypothesis (EMH) is a portfolio theory which assumes that securities markets are very efficient in reflecting information about individual stocks and about the stock market as a whole (Fama E. , 1970). The model presumes that news spreads very quickly and is incorporated into the prices of securities without delay. Thus, neither technical analysis, which is the study of past stock prices in an attempt to predict future prices, nor fundamental analysis, which is the analysis of financial information such as company earnings and asset values, could help investors to select stocks that are undervalued. This implies that it is not possible for the investor to earn returns greater than those, which could be obtained by holding a randomly selected portfolio of individual stocks with comparable risk.

The efficient market hypothesis is associated with the idea of a "random walk", which is a term loosely used in the financial literature to characterise a price series where all subsequent price changes represent random departures from previous prices. The logic of the random walk idea is that if information flows seamlessly, this information is immediately reflected in stock prices, and then tomorrow's price change will reflect only tomorrow's news and will be independent of the price changes today. As a result, prices fully reflect all known information, and even uninformed investors buying a diversified portfolio can still obtain a rate of return as generous as that achieved by the experts.

Another model, which has been used in portfolio selection, is the value-investing model. Value investing is a skill which identifies stocks with a low price earnings ratio (P/E) and a price-to-book value ratio (P/B) in order to outperform the market by producing earnings which are

above market average (Athanasskos, 2012). This technique is different from the modern portfolio theory by Harry Markowitz and William Sharpe in that it is less diversified and does not rely on public information, but instead uses intrinsic evidence about firms. When using the value investing technique, investors first of all identify undervalued shares, calculate the intrinsic value and decide to invest if the prevailing share price is lower than the intrinsic value.

From the above analysis, there are generally two main views about what drives factor returns. The first is based on the view that markets are efficient and that factors reflect "systematic" sources of risk. The other view is based on the view that investors either exhibit behavioral biases or are subject to different constraints such as time horizons and ability to use leverage, among other things. In the first view, the term "systematic" refers to the fact that risks to these stock traits cannot be diversified away, as in the true spirit of Ross's APT Model, (Ross, 1976). This argument is consistent with the efficient market theory, which assumes that markets are efficient and investors are rational. Here, factors earn excess returns because there is "systematic risk" attached to them. For example, some have argued that the small cap premium is return earned for exposure to companies, which are less liquid (Liu, 2006), less transparent (Zhang, 2006) and more likely to experience financial distress (Dichev, 1988).

There are several explanations for the existence of this effect. In the efficient markets view, the value premium is compensation for higher real or perceived risk. Zhang (2006) suggested that contrary to their leaner and more flexible growth counterparts, value firms have less flexibility to adapt to unfavourable economic environments. Bergaoui (2015) found that value stocks are riskier due to their high financial leverage and large uncertainty in future earnings. The CAPM, on the other hand, has increasingly been criticised due to its inability to explain the pricing of risky assets.

The APT specifies returns as a linear function of more than a single factor; it predicts a relationship between the returns of a portfolio and the returns of a single asset through a linear combination of variables. As Ross (1976) noted, arbitrage-theoretic reasoning is not unique to his particular theory, but is in fact the underlying logic and methodology of virtually all finance theory. According to Guo (2002) and Lamont (2000), economic state variables have systematic effects on stock returns. From the perspective of the efficient market hypothesis and rational

expectations, asset prices depend on their exposure to the state variables, which describe the economy.

Several studies have found the Zimbabwe Stock Exchange to be inefficient (Smith, Jefferies & Ryoo, 2002; Magnusson & Wydick, 2002; Mlambo, Biekpe & Smit (2003), although a few studies, notably Jefferis and Okeahalam (2000) and Appiah-Kusi and Menyah (2003), found the opposite. This suggests that the existing empirical studies do not provide a conclusive analysis on the dynamics of stock market developments in Zimbabwe.

3.3 Dividend discount models

The Dividend Discount Model (DDM) is another theoretical model, which explains the relationship between stock market prices and macroeconomic variables. The DDM was developed by Miller and Modigliani, (1961), and proposes a relationship between stock prices, future cash flows and discount rates. According to the DDM, stock market prices are a function of future cash flows from the underlying assets and the discount rate. Future cash flows and discount rates are sensitive to changes in macroeconomic conditions, which implies that the model closely relates the changes in stock prices to macroeconomic variables. The DDM posits that future cash flows of companies on the stock market are influenced by economic activity, and discount rates depend on the prevailing interest rates and volatility of future cash flows, which is measured by risk premiums.

Generally, when an investor buys stocks, the expectation is that there are two types of cash flows that one can receive, namely dividends that can be received during the period one is holding the stock, and an expected price at the end of the holding period. Since this expected price is itself determined by future dividends, the value of a stock is the present value of dividends into infinity. This can be summarised in the following equation:

$$\sum_{t=1}^{t=\infty} \frac{E(DPS_t)}{(1+k_e)t} \tag{3.3}$$

Where DPS_t is expected dividends per share and k_e is cost of equity. The model relies on the present value rule, i.e. the value of any asset is the present value of expected future cash flows discounted at a rate appropriate to the riskiness of the cash flows.

While the DDM appears to be a plausible model that can be used to evaluate potential dividend income from a stock, it has some shortcomings. One of its major weaknesses is that it is not applicable to stocks, which do not provide dividends, although they may provide capital gains, which accrue from investing in the stock. The DDM is also premised on a flawed assumption, which suggests that the only value of a stock is the return from investment provided through dividends. Moreover, it is generally difficult to have accurate projections given that the model does not take into account the issue of buy backs as well as its flawed assumption on income (Woodward & Partington, 2006). The stock value is mainly determined by the discounted cash flow (DCF) analysis used in making future projected dividends. If the value determined is greater than the stock's current share prices, then the stock is considered undervalued and therefore worth buying.

The other theoretical model is the contagion model, which explains the transmission of volatility across stock markets. Yang and Lim (2002) defined contagion as the shift of cross-country correlation from a tranquil period to a crisis period, while Forbes and Rigobon (2002) defined it as an increase of common movements of financial asset markets at a particular time, mainly during a period of crisis. The World Bank (2009) categorised financial contagion into three things: (a) a cross-country transmission of shocks, which includes fundamental linkages; (b) excess co-movement after controlling for common and fundamental shocks; and (c) a cross-country transmission mechanisms which excludes a constant high degree of co-movement in a crisis period.

In addition, (Khallouli & Sandretto, 2010) provided different definitions of contagion, which include the transmission of a crisis from one country to another; the propagation of shocks not linked to fundamentals; the spread of shock as a result of panic movements and the herding behaviour of investors; the transmission of shocks which causes markets to co-vary; and the propagation of shocks which occurs with a higher probability during a financial crisis period. The contagion effect therefore means that stock markets correlate mildly during tranquil times

and highly during crisis periods, i.e. the ZSE may move in line with developments in other international stock markets such as the NYSE, NASDAQ, LSE and the JSE, to mention a few. It is against this background that international stock market volatility is included as one of the determinants of stock market prices in Zimbabwe.

3.4 Determinants of stock market performance

While the above theoretical strands of literature on stock markets suggest different factors as being important in determining stock market developments, what has become clear is that the factors at play tend to vary from one economy to the other. The APT thus made an important contribution when it introduced the idea of multiple factors, as they affect stock market developments in various ways. Moreover, asset prices depend on their exposure to the fundamental variables describing the economy; any systematic variable, which affects the economy at the same time, affects the return of a single stock, and consequently the stock market's return as a whole. Thus, these variables are the systematic risk factors.

Literature suggests that the determinants of stock market viability in any economy include, among others, incomes per capita, market liquidity, macroeconomic stability, foreign capital investment, banking sector development and institutional quality (Aduda, Masila, & Onsongo, 2012; Naceur, Ghazouani, & Mohammed, 2005; Yartey, 2008). The notable macroeconomic factors influencing stock market developments include the following:

3.4.1 Market liquidity

Chordia, Roll and Subrahmanyam (2003) stated that market liquidity and trading activity are important features of financial markets, and the factors which influence liquidity must be known in order to predict stock market performance. They have also argued that market liquidity is an essential element, which increases investor confidence in financial markets thereby enhancing corporate resource allocation. An illiquid market has the tendency to induce high levels of volatility as well as a decrease in trading activity and spreads. Chordia et al. also suggested that long-term interest rate regime in an economy influences liquidity, in addition to

positive macro-economic announcements. This is due to the inverse relationship between stock prices and interest rates (Chordia, Roll, & Subrahmanyam, 2003). When long term interest rates are low, investors would shift their resources from the money market to the stock market, thus influencing liquidity on the stock markets. Admati, Pfleiderer, and Zechner (2006) and Palmiter (2002) postulated that where stock prices are used as a basis for management performance, increased liquidity would facilitate informed selling.

The argument made by Fang and Tice (2009) makes sense in that a liquid market always allows non-shareholders to become shareholders as they seek to secure assets in exchange for their savings. An illiquid market cannot generate new shareholders and hence cannot stimulate significant activity on the stock market.

3.4.2 Macroeconomic stability

The economic situation in a country is a key-determining factor on the performance of financial markets (Akbar, Ali, & Faisal, 2012). Macro-economic factors that are beyond corporate management control include, among others, inflation, money supply, government policy, per capita incomes, GDP growth, population or market size, interest rates, foreign direct investment and governance issues (Aduda, Masila, & Onsongo, 2012; Aduda, Masila, & Onsongo, 2012; Hosseini, Ahmah, & Li, 2011). Managers of stock listed firms need to perform beyond the expectation of shareholders by ensuring share price and earnings growth, irrespective of the business operating environment (Berk & DeMarzo, 2014). In a multiple currency economy, volatility is prevalent not only because of an unstable macroeconomic situation, but also external shocks, which affect the basket of currencies emanating from the international market.

3.4.3 Gross domestic product

Gross domestic product (GDP) is typically used as a measure for real economic activity, which is regarded as a crucial determinant of stock market performance (Adjasi & Biekpe, 2006;

Raheman, 2012). Eita (2012) highlighted that an increase in economic activity causes stock market returns to increase.

The unavailability of high frequency monthly data on GDP, however, prompts many researchers to proxy GDP with the Volume of Manufacturing Index (VMI), as an increase in the VMI signals economic growth (Maysami, Howe, & Hamaz, 2004). This index may also predict the variations in stock market returns compared to GDP (Ratanapakorn & Sharma, 2007). An increase in the VMI increases corporate earnings, thereby enhancing the present value of the firm. This, in turn, leads to an increase in stock market investments, which ultimately boosts stock prices.

3.4.4 Interest rates

Interest rates typically signal the impact of monetary policy on the economy (Bernanke & Kuttner, 2005); high interest rates reflect a tight monetary policy stance, while lower interest rates indicate a loose monetary policy. High interest rates or discount rates reduce the present value of cash flows, which in turn reduce the attractiveness of investments, thereby shrinking stock returns (Rahman, Sidek, & Tafri, 2009). Changes in interest rates affect both the expected future cash flows for firms and the value of the companies (Martinez-Moya, Ferrer-Lepena, & Escribano-Sotos, 2013). Firstly, an increase in the interest rates increases the interest expenses of firms, which leads to a decrease in dividends, thereby affecting future cash flows and stock prices. Higher interest rates also adversely affect the investment behaviour of firms.

An increase in interest rates makes bonds more attractive due to their risk-return nature, and motivates investors to adjust their portfolios by buying bonds and selling shares, which depresses share prices (Bernanke & Kuttner, 2005). Moreover, an increase in the interest rates can make government securities more desirable since they are viewed as safer or risk free investment opportunities. Another impact could be through portfolio substitution, that is, a rise in interest increases the opportunity cost of holding cash, which results in substitutions between stock and other interest bearing securities like bonds (Raheman, 2012).

Overall, low interest rates tend to improve the economy and raise the value of stock, while high interest rates tend to lower economic activity. The impact of the interest rate channel on stock market performance in Zimbabwe is unique, since the country has lost its monetary control and ability to set interest rates. This study will, therefore, assess the impact of both foreign and domestic interest rates on stock market performance.

3.4.5 Exchange rates

The exchange rate regime generally influences the international competitiveness of firms (Agrawal, Srivastav, & Srivastava, 2010; Korkeamaki, 2011). Eita (2012) found that exchange rates influence a firm's cash flow and the amount of dividends to be paid in open economies, and affect the value of a company since the expected cash flows change together with changes in the currency values. This also results in a change in investments and profitability, which is reflected in the financial performance and stock returns (Agrawal, Srivastav, & Srivastava, 2010).

The movements in exchange rates affect stock prices through three components, i.e. the local currency value, the foreign currency value, and the imported input price (Kim, 2003). The depreciation of a local currency against a foreign currency makes exports less expensive and may increase their volume (Pan, Fok, & Lie, 2007), thus exports increase while imports decrease. Rahman, Sidek and Fauziah (2009) argued that the significance of international trade for an economy determines the effect of exchange rates on stock prices.

Specifically, the depreciation of a domestic currency against foreign currencies increases the return on foreign currency, and induces investors to shift investments from domestic assets to foreign assets. This move depresses domestic stock market prices, while the appreciation of a domestic currency lowers the competitiveness of exporting firms, consequently affecting stock market prices.

3.4.6 Inflation

The Consumer Price Index (CPI) is a reflection of inflation in the economy, which is an important variable that investors consider before making any investment decisions (Shrestha & Subedi, 2014). Shrestha and Subedi (2014) posited that inflation should be positively related to stock returns if stocks provide a hedge against inflation. A higher level of inflation may threaten macroeconomic stability, which ultimately affects the stability of the stock market. Empirically, the impact of inflation on stock market performance is mixed. Pal and Mittal (2011) found a negative correlation between inflation and stock price, however the negative relationship between inflation and stock return can also be explained through the dividend discount model. Since stock price can be viewed as the discounted value of an expected dividend, an increase in inflation may enhance the nominal risk free rate and thus the discount rate, leading to a declining stock price. However, some empirical studies also found a positive relationship between inflation and stock return, for example Ratanapakorn and Sharma (2007) suggested that equity acts as a hedge against inflation.

Ultimately, the adoption of the multiple currency regime compromised the ability of the Reserve Bank of Zimbabwe to create money supply and influence inflation through controlling money supply, and the stability brought about by introducing the regime in terms of inflation did not bring positive results to the stock market.

3.4.7 Money supply

The level of money supply in any economy can have a considerable effect on the other macroeconomic aggregates, depending on the strength of the money multiplier (Magweva & Mashamba, 2016; Sunde & Sanderson, 2009). According to the portfolio theory, an increase in the money supply may result in a portfolio change from interest bearing assets like bonds and treasury bills, to non-interest bearing financial assets like stocks. Moreover, as Mukherjee and Naka (1995) pointed out, if money supply brings about an economic stimulus, the resulting corporate earnings could in turn increase stock market prices. On the other hand, when an increase in money supply results in higher inflation, an increase in money supply could raise

the discount rate and ultimately reduce the stock market prices. Ratanapakorn and Sharma (2007) found a positive relationship between money supply and stock prices, whereas Abdul, Mohd-Sidek, and Fauziah (2009) found a negative relationship. In the Zimbabwean case, the adoption of the multiple currency regime has made the money supply highly exogenous. It is therefore interesting to note the transmission mechanisms through which the multiple currency regime affected money supply growth and ultimately stock market prices.

3.4.8 Monetary policy

In an economy, monetary policy is a measure implemented by monetary authorities to influence the availability, volume and direction of money supply and credits, with the aim of achieving desired economic objectives (Okpara, 2010). The monetary authorities can achieve the objectives through interest rates, money supply and or exchange controls (Ayogu & Emenuga, 2009). Using these measures, the monetary authorities can influence the balance sheets of banks. Monetary policies affect macroeconomic variables, which in turn influence financial and stock markets, i.e. a change in monetary policy leads to a change in market interest rates, which in turn affect real activity in an economy. The role of the stock market is thus influenced through the transmission of monetary policy (Sellin, 2001). The effect on the stock market is illustrated in Figure 3.1.

Figure 3.1: The stock market channel

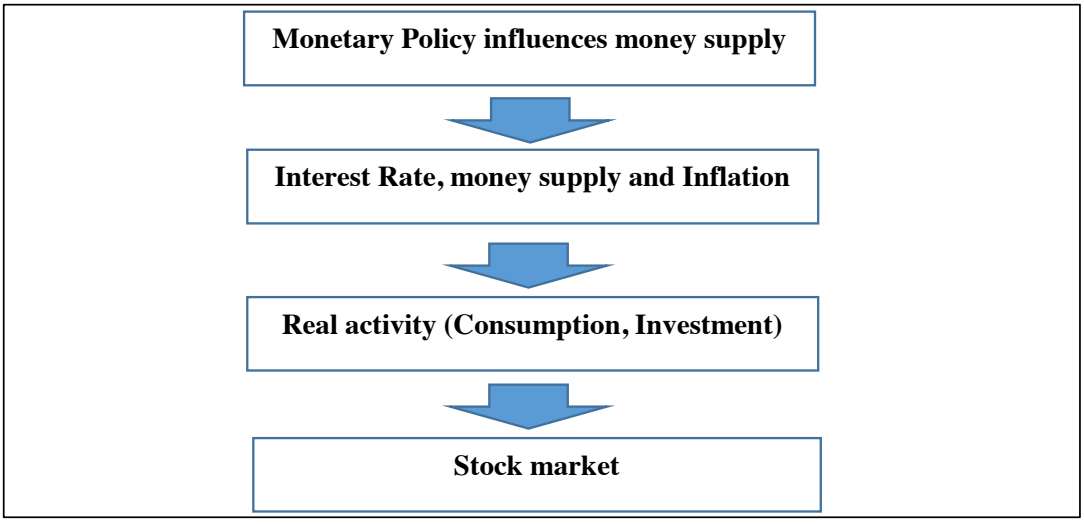


Figure 3.1 shows that a change in the monetary policy will influence either a change in money supply or instrumental rate (interest rate or exchange rate), which may lead investors to revalue the stock market. Since the value of a stock is obtained from the sum of discounted future dividends, i.e. the amount paid out to shareholders from the earnings, an expansionary or contractionary monetary policy can influence stock prices through expected future earnings and through the rate at which the earnings are discounted in the organisation paying dividends (Sellin, 2001). As per Figure 3.1, altering the monetary policy position will induce changes in investors' financial wealth, which will have an effect on their investment and consumption expenditures. Companies' cost of capital will also be affected which in turn affects the real investment spending by investors. From the change in investment, cost of capital and consumption expectation, which are real activities, will result in an impact on the inflation level. The effect of monetary policy on stock market performance is discussed below under monetary policy and stock returns, monetary policy announcement effects, and monetary policy and the predictability of stock prices and returns.

a. Monetary policy and stock returns

The Monetary Portfolio model, which was coined by Rozeff (1974) but developed Friedman (Friedman, 1961) and Friedman and Schwartz (1963) views money as an asset in an investors' portfolio. Any change in monetary policy which leads to money supply shocks will lead investors to substitute between money and other assets in an attempt to re-establish their desired money holdings. In this instance, investors will respond with a lag, which would imply that investors could predict their stock returns. Therefore, past money supply data can be used to estimate future stock returns (Sellin, 2001), which is supported by evidence from empirical studies such as (Akram, 2014; Anokye & Tweneboah, 2008; Flannery & Protopapadakis, 2002).

b. Monetary policy announcement effects

This involves assessing the effects that occur immediately after a monetary policy announcement, for example the announcement that Zimbabwe was officially adopting the multiple currency system. Studies have shown that soon after a monetary policy announcement, money supplies change (Cornell, 1983; Lynge, 1981; Pearce & Roley, 1983), discount rates change (Jensen & Mercer, 2006; Smirlock & Yawitz, 1985), both money supplies and discount

rates change (Hardouvelis, 1987; Hafer, 1986), and there are changes in Central Bank funds rate target (Thorbecke, 1997), and open market operations (Tarhan, 1995).

Studies by (Lynge, 1981) revealed that stock prices react negatively to money supply changes through changes in monetary policy, while Cornell (1983) posited that money supply change announcements through monetary policy can only affect asset prices through altering agents' information sets. Pearce and Roley (1983), meanwhile, found that changes in discount rates influenced by monetary policy changes have a negative effect on equity prices, and Hafer (1986) found that there is a negative relationship between discount rates and equity prices. On the other hand, Tarhan (1995) found no evidence of stock prices being influenced by monetary policy through open market operations.

c. Monetary policy and predictability of stock returns and prices

A study by Wasseja; Njoroge and Mweda (2015) on the impact of macroeconomic variables on stock market prices indicated that monetary base does not Granger cause stock prices. On the contrary, Musa (2017) found some significant effect of the monetary policy on BIST stock market prices and returns in Turkey. Akram (2014) also achieved the same results as those of as Musa, 2017 that there is predictive power in the financial variables, which is independent of the predictive power of the monetary variables, and vice versa.

Thorbecke (1997) used industrial portfolio indices and found that tightening monetary policy has a strong negative effect on equity prices, while (1997) estimated the short run responses on interest rates and equity prices to monetary supply shocks and found that money supply shocks have a positive and significant effect on real equity prices. From the studies provided, stock prices and returns were found to respond negatively to tight monetary policy and positively to an expansionary monetary policy. It is also clear that monetary policies seem to exert an influence on stock prices, both independently and together with the state of the business cycle (Akram, 2014; Musa, 2017; Thorbecke, 1997; Wasseja, Njoroge, & Mweda, 2015).

3.4.9 Commodity prices

Countries, which are in the extractive stage of development, base much of their economic growth on commodity prices; i.e. when commodity prices are high, the stock market will also generally be trading at high levels as well, whilst the reverse is true when commodity prices are at very low levels. Significant commodities in the world include gold, platinum, oil and some agricultural produce. Gold is the leader commodity in stock markets and is a safe haven as an industrial commodity and investment asset (Shahzadi & Chohan); it has the ability to resist changes in the external and internal purchasing power of the local currency (Le & Chang). In India, a study by Jauhari and Yadav (2014) revealed that gold price movements have an effect on stock prices, i.e. the domestic gold price in India influences liquidity. Gold prices also serve as indicators of inflation (Ziaei, 2012), as they control inflation instability and provide unique situations with dynamic opportunities (Saira & Batool, 2013).

Mahdavi and Zhou's (1997) study revealed that there is no long-term significant relationship between gold and stock indices, yet a study by Ratanapakorn and Sharma (2007) concluded that the gold price is highly interlinked with both the international market and the domestic market in India. Foreign investors invest their capital into the safest commodity of the economy, and gold is the real place for the stock market development as alluded by Shaique, Aziz & Herani (2016); it is a form of endorse insurance of uncertain economic conditions of delicate macroeconomic variables (Nadeem, Zakaria, & Kayani, 2014).

A sharp rise in gold prices makes crisis conditions more stable. Moreover, a fall in commodity prices reduces export revenues for commodity producers, while it benefits commodity importers. Maximum capital investment in the gold market thus plays a significant role in protecting investors from inflation (Shaheen & Muhammad-Ali, 2016). Given that Zimbabwe is a commodity-dependent country in terms of exports, which are driven by gold, platinum, nickel, chrome and tobacco, it is interesting to assess how commodity prices have affected stock market performance under the multiple currency regime.

3.4.10 Size of the firm

The size of the firm is also an important determinant of stock market performance (Barry, Goldreyer, Lockwood, & Rodriguez, 2001); the size effect (also termed the small firm effect) is the relationship between company size and common stock return. In a sample of emerging markets and Europe, there was ample evidence suggesting that small firms outperform large firms (Mathijs & Dijk, 2011). Rouwenhorst (1999) also reported a substantial size effect based on portfolios constructed by sorting stocks from 20 countries on the basis of firm size. Barry, Goldreyer, Lockwood and Rodriguez (2001), however, only found evidence of a size effect in 35 emerging markets when they measured size relative to the local market.

3.4.10 Politics

In general, the stock market index is considered to be a reflection of the expected future profitability of companies, and political events as well as policy changes tend to influence it. Beaulieu, Cosst and Essaddam, (2006) investigated the short run impact of the political uncertainty caused by the Quebec referendum on stock returns, and found that uncertainty surrounding the referendum outcome had a short-term impact. This implies that politics directly influence stock prices. Similarly, a study by (Jensen & Schmith, 2005) estimated the impact of four Brazilian presidential candidates on the mean and variance of the Brazilian stock market. From the time series regression used, they found that political events such as the election of a politician who is expected to enact market-friendly policies leads to increases in stock market returns. On the other hand, they also found that political events that are expected to have a negative impact on the economy or on specific firms lead to a decrease in stock market returns.

3.4.11 Currency change or dollarisation

Currency change is assumed to have an effect on the stock exchange; events such as dollarisation have influenced inflation levels in countries such as Panama, Ecuador and Mexico. A study by (Jansen & Ortiz, 2007) on the impact of dollarisation and the related economic liberalisation of Ecuador, based on tails of distribution and extreme value theory on

the distribution of stock returns, had mixed results. For instance, the mean dollar return of investing in Ecuadorian stocks changed from large and negative to large and positive. On the other hand, traditional measures of volatility such as standard deviation of returns actually increased after dollarisation. Further, the study found that the tail thickness of the distribution of Ecuador stock returns increased for positive returns but decreased for negative returns.

A study by Atkeson Kehoe (2000) revealed that where markets are well integrated, the adoption of the currency of a major country will result in positive effects on the smaller country's stock prices, for example Mexican stocks are directly influenced by the movement of the US dollar. Cristo and Puig (2014) investigated the interrelationship between the evolution of the Emerging Markets Bonds Index (EMBI) and some macroeconomic variables in seven Latin American countries, two of which were fully dollarised (Ecuador and Panama), using the Co-integrated Vector Framework. They found that EMBI is more stable in dollarised countries and that its evolution influences economic activity in non-dollarised economies. This suggests that investors' confidence might be higher in dollarised countries, where real and financial economic evolution are less tied than in non-dollarised economies. Evidence from dollarised economies; therefore, suggest that dollarisation or a change in currency may be considered a factor that affects a stock market.

For the case of Zimbabwe, dollarisation or the multiple currency system brought opposite results, as the Zimbabwean economy is not well integrated with the US economy and only adopted partial dollarisation.

3.5 Impact of external factors

External factors have become particularly important determinants of stock market performance the world over, following the global financial crisis of 2007-2009 (Bilson, Brailsford, & Hooper, 2001). The global financial crisis amply demonstrated the potential danger caused by external factors on world economies, and resulted in falling international commodity prices, thus inducing some fiscal imbalances, especially in countries that are commodity dependent such as Zimbabwe (Zivengwa, Mashika, Bokosi, & Makova, 2011). While the global economic

and financial crisis was triggered by the US mortgage market collapse, the magnitude of the spill over effects which swept across the length and breadth of the global economy raised concerns about the role of external shocks in business cycles (Osterholm & Zettelmeyer, 2008).

Bayoumi and Swiston (2009) found that the US economy generates the largest spill overs to other economies, and established that shocks from the US economy are transmitted through financial channels including short-term interest rates, bond yields, and equity prices. Another key result of their study was that emerging market economies have gained systematic importance in recent decades in terms of their growth spill over effects on other economies. Focusing on Chinese spill overs, Arora and Vamvakidis (2010) found that a one-standard deviation shock in China's growth receives a response from the rest of the world of 0.4 percentage points over three years and one percentage point over five years. Another study focusing on the effect of the BRICS countries on low-income countries found that spill overs are significant and persistent, with bilateral trade being the most important channel of transmission (Samake & Yang, 2011). Against this backdrop, the impact of external events on stock market developments has become critical, because stock markets are sensitive to both internal and external events and react immediately after their occurrence.

3.6 Foreign investor participation

Foreign investor participation has increasingly become an important determinant of stock market developments as economies become more open. Foreign investors are a major source of capital inflows in most developing economies and help augment the gap in aid flows. Gumus G. K., Duru, A., & Gungor, B., (2013) highlighted that there are multiple benefits from increased foreign capital in the form of contributions to host countries' capital accumulation and production capacity, employment creation, technological and knowledge advancement, improved balance of payments positions, new sales and marketing techniques, new business opportunities, and increased tax revenues for governments, among other things. A good understanding of the push and pull factors of foreign investor participation is therefore critical to guide policy-makers on ways of stabilising or improving capital flows in developing economies.

The theory on foreign investor participation is mainly drawn from three theoretical strands of literature, namely the feedback-trading hypothesis, the information contribution hypothesis, and the base-broadening hypothesis. The feedback hypothesis posits that equity flows are influenced mainly by past equity returns; in this regard, foreign investors are viewed as return chasers (Bohn & Tesar, 1996; Bekaert, Harvey, & Lumsdaine, 2002), which implies that foreign investors tend to invest in markets that are bullish and shy away from markets that are bearish. As such, stock returns are expected to move together with foreign investor transactions.

The base-broadening hypothesis, on the other hand, asserts that foreign investor participation is driven by the need for achieving risk diversification. The hypothesis suggests that the expansion of the investor base to include foreign investors is mainly motivated by the need to reduce risk through increased diversification, consequently lowering the required risk premium. Thus, there is a permanent increase in the equity share price through risk pooling (Merton R. C., 1987). This helps improve risk sharing and liquidity, which causes required risk premium to decrease and stock prices to increase in turn.

The information contribution hypothesis postulates that foreign equity flows affect stock returns. This hypothesis can be examined in two parts. According to the first part, equity flows incorporate fundamental prospects that make the impact of flows on returns permanent (Lin & Swanson, 2003). The second part incorporates the price pressure explanation, which asserts that it is the noise, not the fundamentals that are incorporated by equity flows and this makes the impact of equity flows on returns temporary. In both cases local returns are related with current and past equity flows. These theoretical hypotheses imply that there are both push and pull factors that influence foreign investor participation in foreign stock markets, which include the stock market returns and prevailing macroeconomic factors, not only in the investor's domain but also in other jurisdictions.

Many authors have examined the relationship between foreign investor transactions and stock market returns. Empirical theory has shown that capital flows into developing and emerging market economies tend to be influenced by periods of stress in industrialised economies, when the VIX becomes the dominant driver of capital flows, while domestic factors such as the host

country's level of financial sector development help attract investors (Nier, Saadi, & Mondino, 2014).

Guluzar et al. (2013) studied the relationship between foreign portfolio investment and macroeconomic variables on the Istanbul Stock Exchange for the period 2006-2012, using VAR, Granger Causality Tests, Impulse Responses and Variance Decomposition, and established that the industrial production index has an effect on foreign portfolio investment. Cordero and Montecino (2010) and Fratzscher (2011) found that the low interest rates in developed countries is a push factor, and financial liberalisation programmes in developing countries is a pull factor, for increasing international portfolio investments. It was also noted that instability in an economy is a push factor, which could drive investment out into foreign economies (Arbatli, 2011).

Bruno and Shin (2015a; 2015b) observed that cross border investments by large international banks are guided by the interest rate regime in advanced countries, notably in the US economy. Similarly, financial markets in economies that are more internationalised and with a larger foreign bank presence are more susceptible to the effects of global monetary policy conditions (Catorelli & Goldberg, 2012). The results from the various studies all indicate that the push and pull factors differ from country to country, which implies that the determinants of foreign investor participation still remain undefined.

3.7 Empirical Literature

An analysis of the empirical relationship between the macroeconomic variables and stock market developments is very important for both market practitioners and policy-makers. The impact of macroeconomic variables on stock market performance has, over the years, stimulated controversies among researchers based on varying findings. Hyde (2007), for example, conducted a study at the sector level to investigate the sensitivity of stock performance to market, interest rate and exchange rate shocks in four major European economies, i.e. France, Germany, Italy, and the United Kingdom (UK). While market exposure was the most significant factor, the study also found a significant level of exposure to exchange rate risk in industries of all four markets, yet interest rate risk was significant only in Germany

and France. All three sources of risk contained significant information relating to future cash flows and excess performance.

Serkan (2008) examined the role of macroeconomic factors on the Turkish stock market; using the macroeconomic factor model from July 1997 to June 2005, and he found that exchange rate, interest rate and world market returns affect portfolio returns, while industrial production, money supply and oil prices have no significant effect.

Kasman, Vardar and Tunc (2011) investigated the influence of the interest rate on the stock market performance in the banking sector, and found a negative and significant effect on stock returns. Similarly, Jefferis and Okeahalam (2000) found that interest rates have a negative influence on stock prices in South Africa, Botswana and Zimbabwe through three channels - the substitution effect, a rise in the discount rate and a depressing influence on investments. Moreover, Korkeamaki (2011) found a negative impact of interest rates on stock, but argued that the influence of interest rates has decreased over time due to the rise in enhanced tools for handling interest rate risks.

Joseph (2012) studied the influence of macroeconomic variables on stock market performance at the London Stock Exchange and found that both exchange rates and interest rates had a negative influence on the stock market performance. This contradicted the findings of Ratanapakorn and Sharma (2007), who studied the relationship between macroeconomic variables and stock market performance in the US and found that exchange rates, money supply and inflation had a positive influence on stock market performance, while interest rates had a negative influence. Only the result on interest rates was in line with the findings of Joseph (2006). Anokye and Tweneboah (2008) and Spyrou (2001) also found a negative strong relationship between inflation and stock market performance in Greece, which again contradicted the findings of (Ratanapakorn & Sharma, 2007).

Shrestha and Subedi (2014) investigated the determinants of stock market performance in Nepal using monthly data from August 2000 to July 2014. The results showed that inflation and broad money impact positively on the performance of the stock market, while interest rates

were found to be negatively correlated with stock market performance. Mehr-un-Nisa and Nishat (2012) investigated the relationship between stock prices, financial fundamentals and macroeconomic factors on the Karachi Stock Exchange using a dynamic panel Generalised Method of Moments (GMM) approach. They used data from 221 firms during 1995-2006, and found that GDP growth; interest rates and financial depth have a significant relationship with stock prices.

The generalised autoregressive conditional heteroskedasticity (GARCH) model is an econometric model commonly used in financial and economic research to estimate volatility in financial markets, and in predicting rates and prices of financial instruments (Mavrides, 2000). Hsing (2011), using a GARCH model, showed that the Czech stock market index was positively related to domestic real GDP and the German and US stock market indices. The stock market index was, however, negatively related to government borrowing, domestic real interest rate, CZK/USD exchange rate, expected inflation rate, and the Euro area government bond yield. Srinivasan, (2012), meanwhile, found that dividend per share negatively impacts on the share price of companies in the manufacturing, pharmaceutical, energy and infrastructure sectors, thus showing that earnings per share and price-earnings ratios are the crucial determinants of share prices in the manufacturing, pharmaceutical, energy, infrastructure and commercial banking sectors.

Zafar (2013) examined macro-economic determinants of stock markets, including Foreign Direct Investment (FDI) as a percentage of GDP, real interest rate, domestic credit and value traded on stock market performance, in Pakistan for the period 1988 - 2008. The key results showed that FDI and value traded have a positive impact on stock market performance, while real interest rates are negatively related and domestic credit has no impact. However, (Syed, Timo, Danielle, & Hasan, 2015) showed that there was a disconnection between stock returns and macroeconomic fundamentals in Pakistan. In addition, the foreign portfolio investment was found to be non-responsive to changes in economic variables in that country. A study by El-Nadar and Alraimony (2013) in Jordan found that money supply, gross capital formation, inflation and credit to private sector have significant positive relationships to stock prices, yet income and net remittances were found to have negative relationships with them.

Mohammed and Rostam (2016) examined the relationship between stock prices and real exchange rates in the BRICS economies (Brazil, Russia, India, China and South Africa) from January 2000 to June 2016. The results showed that there was a bidirectional causality of stock market and exchange rates in India, a unidirectional causality in Brazil from exchange rates to stock prices, and a unidirectional relationship from stock prices to exchange rates in Russia and South Africa. The study could not find a significant relationship between stock prices and exchange rates in China.

King and Wadhwani (1990) explored correlations of stock markets in the US, UK and Japan, and found that cross-market correlations increased in the aftermath of the US market crash in 1987. Baig and Goldfajn (1999) used a similar methodology to test for contagion in the Asian markets, and found clear evidence of it in the currency and sovereign bond markets only. Dungey, Fry and Martin (2003), meanwhile, examined contagious linkages between Asian equity markets, namely Hong Kong, Korea, Indonesia, Thailand, Malaysia and Australia, and Australian equity, for the period 1997 to 2001. The results showed little evidence of contagion in East Asian equity markets. Ibrahim and Aziz (2003) assessed the relationship between stock prices and industrial production, money supply, consumer price index and exchange rates in Malaysia, finding that stock prices share positive long-term relationships with industrial production and CPI, however they also found that money supply and exchange rates are negatively associated with stock prices.

In India, macroeconomic variables such as GDP, savings, capital formation, the gold price, industrial output, money supply and exchange rates have an influence on stock prices (Jauhari & Yadav, 2014). In addition, a study by Naik and Padhi (2012) also examined the Indian stock market index (Sensex), and observed positive relationships between stock prices, money supply and industrial production, but a negative relationship with inflation.

Whilst the empirical literature indicates the importance of macroeconomic factors in an economy, the specific factors influencing stock markets still vary from one country to another. Moreover, the different methodologies employed also influence the conclusions drawn from the empirical studies.

3.8 Africa

Elly and Oriwo (2013) and Mutheu (2016) analysed the relationship between the stock market and macroeconomic variables in Kenya, focusing on share prices for 10 commercial banks. The study found that increases in interest rates, exchange rates and inflation rates, as well as decreases in dividend pay-outs, decreased the share prices of the listed Kenyan banks. Anokye and Tweneboah (2008), meanwhile, investigated the impact of macroeconomic variables on stock price movements in Ghana, using quarterly data from 1991 to 2006. The macroeconomic variables used as regressors included FDI, interest rates, inflation and exchange rates, and the study showed the existence of a long term relationship between macroeconomic factors and stock prices – in particular, FDI and interest rates are the key determinants of share price movements in Ghana.

Adam and Tweneboah (2009) also examined the short run and long run dynamic relationship between the Ghanaian stock market and economic variables (inward FDI, treasury bill rate, consumer price index, average oil prices and exchange rates) using co-integration test based on Vector Error Correction Model (VECM). The study found that there is co-integration between the macroeconomic variables and stock prices in Ghana, which suggests that there is a long run relationship between them. In addition, the VECM analysis revealed that the lagged values of interest rates and inflation have a significant influence on the stock market.

Ouma and Muriu (2014) explored the impact of macroeconomic variables on stock returns utilising the Arbitrage Pricing Theory (APT) and Capital Asset Pricing Model (CAPM) framework for Kenya from 2003 to 2013. The study used monthly data and showed that money supply and inflation negatively impact stock returns, but the impact of interest rates is insignificant.

The importance of macroeconomic variables and stock prices in Kenya was also confirmed by Mutuku (2015), who used a vector error correction model (VECM) and found that macroeconomic variables drive equity stock market prices in the long run. The study used GDP, inflation, Treasury bond rates and exchange rates as explanatory variables, where GDP,

inflation and Treasury bond rates were found to positively impact stock market prices, and inflation was found to negatively affect them.

Amadi, Oneyema and Odubo (2000) used a multiple regression analysis to estimate the relationship between money supply, inflation, interest rates, exchange rate and stock prices. The findings of their study agreed with those of other studies, i.e. that macroeconomic variables influence stock prices in Nigeria. An attempt to establish a long run relationship between stock prices and macroeconomic indicators for Nigeria by Nwokoma (2002) revealed that industrial production and interest rates have a long term relationship with stock prices. Ologunde, Elumilade and Asaolu (2006) also examined the relationships between stock market capitalisation rates and interest rates, revealing that interest rates exert a positive influence on stock market capitalisation rates. Olufem (2010) analysed the impact of foreign exchange rate risk exposure on 117 Nigerian listed firms for the period 1998 – 2007, concluding that Nigerian listed firms are highly exposed to exchange rate risks. The study also showed that there was no difference between financial and non-financial sector firms in terms of exchange rate exposure.

Thirty listed firms on the Nigerian stock exchange were examined by (Uwalomwa, Olowe, & Agu, 2012) using data from 2006 to 2010. The study investigated the impact of financial performance, dividend pay-outs and financial leverage on the share price using ordinary least squares, finding that firms' financial performances, dividend pay-outs and financial leverage drive share prices in Nigeria. Enow and Brijlal (2016) examined the determinants of share prices using 14 companies listed on the JSE from 2009-2013. The study used a multiple regression analysis, with dividend per share, earnings per share, and price-earnings ratio as the main explanatory variables. All of these impacted positively on stock prices, accounting for 57.8% of share price movements.

Angko (2013) examined the macroeconomic relationship between economic growth and stock market performance for the period from 1990 to 2008 using an error correction model, and showed that stock market performance had an impact on economic growth in Ghana. Eita (2012) also explored the impact of macroeconomic variables on stock market prices but in Namibia, using a vector error correction model (VECM). The study showed that GDP and money supply positively affected stock market prices, while inflation and interest rates were

negatively associated with stock market prices. Sichoongwe (2016) explored the impact of exchange rate volatility on the stock market in Zambia, using a generalised autoregressive conditional heteroskedasticity (GARCH) on data from 2000-2015. The study found a negative relationship between exchange rate volatility and stock market returns.

3.9 Zimbabwe

Oyama (1997) investigated the relationship between stock prices and macroeconomic variables in Zimbabwe using an error correction model, and ascertained that the stock market prices were affected mainly by money supply and interest rates. In addition, the study, using individual stock returns based on a multi-factor return generating model, showed that the stock returns were being driven by macroeconomic fundamentals. Sibanda (2015) also investigated the relationship between the stock market and exchange rates in Zimbabwe under the multiple currency era, showing that there was no relationship between stock market returns and the proxy exchange rate, implying that there is a disconnection between stock market performance and exchange rate movements in a multiple currency environment.

Chiwanza et al. (2015) analysed the impact of global oil price vitality on the Zimbabwean stock exchange using a generalised autoregressive conditional heteroskedasticity (GARCH) for the period 2009-2012. The results showed a positive correlation between the industrial index and bent crude oil, with a correlation coefficient of around 0.5. The mining index and bent crude oil were, however, found to be negatively related, with a correlation coefficient of around -0.33. The study highlighted that the ZSE was affected by exogenous risks emanating from rising global crude oil price movements, i.e. increases in crude oil prices tend to deflate share prices. In addition, Kganyago and Gumbo (2015) investigated the relationship between money market interest rates and stock market returns in Zimbabwe using monthly data from 2009 to 2013. The study employed a vector error correction framework, controlling for other factors such as money supply growth rate, inflation, volume of manufacturing index, crude oil price and political stability. The study found a significant inverse causal relationship between money market interest and stock market returns in both the short and long run.

Magweva and Mashamba (2016) also analysed the relationship between stock market development and economic growth in Zimbabwe, using a Vector Error Correction Model for the period 1989 to 2014. The study found a negative relationship between stock market and economic growth in Zimbabwe; the short run relationship was found to be positive but insignificant. Kadenge and Tafirei (2014) investigated the impact of bank and stock market developments on growth in Zimbabwe, finding that there was a strong positive relationship between the banks and economic growth, but a weak positive relationship between the stock market and growth. Jecheche (2008) also analysed the relationship between economic growth and stock market development in Zimbabwe, using data for the period 1991 to 2007. The study employed fully modified ordinary least squares (FMOLS) and Auto Regressive Distributed Lag (ARDL) bounds-testing for the long run relationship, and the error correction model for the short run dynamics. The results confirmed a positive relationship between efficient stock market performance and economic growth both in short run and long run terms. Other control variables used included financial instability, inflation, human capital and FDI.

Mbulawa (2015), using Zimbabwean data from 1980-2008, concluded that there was a uni-directional causal link between stock market development and economic growth, and highlighted that there was an indirect transmission mechanism through the effect of stock market development on investment market factors. The findings from the various empirical literatures amply demonstrate the importance of macroeconomic factors in influencing stock market performance.

However, past studies have produced divergent views on the impact of the macroeconomic variables on an economy. There is currently no clear agreement on the relationship between the macroeconomic variables and stock market performance and that stock performance in each market responds differently to changes in macroeconomic variables. Most of the past studies have tended to investigate the effect of one or a combination of two macroeconomic variables on stock market performance, thus a study combining more than two variables would contribute greatly to explaining stock market performance. It is also clear that no attempt has been made to find out how stock performances from different sectors in the same market are influenced by the macroeconomic variables, and if those influences are any different from the overall market performance.

In addition, there are other idiosyncratic features, which are also important in influencing Zimbabwe's stock market performance, such as inflationary momentum. Because of the demand of exchanging the currency, some economic swings caused by currency change and external shocks directly influenced the country, due to investors being attracted by the use of a strong currency, which eliminated exchange risk. When introducing the dollar, the exchange risk and risk of devaluation disappeared, which is what was experienced in Panama, Ecuador and El Salvador (Yousuf & Nilson, 2013). Interest rates also tend to be lower and adjust to international rates, thus the stock market becomes more attractive as profitability depends on flows of capital of companies, which is higher when there is less uncertainty. With dollarisation or a multiple currency regime, the stock market may experience a lower demand, but later the initial impact can be reduced as the market can be integrated to international markets. This is mainly due to the fact that investors are more interested in a country where the risk of devaluation is lower or almost zero.

In the case of Zimbabwe, the situation is unique given the fact that the country does not have a currency of its own. Under a dollarised environment, the stock market dynamics may be different. This is because the exposure to currency risks is also different, hence it is paramount to investigate whether the multiple currency environment in Zimbabwe has any bearing on stock market performance. This study aimed to bridge this gap in the literature.

3.10 How multi-currency or dollarisation influences determinants of stock markets

Evidence from the literature suggests that countries which give up their currencies will be unable to engage in monetary and macroeconomic mismanagement, for example Barro (2001) argued that adopting another nation's currency eliminates the inflation bias problem of discretionary monetary policy. In addition, countries that give up their currencies will tend to grow faster than non-dollarised countries; this growth effect is expected to take place through lower interest rates, higher investment and faster growth (Dornbusch & Fischer, 1980), as well as through the elimination of exchange rate volatility, thereby encouraging international trade. Evidence from a study by Edwards (1998) also supports the argument that accepting another country's currency, such as dollarisation in Liberia and Panama, lowers inflation and fiscal deficits. Ghosh, Marie & Wolf, (1998) provided empirical evidence that countries with high

levels of dollarisation may have sacrificed the flexibility of their monetary policy, but gained the long term benefits of lower inflation and a more stable exchange rate. They also noted that dollarised economies exhibited accelerated economic growth as reflected in the high GDP growth.

From studies conducted by Ghosh, Marie & Wolf, (1998), Edwards (1998), Barro (2001), Dornbusch (1980) and Bernanke and Kuttner (2005), it can be seen that a change in the currency (in this case the multiple currency system in Zimbabwe) does not affect the stock market directly, but does so rather through its influence on other determinants of the stock market. In the case of Zimbabwe, the multiple currency system represents a change in the currency or monetary policy of the country.

Bernanke and Kuttner (2005) found that a change in currency affects real stock prices in the short run and can affect the performance of asset markets in the long run. They stated that the effect comes through influences in inflation, interest rates and money supply. In this instance, a currency change triggers changes in the interest rate structure, which in turn triggers a delayed response from investors. Menike (2002) found that a change in currency influences other macroeconomic variables such as interest rates, exchange rates, money supply and inflation, which affects stock prices. Thishanthi and Silva (2015) highlighted that the adoption of a stronger currency can be considered one of the precautionary measures that dampen high volatility in asset prices.

The existence of interest rate and exchange rate differentials as a result of a change in currency or monetary policies induces a substitution between domestic and foreign assets (Okpara, 2010). The adoption of a foreign currency as country's currency, for example dollarisation, influences items on the balance sheet of commercial banks (Okpara, 2010). In such a scenario, interest rates are set and influenced by market forms of demand and supply. Since the monetary authorities have less power to influence money supply, the economy will be controlled by the market forces of demand and supply for the currency.

A study in Zimbabwe by Mutengedzanwa, Mauch, Nyanike, Matanga and Gopo (2012) revealed that dollarisation helped Zimbabwe to manage inflation, maintain exchange rate stability and boost confidence in the country, while Chidakwa and Munhupedzi (2017) revealed that dollarisation caused a marginal increase in GDP. However, dollarisation has also brought about challenges in the economy, including stunted growth, de-industrialisation and liquidity challenges (Chigome, 2015).

It is clear that a multiple currency system influences other determinants of stock markets, thus this study assessed the impact of a multiple currency regime on stock performance in Zimbabwe indirectly, through the effect of multiple currencies on other determinants such as inflation, exchange rates, economic growth, interest rates and money supply. There is no focused literature which assesses the impact of a change in currency or dollarisation on stock market performance in Zimbabwe, as there is no past data and the use of dummy variables cannot be applied as there is a need to compare the current situation with the period before the multiple currency regime. For this reason, this study focused on the indirect effect.

3.11 Summary

This chapter reviewed the theoretical and empirical literature on stock market performance, focusing in particular on portfolio theory. Markowitz (1952) analysed how, for a given rate of expected return, assets can be combined to minimise total risk, comprising unsystematic and systematic risk. The CAPM model, on the other hand, posited that the return on a single stock is directly related to a single factor, which is the rate of return on the market portfolio. However, the need for diversification and the risk minimisation aspects of the portfolio theory led to more emphasis being placed on macroeconomic variables as the likely sources of systematic risk, hence the use of the APT, which specifies returns as a linear function of more than a single factor. Empirical literature, however, demonstrates that the factors at play vary from one country to another, hence the need for a study on the impact of the multiple currency system on stock market performance in Zimbabwe.

The chapter also looked at the growing importance of external factors in influencing stock market developments, i.e. the global financial crisis experienced between 2007 and 2009 highlighted the need for an in-depth analysis of the role of external factors in stock market developments. Similarly, the theoretical literature on the role of foreign investor participation was also reviewed.

The chapter further discussed the various empirical literature on stock markets. The key issue that came from this review is that factors at play differ from country to country, i.e. the question remains as to what the impact of external factors on the ZSE's performance is. From the literature reviewed it can be seen that there is no clear agreement as to the relationship between the macroeconomic variables and stock market performance, and that stock performance in each market responds differently to changes in macroeconomic variables. Most studies have tended to investigate the effect of one or a combination of two macroeconomic variables on stock market performance, i.e. no attempt has been made to find out how the stock performance of different sectors in the same market is influenced by the macroeconomic variables, and if those influences are any different from the overall market performance. This study is therefore meant to bridge this gap.

CHAPTER FOUR: RESEARCH METHODOLOGY

4.1 Introduction

This chapter outlines the methodology used to analyse the impact of the multiple currency on stock market performance in Zimbabwe. The study largely relied on quantitative secondary data, the importance of which lies in indicating relationships that may be salient to the researcher. It further protects the researcher from being deceived by false impressions that may be deduced from qualitative data, and can also support findings based on qualitative evidence (Gujarati, 2009). The chapter first develops a panel regression model for analyzing the macroeconomic factors and the firm specific factors influencing stock market performance in Zimbabwe as measured by the log of share prices over time during the multiple currency system.

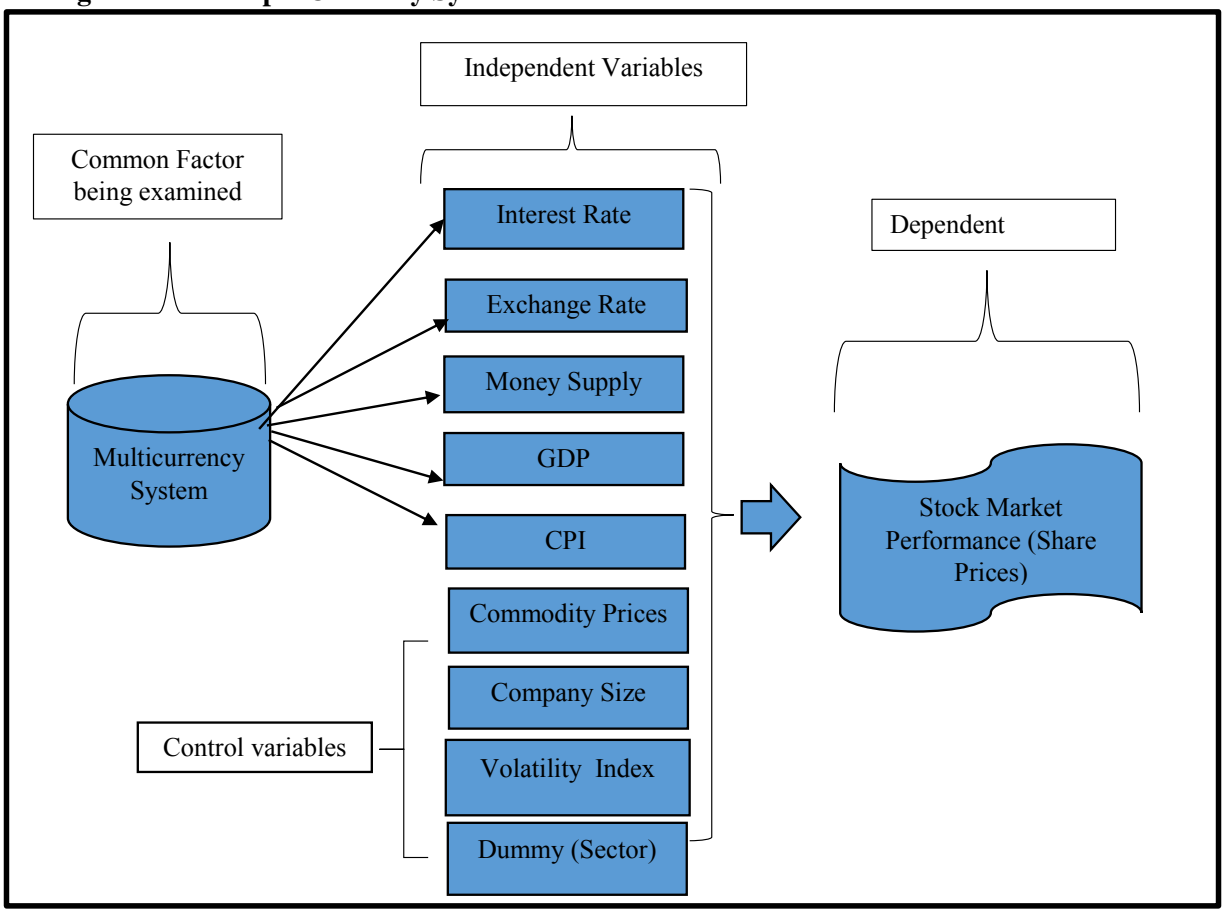
The panel regression model is estimated using the Ordinary Least Squares (OLS) method of estimation. As a robustness check, the study applies the bootstrapping method to confirm the results from the first model. However, due to the endogeniety challenges associated with the OLS method, the chapter also performs other more advanced estimation methods, namely the Two Stage Least Squares (TSLS) method and the General Methods of Moments (GMM). Finally, the study develops an aggregated regression model for the stock market index to validate the results obtained from the first model.

The chapter goes further to develop a model for analyzing the impact of external shocks on stock market performance in Zimbabwe. In addition, the chapter develops a model for assessing the factors influencing foreign investor participation on the ZSE under the multiple currency environment.

4.2 Multiple Currency System Model Framework

The study applied a panel regression model using multiple factors to analyse the impact of the multiple currency regime on stock performance in Zimbabwe using quarterly data from 2009 to 2016. The use of multiple factors in the model was important as it showed how the different factors may influence stock market developments in Zimbabwe. In addition, the inclusion of multiple factors offers a more plausible explanation of the complex interplay of the various factors affecting stock market performance (Perlin, et al., 2014). Figure 4.1 shows the model specification.

Figure 4.1: Multiple Currency System Model Framework



Source: Researcher's own construct

The model specification frame (Figure 4.1) illustrates the relationship between the multiple currency system in terms of it being linked to independent variables (interest rate, exchange rate, money supply, consumer price index and Gross Domestic Product) and control variables (commodity prices, company size, volatility indicator and dummy). The multiple currency system might affect both macroeconomic and microeconomic factors in the country, which might in-turn influence stock market performance, hence the need to analyse all the factors.

4.3 Model Specification

To analyse the impact of the multiple currency system on stock market performance in Zimbabwe, the study applied a panel regression model analysing the individual firms in terms

of how the share prices in logs ($LOGSP_t$) responded to the different macroeconomic and idiosyncratic factors. Precisely, the study analysed how the share price was influenced by its lags (SP_{t-1}), rate of change in money supply or money supply growth at time t (MS_t), domestic interest rate at time t ($DINT_t$), inflation developments in Zimbabwe as measured by the log of the consumer price index ($LOG(CPI_t)$), the Rand to US exchange rate at time t denoted as ($LOG(EXR_t)$), and economic performance proxed by the quarterly changes in the volume of manufacturing index (VMI) at time t (LOG(VMI_t)). The use of the Volume of Manufacturing Index (VMI) is mainly because GDP is mainly available in annual frequency in most developing countries. The VMI is used in place of the Gross Domestic Product (GDP) because the GDP is not available in quarterly frequency in Zimbabwe, just like in most developing countries. The VMI is normally used as a proxy for economic trends because a significant relationship appears to exist between GDP and Industrial Production Indices (Chen & Ross, 1986; Fama E. F., 1981; Humpe & Macmillan, 2009; Nishat & Shaheen, 2004).

The study also analyses the impact of external factors, notably, the foreign interest rate at time t ($FINT_t$), the rate of change of the volatility index for global stock markets at time t ($LOG(VIX_t)$), and the rate of change in the international commodity price index ($LOG(COM_t)$). In addition, the study also looks at whether the firm size at time t ($SIZE_t$) and the type of economic activity measured by the dummy (DUM) where 1 represents firms involved in manufacturing and mining while 0 represents firms involved in distribution (wholesale and retails) and services such as hotels, finance and insurance. The inclusion of multiple factors offers a more plausible explanation of the complex interplay of the various factors affecting stock market performance (Ozlen, 2015). The advantage of a panel regression is that it enables the study to combine firm specific factors and macroeconomic factors, which most previous studies did not do. This approach is similar to the approach used by Rjoub, Civcir & Resatoglu (2017), Ozlen (2015), Chen, Kim & and Kim (2005). The model can thus be represented mathematically as follows:

$$\begin{aligned} LOG(SP_{it}) &= \alpha + \beta_1 LOG(SP_{it-1}) + \beta_2 MS_t + \beta_3\, DINT_t + \beta_4 LOG(CPI_t) + \\ &\beta_5 LOG(EXR_t) + \beta_6 LOG(VMI_t) + \beta_7 FINT_t + \beta_8 LOG(VIX_t) + \beta_9 LOG(COM_t) + \\ &\beta_{10} LOG(SIZE_{it}) + \beta_{11} DUM + \varepsilon_t \end{aligned} \tag{4.1}$$

Where SP_{it} is the share price of company i at time t, MS is money supply, DINT is the domestic interest rate, CPI is the consumer price index, EXR is the exchange rate, VMI is the volume of manufacturing index, FINT is the foreign interest rate, VIX is the volatility index, COM is the commodity price index, SIZE represents the size of the company in terms of market capitalization, and DUM is the dummy variable representing the type of industry, and i is the i^{th} company and t is the time factor. The summary of variables for the model specified above is as shown in Table 4.1 as follows:

Table 4.1: Summary of Variables for Analysing Stock Market Performance

Variable	Description
$LOG(SP_{it})$	Log of Share Prices for *ith* Firm at time *t* (Dependent Variable)
$LOG(VMI_t)$	Economic Performance Indicator (Volume of Manufacturing Index at time *t*)
$LOG(COM_t)$	Log of Commodity Prices at time *t*
$LOG(EXR_t)$	Log of Rand/USD Exchange Rate at time *t*
$DINT_t$	Domestic Interest Rate at time *t*
$LOG(CPI_t)$	Consumer Price Interest at time *t*
$FINT_t$	Foreign Interest Rate at time *t*
MS_t	Money Supply at time *t*
$LOG(VIX_t)$	Log of Volatility Index
$LOG(SIZE_{it})$	Log of Size of Company *i* at time *t*
DUM	Dummy Variables indicating type of industry

Source: Researcher's own computations

4.4 Justification of variables

Share price: One of the important indicators of stock market performance is the general trend in share prices of companies listed in the stock exchange market. A general increase in share prices does not only show that the company is growing but also indicates the growth of the capital market. This implies that companies will also find it easy to raise additional capital through the capital market.

The use of share prices in logs was essentially to reflect the impact of the multiple currency on stock returns. This is mainly because the percentage changes in stock prices technically captures stock market returns as shown by the basic formula for stock market returns given as:

Stock returns = Capital gains + Dividend yield

Where: Capital gains is appreciation in the stock price $(P_t - P_{t-1})$ such that:

Total stock returns = $(P_t - P_{t-1}) + D$

Taking the logs on each size implies that:

The percentage stock market return = $Log(P_t - P_{t-1}) + Log(D) = (P_t - P_{t-1})/P_{t-1}$

The stock market performance depends on the individual firms performance and these also depend on an array of factors including the domestic macroeconomic factors, idiosyncratic factors as well as the international developments (Adjasi & Biekpe, 2006; Awan & Iftekhar, 2015; Zivengwa, Mashika, Bokosi, & Makova, 2011). Hence the model incorporated all the representative factors to ensure it is able to account for each one of them. In essence, the stock market index is an average index of the individual firms' performance. Therefore, the individual share prices are a good indicator of the stock market performance. The model used a number of variables to explain the impact of the multiple currency system on stock market performance in Zimbabwe.

The share prices, however, depend on a number of variables, notably, economic performance as measured by *VMI*, domestic interest rates (*DINT*), money supply growth (MS), the consumer price index representing inflation (CPI), the size of the company (*SIZE*), the type of business represented with a dummy (*DUM*), international developments such as foreign interest rates (*FINT*), commodity prices (*COM*), and the global stock market volatility index (*VIX*).

The VMI: The VMI was included to proxy for the overall economic activity affecting the stock market returns. The use of the *VMI* is mainly because GDP is mainly available in annual

frequency in most developing countries. A significant relationship appears to exist between GDP and Industrial Production Indices (Humpe & Macmillan, 2009; Nishat & Shaheen, 2004; Chen, Roll, & Ross, 1986; Fama E. F., 1981). The performance of the economy also affects a firm's cash flow. Higher real GDP implies a higher demand for goods and services, which translates into higher revenues for the firm and higher stock prices. As a result, a positive relationship was expected between real GDP and the stock market performance.

Money supply growth (MS): money supply growth in the economy shows the liquidity situation in the economy under the multiple currency system. There are several studies in empirical literature, which have shown the significance of money supply in influencing stock markets, for instance, (Kirui, Wawire, & Onono, 2014; Flannery & Protopapadakis, 2002). In this study, money supply was measured by the broad definition of money (M_3).

The Consumer price index (CPI): The study also includes the Consumer Price Index (CPI) to show how inflation may influence stock market performance in the multiple currency era. Since investors are worried about preserving the value of their investment, they consider inflation developments as this can affect the real return from their investments.

The exchange rate (EXR): the exchange rate has been included given the importance of the Rand to US dollar exchange rate in the Zimbabwean economy. South Africa's trade with Zimbabwe constitutes over 60% of total trade between Zimbabwe and the rest of the world. Therefore, developments between the Rand and the US dollar exchange rate is very important to also explain stock market developments under the multiple currency system in Zimbabwe.

Commodity prices index (COM): commodity prices were included in the analysis given the reliance of Zimbabwe on exports of primary commodities; an increase in commodity prices leads to an increase in the cost of production for some firms, while increasing the revenue of commodity-producing firms. However, the expected net effect of commodity prices on stock market returns as a whole is indeterminate. Moreover, a firm's value also depends on the ruling exchange rate. Following dollarisation, a country no longer has an exchange rate of its own, however the dynamics of company performance is influenced by the exchange rates of major trading partners. For this reason, the South African rand exchange rate was used in this study

to assess the impact of exchange rates on stock market performance. Some firms are negatively related to the exchange rate, some are positively related, and some have no relationship, thus it was expected that exchange rates were unlikely to yield a significant coefficient.

Foreign interest rate (FINT): This has been included to determine whether international interest rates developments influence the ZSE performance. International investors look for high return on investment (ROI). As such, when foreign interest rates are lower, they move capital to developing countries looking for high ROI.

Volatility Index: This has been included to understand whether international stock market developments also have a bearing on the ZSE. This is because in the global economic village, capital can easily move between borders as investors search for high returns. As such, adverse stock market developments in advanced economies can actually force capital to move to developing countries, thus influencing share prices in the receiving economies.

The dummy variable: This is important to understand if the effect of the multiple currency on the stock market performance depends on the type of economic activity. The idea of making such a distinction was to check whether the impact was different between the two sectors.

4.4 Estimation Methods

To test the robustness of the benchmark results, some variations are made to the estimation of equation (4.1). The first is the regression using TSLS and system Generalised Method of Moments estimators (system GMM). For the system GMM, we employ the following: dynamic panel-data estimation, two-step system GMM, Windmeijer-correct standard error, small sample adjustments and orthogonal deviation estimators. It also addresses any endogeneity issues related to benchmark estimations. Several diagnostic tests are conducted to ensure that the models are fit and the estimations are precise and consistent. Most models rely on the Ordinary Least Squares (OLS) method of estimation. This is based on the fundamental assumption that the explanatory variables are uncorrelated with the disturbance term. There are, however, many instances in which this assumption is violated, implying that the OLS

method becomes both biased and inconsistent. This may happen when the explanatory variables are correlated with disturbances. Some classic examples occur when: There are endogenously determined variables on the right-hand side of the equation which implies that the variables are measured with error. This study, therefore, also estimated using the GMM and Two Stage Least Squares (TSLS) methods for robustness checks.

4.4.1 The Two Stage Least Squares (TSLS)

The problem with the OLS method is the endogeneity of the explanatory variables implying that their changes are correlated with changes in the error terms. Assuming a simple regression model: $y=c+ax+u$, where y is the dependent variable, c is a constant, a is the coefficient of the explanatory variable x; and u is the error term, what is needed is a method to generate only the exogenous variation in the explanatory variable x. This can be done through use of an instrument variable z such that changes in z are associated with changes in the explanatory variable x but do not lead to change in y (aside from the indirect route via x). However, z and y may still be correlated, but the only source of such correlation is the indirect path of z being correlated with x which in turn determines y. Thus the more direct path of z being a regressor in the model for y is ruled out. In this instance, the variable z is referred to as the instrument or instrumental variable for the regressor x in the scalar regression model $y = c + ax+u$ if z is uncorrelated with the error term u, but is correlated with the regressor x.

Instrumental variable methods allow for consistent estimation when the explanatory variables (covariates) are correlated with the error terms in a regression model. Such correlation may occur when changes in the dependent variable change the value of at least one of the covariates, when there are omitted variables that affect both the dependent and independent variables, or when the covariates are subject to a measurement error. Explanatory variables which suffer from one or more of these issues in the context of a regression are sometimes referred to as endogenous. In this situation, ordinary least squares produce biased and inconsistent estimates.

The Two-Stage Least Squares (TSLS) thus represents a special case of regression analysis using instrumental variables. As the name suggests, it involves two distinct stages namely,

finding the portions of the endogenous and exogenous variables that can be attributed to the instruments z and then estimating an OLS regression of each variable in the model on the set of instruments in the first stage, followed by the regression of the original equation, with all of the variables replaced by the fitted values from the first-stage regressions. The coefficients of this regression are the TSLS estimates.

4.4.2 The General Methods of Moments (GMM)

The General Methods of Moments (GMM) on the other hand better controls the three sources of endogeneity, namely, unobserved heterogeneity, simultaneity and dynamic endogeneity often associated with panel data. The GMM is known to be consistent, asymptotically normal, and efficient in the class of all estimators that do not use any extra information aside from that contained in the moment conditions.

4.5 Aggregate Stock Market Index Model

Equation 4.1 analysed the impact of the multiple currency system on stock market performance using share prices of individual stocks. For robustness checks and also to ensure the impact on the aggregate stock market is fully captured, the study also looked at the aggregate Stock Market Index (SMI_t) as represented by equation 4.2:

$$\begin{aligned} LOG(SMI_t) &= \alpha + \beta_1 LOG(SMI_{t-1}) + \beta_2 MS_t + \beta_3\, DINT_t + \beta_4 LOG(CPI_t) + \\ &\beta_5 LOG(EXR_t) + \beta_6 LOG(VMI_t) + \beta_7 FINT_t + \beta_8 LOG(VIX_t) + \beta_9 LOG(COM_t) + \varepsilon_t \end{aligned} \tag{4.2}$$

4.6 Bootstrapping

In addition, the study applied the bootstrapping procedure as a robustness check. This is a general approach to statistical inference based on building a sampling distribution for a statistic by resampling from the data at hand.

As the population is unknown, the true error in a sample statistic against its population value is unknowable. In bootstrap resamples, the population is in fact the sample, and this is known, hence the quality of inference of the true sample from resampled data is measurable. The bootstrap method relies on random sampling with replacement and is used to improve the accuracy of statistical estimations. The application of bootstrap methods to regression models helps to approximate the distribution of the coefficients and the distribution of the prediction errors.

The bootstrapping technique provides a way of estimating the covariance matrix. There are four key bootstrap techniques, namely the residual bootstrap (Residual), the bootstrap (XY-pair), and two variants of the Markov Chain Marginal Bootstrap (MCMB and MBMB-A).

The residual bootstrap is constructed by resampling (with replacement) separately from the residuals to obtain the estimator of the asymptotic covariance matrix. The XY-pair bootstrap also applies sampling with replacement, but is valid in settings where observations and the error terms are not independent.

The primary disadvantage of the residual and design bootstrapping methods is that they are computationally intensive, requiring the estimation of a relatively difficult dimensional linear programming problem for each bootstrap replication. He and Hu (2002) proposed a new method for constructing bootstrap replications which reduces each dimensional bootstrap optimisation to a sequence of easily solved one-dimensional problems, the Markov Chain Marginal Bootstrap (MCMB).

The sequence of one-dimensional solutions forms a Markov chain, whose sample variance consistently approximates the true covariance for large and small samples. One problem with the MCMB, however, is that high autocorrelations in the MCMB sequence for specific coefficients will result in poor estimates for the asymptotic covariance for given chain length, and may result in non-convergence of the covariance estimates for any chain of practical length.

Kocherginsky, He, and Mu (2005) came up with a modified MCMB, the MCMB-A, which alleviates autocorrelation problems by transforming the parameter space prior to performing the MCMB algorithm, and then transforming the result back to the original space. In this study, three bootstrapping techniques were used, namely the Residual, the XY-pair and the MBMB-A.

4.7 Impact of External Factors on the ZSE

The other important aspect crucial for understanding stock market performance was to investigate the impact of external factors on stock market performance in Zimbabwe. This is also important to understand how foreign events or external factors influenced stock market performance in Zimbabwe under the multiple currency system. Understanding of the external factors influencing stock market performance is critical given the savings gap in the economy and the increasing reliance on foreign saving and investment due to the liquidity shortages experienced in the economy under the multiple currency environment.

In order to analyse the impact of external factors on stock market performance in Zimbabwe, there was need to first determine the external shock from the existing external factors, namely the volatility index, foreign interest rate and the commodity price index. The impact of external shocks on the stock market was estimated as a residual of external factors (*EF*), namely the commodity price index (*COM*), volatility index (*VIX*) and the foreign interest rate (*FINT*). These were then regressed against their lags, including a time trend as shown in equation 4.3:

$$Ln(EF)_t = \alpha_0 + \alpha_1 t + \sum_p^3 \delta_p \ln EF_{t-p} + \varepsilon_t \qquad (4.3)$$

Where EF_t is the external shock variable proxied by the commodity price index, foreign interest rate, and volatility index, t is the time trend, $\propto$ and δ_p are fixed parameters. The ε_t is the error term. The estimated external shock variables were then regressed against the stock market index (*SMI*) to determine their impact on stock market performance using the following model specification.

$$LOG(SMI_{it}) = \alpha + \beta_1 LOG(SMI_{it-1}) + \beta_2 EF_{it} + \sum_{t=1}^{n} \delta_i OCV_t + \varepsilon_t \quad (4.4)$$

Where OCV_t stands for other control variables, which are the macroeconomic variables included in equation 4.1, notably, GDP, money supply, and the domestic interest rates. In general, the variables were earmarked to capture the macroeconomic sustainability of stock market performance.

4.8 Impact of foreign investor participation

To assess how the multiple currency system influenced foreign investor participation on the ZSE, it was assumed that foreigners would take into account developments on the global stock markets, foreign interest developments, as well as domestic developments in Zimbabwe. In the case of Zimbabwe, after the stabilisation of economic activities in the country due to the multiple currency system, foreign investors were hesitant to invest in the stock market regardless of the elimination of foreign exchange risk, and there was not much in terms of capital movement through portfolio investment in the country even if there was high anticipation for better returns.

Empirical theory has shown that capital flows into developing and emerging market economies tend to be influenced by periods of stress in industrialised economies when the VIX becomes the dominant driver of capital flows, while domestic factors such as the host country's level of financial sector development help attract investors (Nier, Saadi, & Mondino, 2014). However, the choice of where to invest will also largely depend on the attractiveness of the domestic factors. Accordingly, investors are likely to invest in the Zimbabwean stock market when the domestic factors are attractive. In this regard, a regression model, which took into account the foreign and domestic factors, was used to assess how the multiple currency system influenced foreign investor participation on the ZSE. The model is represented as follows:

$$\begin{aligned} LOG(VSBF_t) = {} & \beta_1 + \beta_2 LOG(VSBF_{t-1}) + \beta_3 LOG(SMI_t) + \beta_4 LOG(VMI_t) + \\ & \beta_5 FINT_t + \beta_6 LOG(VIX) + \varepsilon_t \end{aligned} \quad (4.5)$$

Where *VSBF* denotes the Value of Shares Bought by Foreigners at time *t*, *SMI* is the Zimbabwe Stock Market Index, *VMI* is the volume of manufacturing index representing economic developments in Zimbabwe, *FINT* is the Foreign Interest Rates, and *VIX* is the Volatility Index while ε_t is the white noise error term. The summary of the variables is as shown in Table 4.2.

Table 4.2: Summary of Variables for Model on Foreign Investor Participation

Variable	Description
$LOG(VSBF_t)$	Log of volume of shares bought by foreigners at time *t*
$FINT_t$	Foreign Interest Rate at time *t*
$LOG(SMI_t)$	Log of stock market index at time *t*
$LOG(VIX_t)$	Log of volatility Index

Source: ZSE, 2017; USA FRB, 2017

4.9 Analysis of the data

The study analysed quarterly data for all the 54 companies that were listed on the ZSE over the specified time frame (2009-2016). The data on money supply and domestic interest rates in Zimbabwe was extracted from the Reserve Bank of Zimbabwe website and is available on monthly basis. The data on exchange rate was obtained from the Reserve Bank of Zimbabwe and the South African Reserve Bank. The data on other key macroeconomic variables such as GDP, consumer price index, volume of manufacturing index is obtained from the Zimbabwe Statistics Agency (ZIMSTAT). The data on stock market, notably share prices, list of companies, stock market index is available on the Zimbabwe Stock Exchange website. The data on foreign interest rate, that is the US Commercial Interest Reference Rate external (CIRR) is obtained from the Federal Reserve Bank of the United States of America. Data on the Commodity price indices was obtained from the Bloomberg website. The companies were mainly in the manufacturing, mining, tourism and hospitality, retail and distribution and the financial services sectors of the economy. A dummy was also used to split the companies between those involved in actual production, notably manufacturing and mining, and other sectors, which were mainly services sectors.

The results were estimated using panel data regression analysis, where panel data refers to a combination of data obtained across samples and also across time. Panel data can have both random and fixed effects. Accordingly, the Housman test was used to select between the fixed effects and random effects model.

The time series data for the analysis was obtained from the World Economic Outlook database, while data on the ZSE indicators was obtained from the ZSE website. Data on macroeconomic variables, namely GDP growth, was obtained from the Zimbabwe Statistical Agency's (ZIMSTAT) quarterly digests, and the data on money supply and interest rates was obtained from the Reserve Bank of Zimbabwe.

4.10 Summary

This chapter outlined the methodological framework used in the study. In particular, it described the panel regression model used to assess the impact of the multiple currency system, and also highlighted the model used for assessing the impact of external factors on the stock market and the transmission mechanism for external shocks into the stock market. All listed 54 companies representing 54 counters on the ZSE were analysed using quarterly data from 2009 to 2016. Since the study used panel regression, the total number of observations was 1728.

The panel regression model helped analyse the relationship between stock market prices and domestic interest rates, exchange rates, money supply and economic growth, and the control variables, commodity prices, company size, volatility indicator and a dummy variable indicating whether the companies were involved in actual production (manufacturing and mining) or services.

The chapter also outlined the model used to assess the impact of external factors on stock market prices, described the bootstrapping methods used, and highlighted the regression model used to analyse the push and pull factors determining foreign investor participation on the domestic stock market.

CHAPTER FIVE: THE TRANSMISSION MECHANISM OF A MULTIPLE CURRENCY SYSTEM ON STOCK MARKET PERFORMANCE

5.1 Introduction

This chapter presents the results of the research on the impact of the multiple currency regime on the performance of the stock market in Zimbabwe. Specifically, the chapter presents the results pertaining to the impact of the multicurrency system on stock market performance in Zimbabwe. The chapter begins with a descriptive analysis of the variables used in the analysis. The chapter first looks at the Ordinary Least Squares (OLS) estimation technique and then goes on to apply other advanced estimation techniques, notably the Generalised Methods of Moments (GMM) and the Two Stage Least Squares (TSLS) methods for robustness checks. In addition, the chapter also administered the bootstrapping method on the data in order to further confirm results obtained from the OLS method.

5.2 Descriptive statistics

As a preliminary analysis, the statistical properties of the data were analysed using descriptive statistics. Table 5.1 is a summary of these.

Table 5.1: Descriptive statistics

	Share Prices (cents)	Stock Market Index	Money Supply Growth	Consumer Price Index	Exchange Rate	Domestic Interest Rate	Foreign Interest Rate	Commodity Price Index	Volatility Index	Market Capitalisation
Mean	43.6	148.6	0.0	96.4	9.9	0.2	0.0	167.5	19.7	66,520,428
Median	6.5	151.6	0.0	97.1	9.6	0.2	0.0	173.2	17.3	17,427,727
Maximum	1525.0	211.2	0.3	101.2	15.0	0.3	0.0	244.2	44.1	1,790,000,000
Minimum	4.0	67.7	0.0	87.9	6.8	0.1	0.0	105.1	11.0	717,269,900
Std. Dev.	130.7	33.0	0.1	3.9	2.6	0.1	0.0	39.2	7.8	166,000,000
Skewness	6.8	-0.3	2.6	-0.8	0.6	-0.1	-0.1	0.1	1.9	6
Kurtosis	59.3	2.8	11.0	2.5	2.1	3.1	1.8	2.1	6.0	44
Jarque-Bera	241276.6	22.0	6526.0	188.0	164.3	3.0	109.3	63.1	1643.9	128,880
Observations	1728	1728	1728	1728	1728	1728	1728	1728	1728	1728

Source: Researcher's own calculations

The results from the descriptive analysis indicate that there was little variation in the variables under analysis, as shown by the small standard deviation coefficients, except for the share prices and firm size, which had relatively high coefficients (Figure 5.1). The high volatility in the share prices imply some degree of instability and a relatively high risk of investing in stocks on the ZSE.

5.3 Correlation coefficients

The correlation coefficients of the variables under study were also examined. Table 5.2 indicates the correlation coefficients for the variables.

Table 5.2: Correlation matrix

	Share prices	Stock market index	Money supply growth	Consumer prices	Exchange rate	Domestic interest	Foreign interest	Commodity price index	Volatility index	Company size
Share prices	1.00									
Stock market index	0.04	1.00								
Money supply growth	0.00	-0.03	1.00							
Consumer prices	0.02	0.45	-0.72	1.00						
Exchange rate	0.01	-0.35	-0.37	0.35	1.00					
Domestic interest	0.01	0.25	-0.39	0.43	-0.11	1.00				
Foreign interest	0.00	-0.43	0.45	-0.69	0.23	-0.52	1.00			
Commodity-price index	0.00	0.47	-0.01	0.04	-0.83	0.56	-0.47	1.00		
Volatility index	-0.03	-0.29	0.26	-0.56	-0.32	-0.20	0.19	0.02	1.00	
Company size	0.18	0.04	0.00	0.02	-0.01	0.02	-0.02	0.02	0.00	1.00

Source: Researcher's own calculations

The correlation matrix shows weak correlation between most variables except for the commodity price index and exchange rate; and foreign interest rate and consumer price index; and money supply and consumer price indices which have strong correlations of 83%, 69% and 72%, respectively. It will be interesting to see the significance of the variables which are strongly correlated from the econometric analysis in the forth coming sections.

5.4 Impact of the multiple currency system on stock market performance

The estimations were first conducted using the Ordinary Least Method and then the General Methods of Moments for robustness checks.

Unit Root Tests

The variables were first tested for stationarity to see if there was mean reversion or not. The results of the unit root tests are as indicated in Table 5.3.

Table 5.3 Panel Unit Root Results

Variable	Levin, Lin & Chu t-stat	Im, Pesaran and Shin W-stat	ADF - Fisher Chi-square	PP - Fisher Chi-square
D(SP)	-35.64 (0.0000)***	-36.59 (0.0000)***	1067.27 (0.0000)***	1225.74 (0.0008)***
D(VMI)	-22.43 (0.0000)***	-20.49 (0.0000)***	588.00 (0.0000)***	572.74 (0.0000)***
MS	-17.05 (0.0000)***	-17.12 (0.0000)***	479.15 (0.0001)***	500.45 (0.0001)***
FINT	-5.29 (0.0000) ***	-8.49 (0.0000) ***	226.12 (0.0000) ***	100.58 (0.6814)
DINT	-11.54 (0.0000) ***	-25.78 (0.0000) ***	816.90 (0.0000) ***	202.28 (0.0000) ***
D(COM)	-23.38 (0.0000) ***	-24.38 (0.0000) ***	715.62 (0.0000) ***	704.86 (0.0000) ***
D(EXR)	-27.00 (0.0000) ***	-30.29 (0.0000) ***	919.08 (0.0000) ***	919.08 (0.0000) ***
D(CPI)	-9.64 (0.0000) ***	-18.59 (0.0000) ***	507.45 (0.0000) ***	1251.14 (0.0000) ***
D(SIZE)	-32.76 (0.0000) ***	-34.64 (0.0000) ***	1068.82 (00000) ***	1274.62 (0.0000) ***
VIX	-28.27 (0.0000) ***	-27.23 (0.0000) ***	817.87 (0.0000) ***	817.87 (0.0000) ***

The table shows the coefficients and p-values in parentheses. P-values with *indicates significant at 10%, ** indicates significant at 5%, *** indicates significant at 1%

The variables prefixed with a D, notably VMI, SP and COM, imply that the variables were stationary after first differencing while the rest of the variables were stationary in levels. Notably, the results indicate that the share prices (SP), volume of manufacturing index (VMI), commodity prices (COM), and the consumer price index (CPI) were stationary after first differencing while the rest of the variables were stationary in levels.

Results from the Panel Regression Analysis

The study firstly estimated the model using the OLS method. The panel regression analysis can be done using either the Fixed Effect (FE) or Random Effect (RE) models. The FE models, analysed the impact of variables which vary over time where each entity has its own individual characteristics which may or may not influence the predictor variables. The FE model therefore removed the effect of those time-invariant characteristics so that the study could assess the net effect of the predictors on the outcome variable. Each entity is different, therefore an entity's error term and the constant (which captures individual characteristics) should not be correlated with the others. If the error terms are correlated, then the FE is not suitable. An important assumption of the FE model is that those time-invariant characteristics are unique to the individual and should not be correlated with other individual characteristics.

The random effects model, on the other hand, ensured that the variation across entities was assumed to be random and uncorrelated with the predictor or independent variables included in the model. The random effects model assumed that the entity's error term was not correlated with the predictors, which allowed for time-invariant variables to play a role as explanatory variables. Against this background, the random effects model was more appropriate for this study, although the results of the fixed model were not materially different from the random effects model.

Table 5.4 shows the results of the regression equation 4.1 where the share prices was regressed against its lags, money supply, domestic and foreign interest rates, exchange rate, volume of manufacturing index, volatility index, commodity prices and a dummy varioable basically showing type of industry.

Table 5.4: Results from the Panel Least Squares Regression Model

Variable	**Random Effect Regression Model**
Constant (C)	12.90058 [4.335738] (0.0030)***
Log of lagged Share Price LOG(SP(-1))	0.991542 [0.006311] (0.0000)***
Money Supply Growth (MS)	1.963694 [0.411461] (0.0000)***
Domestic interest rate (DINT)	1.375060 [0.493818] (0.0054)***
Log of consumer price index (LOG(CPI))	-1.456062 [0.970700] (0.1338)
Log of Exchange Rate (LOG(EXR))	-0.000178 0.030481 (0.9953)
Log of volume of manufacturing Index (LOG(VMI))	-1.314170 [0.827890] (0.1126)
Log of commodity Prices (LOG(COM))	-0.065324 [0.318483] (0.8375)
Foreign Interest Rates (FINT)	-16.97955 [7.783035] (0.0293)**
Log of volatility index (LOG(VIX))	-0.002346 [0.002807] (0.4035)
Log of size (LOG(SIZE))	2.18E-11 [1.83E-10] (0.9049)
Dummy variable (DUM)	-0.043874 [0.028266] (0.1208)
R-squared	0.948947
Adjusted R-squared	0.948609
Durbin-Watson Statistic	2.053979

The table shows the coefficients, standard errors […], and p-values (…). P-values with *indicates significant at 10%, ** indicates significant at 5%, *** indicates significant at 1%

The results from the random effects panel regression model provided interesting revelations concerning the influence of macroeconomic variables on stock market performance in Zimbabwe. Firstly, the model has a high R-squared and a Durbin-Watson statistic of about 2, implying that the models had a high explanatory power and that they did not suffer from autocorrelation.

The RE Panel Least Regression model results indicate that foreign interest rate, money supply, domestic interest rates and the lagged share price were significant, implying that stock market performance under the multiple currency system was influenced by its past performance, foreign interest rates and money supply in the economy. This can be explained by the fact that under the multiple currency system, the country has been relying on foreign savings to boost money supply in the economy since the current account deficit has been financed mainly from foreign borrowing.

The reliance on foreign borrowing was mainly because the country's deposits have been very low and hence the need to borrow from offshore to boost liquidity in the economy. Since the country was relying more on foreign borrowing, this also implies that foreign interest became important in influencing economic activity in the country as well as the stock market. Domestic interest rates were also significant. This can be explained by the fact that since domestic banks were borrowing offshore for onward lending to domestic industries, it implies that the interest rates would also be affected by foreign interest rates as well. Other variables were not significant as shown by the probability of greater than 0.05.

5.5 Bootstrapping

For robustness checks, as well as to enhance the quality of the analysis, the bootstrapping technique was applied using the Residual, XY-pair and the MBMB-A techniques.

Table 5.5 indicate the results of the Bootstrapping results where the share prices was regressed against its lags, money supply, domestic and foreign interest rates, exchange rate, volume of manufacturing index, commodity prices, volatility index and a dummy varioable basically showing type of industry.

Table 5.5: Results from bootstrapping

	Residual	XY-Pair	MCMB-A
C	3.916780 [1.476564] (0.0081)***	3.916780 [1.926353] (0.0422)**	3.916780 [2.000243] (0.0504)*
Log of lagged share prices (LOG(SP(-1))	0.993891 [0.002122] (0.0000)***	0.993891 [0.002271] (0.0000)***	0.993891 [0.002137] (0.0000)***
Money supply growth (MS)	1.105825 [0.158725] (0.0000)***	1.105825 [0.266265] (0.0000)***	1.105825 [0.247643] (0.0000)***
Domestic interest rate (DINT)	0.523961 [0.154664] (0.0007)***	0.523961 [0.243475] (0.0315)**	0.523961 [0.219052] (0.0169)**
Log of consumer price index (LOG(CPI))	-0.537888 [0.321850] (0.0949)*	-0.537888 [0.383385] (0.1608)	-0.537888 [0.444488] (0.2264)
Log of exchange rate (LOG(EXR))	-0.012984 [0.010382] (0.2112)	-0.012984 [0.012980] (0.3173)	-0.012984 [0.013730] (0.3445)
Log of volume of manufacturing index (LOG(VMI))	0.038813 [0.109070] (0.7220)	0.038813 [0.129403] (0.7643)	0.038813 [0.121864] (0.7501)
Log of commodity prices (LOG(COM))	-0.268488 [0.101847] (0.0085)***	-0.268488 [0.150892] (0.0754)*	-0.268488 [0.144412] (0.0632)*
Foreign interest rate (FINT)	-9.609789 [2.463105] (0.0001)***	-9.609789 [3.570983] (0.0072)***	-9.609789 [4.014176[(0.0168)**
Volatility index (VIX)	-0.001405 [0.007791] (0.8569)	-0.004446 [0.001182] (0.2001)	-0.001445 [0.002404] (0.3456)
Log of size (LOG(SIZE))	1.63E-10 [8.86E-11] (0.0666)*	1.60E-10 [8.84E-11] (0.0701)*	1.61E-10 [8.85E-11] (0.0696)*
Dummy variable (DUM)	-0.013405 [0.010372] (0.1964)	-0.013405 [0.010745] (0.2124)	-0.013405 [0.009698] (0.1671)

The table shows the coefficients, standard errors […], and p-values (…). P-values with *indicates significant at 10%, ** indicates significant at 5%, *** indicates significant at 1%

The results from the bootstrapping were important for robustness checks as they also proved the significance of foreign interest rate, domestic interest rate and money supply growth as the significant factors influencing stock market performance in Zimbabwe. All the three methods, namely, the XY-pair, the MCMB-A and the residual bootstrapping techniques were not statistically different from the random effects regression model, implying that the results are robust and can be relied upon to draw conclusions regarding stock market performance in Zimbabwe.

5.6 Results from the Panel TSLS and GMM Models

The next stage was to estimate the model using both the GMM and TSLS methods. The instruments used were mainly the lagged variables of the independent variables and the log of the stock market index. This is mainly because in the absence of other instruments, the lagged variables induce changes in the explanatory variable but have no independent effect on the dependent variable; allowing a researcher to uncover the causal effect of the explanatory variable on the dependent variable.

Table 5.6 shows the results of the GMM and the TSLS estimation where the share prices was regressed against its lags, money supply, domestic and foreign interest rates, exchange rate, volume of manufacturing index, commodity prices, volatility index and a dummy varioable basically showing type of industry. This was done as a robustness check to results obtained from the panel regression model 4.1.

Table 5.6: Results from the Panel GMM and Two-Stage Least Squares Models

Variable	Panel GMM Regression Model	Panel Two-Stage Least Squares Model
C	16.88017 [25.38076] (0.5862)	35.08998 [45.76202] (0.4433)
LOG(SP(-1))	0.986913 [0.078059] (0.0000)***	1.021585 [0.160939] (0.0000)***
MS	2.389542 [0.362107] (0.0000)***	2.554411 [0.361245] (0.0000)***
DINT	1.437533 [0.497986] (0.0039)***	1.180544 [0.490625] (0.0162)**
LOG(CPI)	-3.814032 [2.107657] (0.0669)*	-4.769705 [4.164331] (0.2522)
EXR	-0.003318 [0.187777] (0.8450)	-0.005064 [0.330862] (0.9878)
LOG(VMI)	-0.255414 [3.152374] (0.9934)	-3.074141 [6.534358] (0.6381)
LOG(COM)	0.439261 [1.909969] (0.7072)	0.368793 [3.329764] (0.9118)
FINT	-16.97955 [7.783035] (0.0293)**	-15.61697 [7.760301] (0.0443)**
VIX	-0.022632 [0.013148] (0.1543)	-0.033138 [0.022582] (0.1425)
SIZE	1.68E-10 [8.53E-10] (0.5689)	-2.25E-10 [1.76E-09] (0.8984)
DUM	0.178838 [5.029946] (0.4594)	-2.018579 [10.35853] (0.8455)
R-squared	0.945942	0.791722
Adjusted R-squared	0.945573	0.790298
Durbin-Watson Statistic	2.076608	1.830559

The table shows the coefficients, standard errors […], and p-values (…). P-values with *indicates significant at 10%, ** indicates significant at 5%, *** indicates significant at 1%

The results from the Panel GMM Estimated Generalised Leased Squares (EGLS) Period Random Effects indicate that money supply, foreign interest rate, domestic interest rates and the lagged share prices were significant whilst the rest of the variables were not significant. Similarly, results from the Panel TSLS regression model also indicated that money supply, foreign interest rate, domestic interest rates and the lagged share prices were significant whilst the rest of the variables were not significant. Since the multiple currency system affected money supply in the economy due to the inability of the monetary authorities to influence money supply, this implies that the multiple currency system had an influence on stock market performance in Zimbabwe. This can be explained by the liquidity challenges in the economy experienced since the adoption of the multiple currency system in 2009.

This is an important observation because the multiple currency system affected the level of liquidity in the economy, since under the multiple currency environment, the government ceased to issue the domestic currency. Money supply under the multiple currency regime is largely dependent on the export performance and amount of foreign investment into the country. Based on the results obtained from the panel regression, the stock market performance was being influenced more by money supply, implying that the multiple currency did have an impact on stock market performance.

The liquidity challenges in the economy resulted in limited access to loans by companies, leading to falling capacity utilisation levels. From the demand side, the limited liquidity in the economy also means that effective demand in the economy is very weak, which affects company and stock market performance in Zimbabwe. The importance of market liquidity in stock market performance has also been observed by a number of scholars. Fang, Noe and Tice (2009), for example, observed that there is a positive relationship between market liquidity and firm performance, while Amihud and Lesmod (2002; 2005) stressed the importance of liquidity in stock market returns.

5.7 Results from the Stock Market Index Regression Model

So far the study looked at models based on the share prices as the dependent variable. For robustness checks, the study also looked at the model based on the stock market index as the dependent variable.

Table 5.7 shows results obtained from model equation 4.2 where the stock market index which is the dependent variable was regressed against its lags, money supply, domestic and foreign interest rates, exchange rate, volume of manufacturing index, commodity prices, and volatility index.

Table 5.7: Results from the Aggregate SMI Regression Model

Variables	Coefficient, Standard Errors and P-value
LOG(SMI(-1))	0.740186 [0.113830] (0.0000)***
LOG(VMI)	-0.004552 [0.004748] (0.3481)
LOG(CPI)	0.543277 [0.310412] (0.0940)*
DINT	0.448253 [0.768870] (0.5658)
MS	-1.654082 [0.489982] (0.0027)***
LOG(EXR)	-0.207069 [0.405107] (0.6143)
LOG(COM)	-0.000816 [0.002703] (0.7656)
FINT	-9.609789 [4.014176] (0.0168)**
LOG(VIX)	-0.002932 [0.003929] (0.4634)
R-squared	0.794560
Adjusted R-squared	0.719855
Durbin-Watson Statistic	1.879737

The table shows the coefficients, standard errors […], and p-values (…). P-values with *indicates significant at 10%, ** indicates significant at 5%, *** indicates significant at 1%

Results from the stock market index regression model are very interesting as well as they confirm the significance of money supply and foreign interest rate in influencing stock market performance in Zimbabwe under the multiple currency system. The results, however, indicate

that other external variables, notably the VIX, and commodity prices were not significant in determining stock market performance in Zimbabwe. Similarly, domestic variables, namely the consumer price index representing inflation, domestic interest rates and the exchange rate were not significant.

5.8 Summary

This chapter assessed the impact of the multiple currency system on stock market performance in Zimbabwe. The study developed a panel regression, with 54 cross sections representing the 54 companies listed on the ZSE. The results from the panel regression random effects model produced very interesting observations concerning the stock market performance in Zimbabwe, i.e. it was observed that while the external variables, namely the VIX and commodity prices did not influence stock market performance, money supply was a very important factor.

It was also noted that the foreign interest rate was the only external factor that was significant in influencing stock prices as the other variables were found to be insignificant. Money supply and domestic interest rates were found to be very significant in influencing stock market performance in Zimbabwe. This was an important observation because the multiple currency system affected the level of liquidity and hence money supply growth, which in turn influenced stock market performance in Zimbabwe. Under the multiple currency regime, money supply growth was largely dependent on export performance and the amount of investment into the country, thus based on the results obtained from the panel regression, the stock market performance was being influenced more by money supply, implying that the multiple currency regime indeed had an impact on stock market performance. In addition, the country relied on foreign capital inflows in the form of foreign borrowing which implied that the domestic interest rate could therefore be influenced by foreign interest rates, hence the significance of domestic interest rates.

These results are in line with other studies, such as one by Ouma and Muriu (2014), which explored the impact of the macroeconomic variables on stock returns utilising the Arbitrage Pricing Theory (APT) and Capital Asset Pricing Model (CAPM) framework for Kenya from

2003 to 2013. Their study showed that money supply and the exchange rates significantly affected stock market returns in Kenya. Similarly, Oyama (1997) investigated the relationship between stock prices and macroeconomic variables in Zimbabwe using an error correction model. Here the stock market prices were found to be affected mainly by money supply and interest rates, however in this study, interest rates were found to be insignificant. This can be explained by the fact the Central Bank is unable to influence monetary policy under the multiple currency environment.

For robustness checks and to enhance the quality of the analysis, three bootstrapping techniques were applied. The results from these techniques, namely the MCMB-A and the XY-pair bootstrapping techniques, confirmed the findings obtained from the random effects panel regression model, i.e. that money supply and the exchange rate were the only variables that were significant in explaining stock market performance in Zimbabwe.

The chapter further highlighted the significance of money supply in influencing stock market performance in Zimbabwe. In particular, the tight liquidity conditions ushered in by the multiple currency environment is a cause for concern for both the government and the monetary authorities. Against this background, there is need for them to implement policies aimed at easing the liquidity conditions in the economy and stimulating economic activity. This should include the implementation of measures to improve export performance, enhancing the attraction of foreign direct and portfolio investment, as well as encouraging diaspora remittances. This can be achieved through reviewing some regulatory bottlenecks which dissuade foreign investors from bringing new capital into the economy.

CHAPTER SIX: ASSESSING THE IMPACT OF EXTERNAL SHOCKS ON STOCK MARKET PERFORMANCE

6.1 Introduction

This chapter assesses the impact of external shocks on stock market performance in Zimbabwe, specifically how international stock markets influence the domestic stock market. The chapter also assesses the impact of international commodity prices on the Zimbabwean stock market.

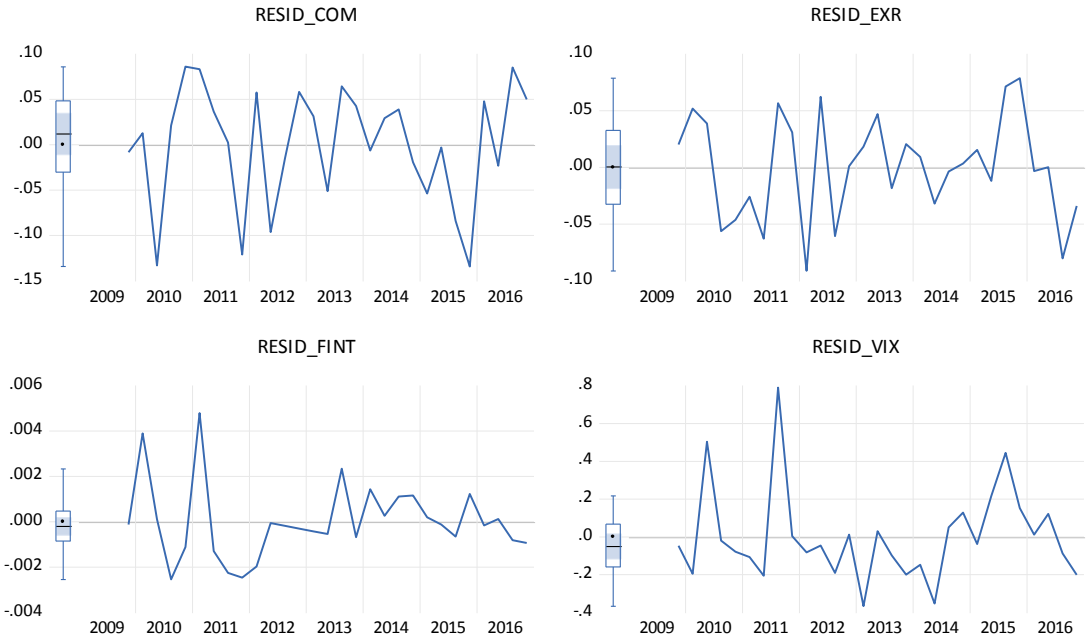
External factors have become particularly important determinants of stock market performance the world over. The global financial crisis, which originated in the United States and spread all over the world, demonstrated the potential danger caused by external factors on economies. Following the global financial crisis, the world market portfolio total return index continuously declined from mid-September 2008, whereas the 30-day rolling portfolio of world markets, measuring normal volatility of global markets, increased during the same period. At the end of 2007 the world equity market capitalisation was more than $64 trillion, but sharply declined in 2009 to stand at $49 trillion, representing a decline of 22%, which is equal to 25% of global GDP for 2009 (World Bank, 2017). The global financial crisis also resulted in falling international commodity prices, thus inducing some fiscal imbalances, especially in countries which are commodity dependent such as Zimbabwe.

Against this background, the impact of external events on stock market developments has become critical, because stock markets are sensitive to both internal and external events and react immediately after their occurrence. Stock exchanges are generally viewed as barometers, which respond to political, economic, regional, national and international environments. Adverse external developments can induce market volatility and affect investor confidence on account of the increased financial risk due to fluctuations in asset prices, which in turn impact the wealth and assets of shareholders. As such, external factors have become important determinants of stock market developments.

6.2 Empirical Analysis of the Impact of External Shocks on Stock Market Performance in Zimbabwe

The analysis begins by estimating the external shocks using regression equation 4.3. The external shocks are derived from the residuals of the external factors, namely, the residuals from the foreign interest rates, commodity price indices, exchange rate and the volatility index. The estimated shocks are as depicted in Figure 6.1.

Figure 6.1: Graph of residuals



From the Figure 6.1, it can be observed that there were quite a number of shocks on international commodity prices which were mostly negative as can be highlighted by the negative spikes on the graph. For instance, six major shocks were experienced on commodity price developments in 2010, 2011, 2012, 2013 and 2016. Similarly, there were five major shocks on the VIX in 2010, 2011, 2013, 2014 and 2016, and four major foreign interest rate shocks observed in 2010, 2011, 2012 and 2016. In the same vein, the ZAR/USD exchange rate experienced major shocks in 2010, 2011, 2012, 2013, 2014 and 2016. The high prevalence of shocks displayed in this analysis demonstrates the importance of external shocks on the economy and stock market development.

6.3 Impact of external shocks on the stock market

To estimate the impact of external shocks on the Zimbabwean stock market, the stock market was regressed against the external shocks and other control variables as specified in the regression equation 4.4. The resulting model results are as shown in Table 6.1.

Table 6.1: Results from the Panel Least Squares Regression

Variable	Coefficient, Standard Errors and P-value
C	-0.025148 [3.880217] (0.9949)
LOG(SMI(-1))	0.975772 [0.100048] (0.0000)***
MS	-0.516119 [0.694588] (0.4665)
LOG(CPI)	-0.327351 [0.880987] (0.7143)
DINT	0.344892 [0.471942] (0.4738)
LOG(VMI)	0.345748 [0.376903] (0.3705)
RESID_COM	0.320681 [0.388255] (0.4191)
RESID_FINT	-0.264992 [0.102674] (0.0183)**
RESID_VIX	-12.82610 [11.66670] (0.2853)
RESID_EXR	0.615886 [0.604932] (0.3214)
R-squared	0.897996
Adjusted R-squared	0.849678
Durbin-Watson stat	1.712628

The table shows the coefficients, standard errors […], and p-values (…). P-values with *indicates significant at 10%, ** indicates significant at 5%, *** indicates significant at 1%

The results show that the model is correctly explained by the data, as shown by a high R-squared and the DW statistic is close to 2 as expected. Specifically, the results show that 85 percent of the variation in the stock market was explained by the model. The p-values of the external shocks, however, indicate that all the external shocks, except for the foreign interest rate shock did not directly affect stock market performance. This suggests the need to look at the transmission mechanisms through which external shocks affected stock market performance.

6.4 Transmission mechanism of external shocks

To identify the transmission mechanism of external shocks to the domestic economy, the external shock variables were analysed against each respective domestic variable. The results of the resulting models are as shown in Table 6.2:

Table 6.2: Results from the Panel Least Squares Regression

Shock Transmission Channels	Commodity Prices	Foreign Interest	Volatility Index	Exchange Rate
Transmission of Shock to the Stock Market-though domestic interest rates	(0.4451)	(0.2703)	(0.3070	(0.3210)
Transmission of Shocks Through the Economy (VMI)	(0.0242)**	(0.4307)	(0.4641)	(0.2362)
Transmission Through Money Supply (MS)	(0.0343)**	(0.0463)**	(0.8596)	(0.2873)
Transmission Through Consumer Price Index (CPI)	(0.2929)	(0.7367)	(0.0630)	(0.0304)**
Direct Transmission of Shocks Through the Stock Market Index (SMI)	(0.4191)	(0.0183)**	(0.2853)	(0.3214)

The table shows the p-values in parentheses. P-values with *indicates significant at 10%, ** indicates significant at 5%, *** indicates significant at 1%

The results from Table 6.2 indicate that commodity price shocks are transmitted through the volume of manufacturing index and money supply growth into the economy. This implies that commodity prices have a bearing on the amount of money supply in the economy. This is mainly because under the multiple currency system, the country's money supply which is foreign currency available for transaction purposes depends on balance of payments developments. The country currently relies mainly on commodity exports which implies that commodity price developments have a strong bearing on the country's balance of payments developments and hence on money supply in the economy under the multiple currency system. Commodity prices also have a strong bearing on economic performance because the country's industry is mainly dominated by the commodity based primary production.

Foreign interest rate shocks are mainly transmitted through money supply and the stock market index. This is mainly because under the multiple currency system, the country has been borrowing from offshore in order to boost money supply in the economy and also to mitigate the liquidity challenges which the economy was facing.

The exchange rate shock was mainly transmitted through the consumer price index. This is mainly because the country depends much on South African imports which constitute more than 60 percent of the country's total imports. This implies that any movements in the Rand-USD exchange rate will have a bearing on the country's inflation as this also affects the price of raw materials for the industry. However, the results indicate that the volatility index did not have any effect on the domestic variables.

It is, therefore, important to also analyse whether the shocks transmitted through domestic variables will then be transmitted indirectly to the economy.

Table 6.3 shows results of how shocks from domestic variables are transmitted to the stock market. In this regard, the stock market was regressed against domestic variable shocks.

Table 6.3: Transmission of Domestic Variables to the Stock Market

Variables	P-Value
Domestic Interest Rate	0.584724 [0.509108] (0.2616)
Economic Activity (VMI)	-0.446645 [0.418462] (0.2960)
Money Supply Growth	2.439569 [0.534183] (0.0001)***
Inflation (CPI)	1.983238 [0.922158] (0.0414)**

The table shows the coefficients, standard errors […], and p-values (…). P-values with *indicates significant at 10%, ** indicates significant at 5%, *** indicates significant at 1%

The results of the model indicate that stock market performance is affected by money supply and inflation. Money supply determines overall liquidity in the economy and hence plays a major role in influencing activity on the stock exchange. In the case of Zimbabwe, the adoption of the multicurrency system removed the ability of the country to print money, affecting overall liquidity in the economy. As such, liquidity has mainly been determined by external factors, notably the performance of exports, remittances, foreign direct and portfolio investment, and the ability of government to access foreign borrowing. However, these sources of liquidity have also been underperforming, further adversely affecting money supply.

Exports have mainly been affected by a lack of competitiveness emanating from the use of an overvalued real effective exchange rate, while foreign and portfolio investments have been affected by continued investor uncertainty. Meanwhile, the ability of the government to access foreign loans has been affected by the existence of external payment arrears to multilateral and bilateral creditors. As a result, the limited quantum of money supply in the economy

significantly affects economic performance, company performance and ultimately stock market prices. As a result, market capitalisation significantly dropped during the greater part of the review period.

Similarly, the consumer price index was significant implying that the stock market was also affected by inflation developments in the country. Since investors are interested in preservation of value of capital, it implies that they do take into account the inflation trends in the economy.

6.5 Summary

This chapter assessed the impact of external shocks on stock market performance in Zimbabwe, specifically how international stock markets influence the domestic stock market. The chapter also analysed the impact of international commodity prices and foreign interest rates on the Zimbabwean stock market. The study unearthed some interesting observations concerning the stock market's performance. The study observed that foreign interest rate had a direct impact on stock market performance. However, other external factors such as commodity prices and exchange rate affected the stock market indirectly. The commodity prices affected money supply and economic activity as shown by the impact on the volume of manufacturing index while the exchange rate had an impact on the consumer price index representing inflation. The money supply growth and inflation in turn had influence on stock market performance the multiple currency system.

CHAPTER SEVEN: AN ECONOMETRIC ANALYSIS OF THE PUSH AND PULL FACTORS DRIVING FOREIGN INVESTOR PARTICIPATION IN ZIMBABWE

7.1 Introduction

This chapter assesses foreign investor participation in the Zimbabwean stock market, particularly the push and pull factors determining foreign investor participation, as this has become particularly important as a source of liquidity in the economy under the multiple currency system.

There is consensus among financial analysts and policy-makers that foreign investor participation is important not only for the development of stock markets, but also as a key driver of economic growth in developing countries (Adam & Tweneboah, 2009). A large number of empirical studies on the role of foreign investment in host countries suggests that foreign investment is an important source of capital and complements domestic private investment (El-Wassal, 2013). Foreign investors are a major source of capital inflows in most developing economies and help augment the gap in aid flows (Bruno & Shin, 2015b). Gumus et al. (2013) highlighted that there are multiple benefits from increased foreign capital in the form of contributing to the host countries' capital accumulation and production capacity, employment creation, technological and knowledge advancement, improved balance of payments positions, new sales and marketing techniques, new business opportunities, and increased tax revenue for government, among other things.

An internationally integrated stock market encourages foreign investment activities and enhances liquidity, leading to stock order flows - particularly in developing markets (El-Wassal, 2013). In such a case, foreign investment activity is important as a determinant of market returns, and any variation or sudden reversal of foreign activity deeply affects these markets. However, there are mixed feelings about the role of foreign investors in economic development in the financial literature, mainly because portfolio investment is very volatile and is prone to speculative attack through sudden reversals, which can potentially destabilise an economy. A good understanding of the push and pull factors of foreign investor participation

is therefore critical to guide policy-makers on ways of stabilising or improving capital flows in developing economies.

For dollarised economies such as Zimbabwe, foreign investor participation on the ZSE is very important as it can be a good source of market liquidity. Given the importance of foreign investor participation in the economy, it is thus important to come up with policies that can attract foreign capital into the economy. This chapter is aimed at understanding the factors influencing foreign investor participation in Zimbabwe, as it is important to know how best the country can harness foreign savings in order to improve liquidity in the economy, and to raise much-needed capital for retooling, especially given the low savings levels in Zimbabwe.

7.2 Empirical analysis of the push and pull factors of foreign investor participation in Zimbabwe

To assess how the multiple currency system influenced foreign investor participation on the ZSE, a regression model that took into account foreign and domestic factors was used (Equation 4.5, Chapter Four). A descriptive analysis of the variables used is as indicated in Table 7.1.

Table 7.1: Descriptive statistics

	LOG(VSBF)	LOG(VMI)	LOG(SMI)	LOG(VIX)	FINT
Mean	16.31	4.53	2.93	4.99	0.02
Median	16.39	4.53	2.87	5.02	0.02
Maximum	17.37	4.73	3.79	5.35	0.03
Minimum	14.96	4.42	2.45	4.22	0.01
Std. Dev.	0.52	0.08	0.33	0.24	0.00
Skewness	-0.40	0.58	1.11	-1.11	0.08
Kurtosis	3.08	3.09	3.85	4.68	1.87
Jarque-Bera	0.83	1.75	7.33	10.05	1.69
Observations	31	31	31	31	31

The analysis covers the period spanning from first quarter 2009 to fourth quarter 2016, i.e. 32 periods. The results from the descriptive analysis indicates that there is little variation in the variables under analysis, as shown by the small standard deviation coefficients (Table 7.2).

Table 7.2: Correlation analysis

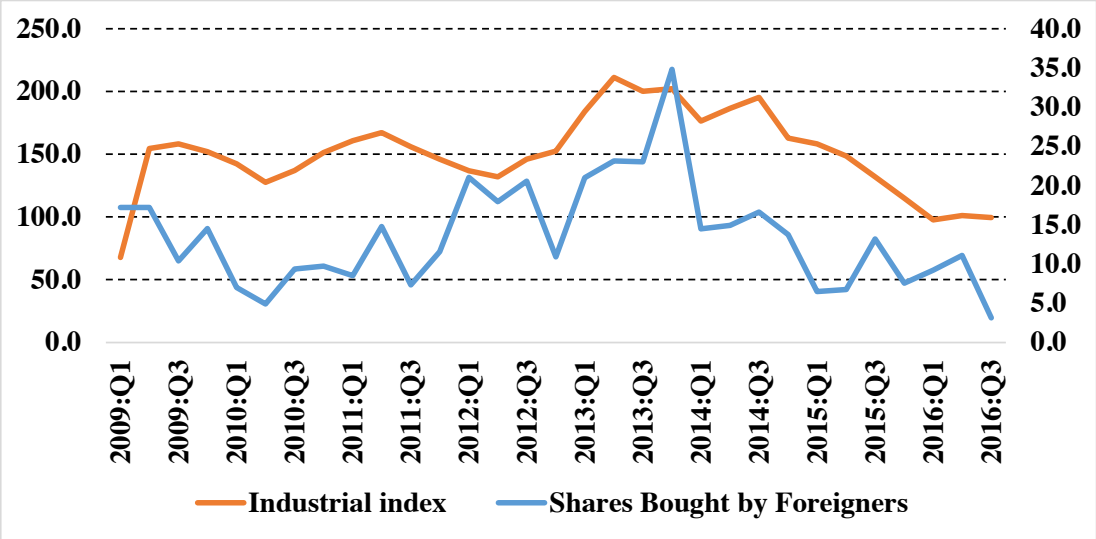
	LOG(SMI)	FINT	LOGVIX	LOG(VMI)	LOG(VSBF)
LOGRM	1.00				
FINT	-0.43	1.00			
LOGVIX	-0.36	0.28	1.00		
LOGVMI	0.33	-0.30	0.25	1.00	
LOGVSBF	0.42	-0.45	-0.20	-0.03	1.00

Table 7.2 indicates that there is weak correlation between the variables, as shown by the low correlation coefficients.

7.3 Association between the industrial index and foreign demand for shares

The association between foreign demand for shares and the industrial index is an important indicator of foreign investor participation in Zimbabwe.

Figure 7.1: The industrial index and foreign demand for shares

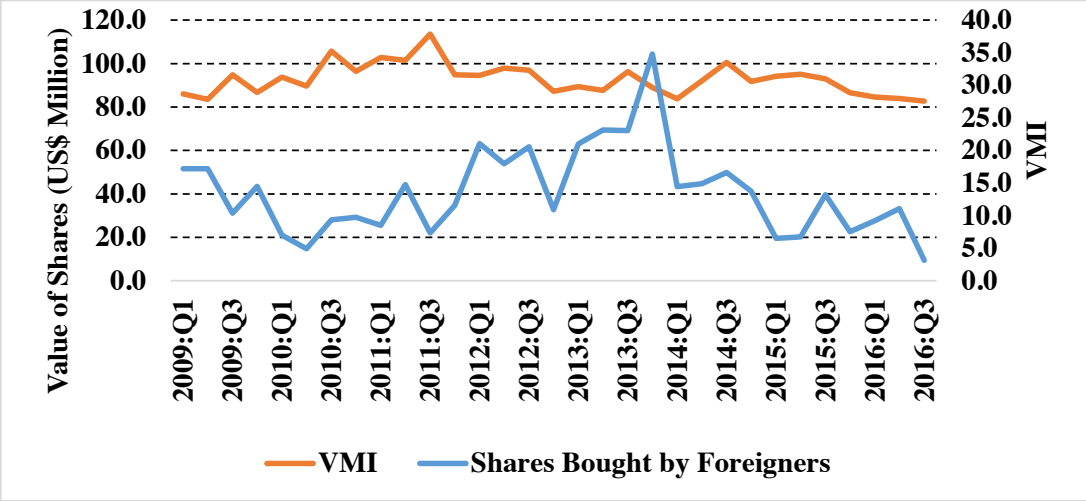


Apparently, Figure 7.1 indicates that there is no correlation between the industrial index and the foreign demand for shares, that is, the trend in the value of shares bought by foreigners over the period under analysis.

7.4 Association between economic activity and foreign demand for shares

The association between economic activity and foreign demand for shares indicates to what extent the push factors (adverse external factors), as reflected by the volatility index particularly in the industrialised economies, lead to a situation where capital flows into developing economies such as Zimbabwe.

Figure 7.2: Association between economic activity and foreign demand for shares



The association between the VIX and foreign demand for shares on the Zimbabwean stock market is also weak (Figure 7.2), which suggests that the changes in the VIX did not influence foreign investor participation.

7.5 Diagnostic tests

Before running the model, some diagnostics tests were conducted to determine if the variables were mean reverting or not using the Augmented Dickey–Fuller (ADF) unit root tests. The ADF tests are important to check for stationarity of the variables.

The variables included are the log of volume of shares bought by foreigners LOG(VSBF), the stock market index (SMI), the volume of manufacturing index (VMI), the foreign interest rate (FINT) and the volatility index (VIX). The results from the Augmented Dickey–Fuller (ADF) unit root tests are shown in Table 7.3.

Table 7.3: ADF Unit Root Test results

Variable	Level	1st Difference
VSBF	-2.802134 (0.2074)	-7.788394 (0.0000)***
SMI	-2.608258 (0.2795)	-6.543786 (0.0000)***
VMI	-3.868382 (0.0300)**	
FINT	-1.446540 (0.8238)	-7.266020 (0.0000)***
VIX	-5.518618 (0.0005)***	

Figures in parentheses are probabilities found from the critical values of the MacKinnon (1996) Maximum Lag Length. P-values with *indicates significant at 10%, ** indicates significant at 5%, *** indicates significant at 1%

The results from Table 7.3 indicate that VMI and VIX are stationary in levels, while FINT, VSBF and RM are stationary after first differencing.

7.6 Regression results on the determinants of foreign investor participation

Table 7.4 shows results from the regression model estimating the factors influencing foreign investor participation on the ZSE. In this regard, the volume of shares bought by foreigners which represents foreigner investor participation or interest on the Zimbabwe capital market was regressed against its lags and the possible push and pull factors notably dometic economic performance as represented by the volume of manufacturing index and the stock market index, and some external factors notably, foreign interest rates and the volatility index.

Table 7.4: Results from the Panel Least Squares Regression

Variable	Coefficient, Standard Errors and P-value
C	15.38319 [6.620119] (0.0289)**
LOG($VSBF_{t-1}$)	0.080191 [0.204064] (0.6978)
LOG(VMI_t)	-1.233890 [1.257700] (0.5721)
LOG(SMI_t)	1.298102 [0.478480] (0.0121)**
$FINT_t$	-44.30699 22.02665 (0.0556)*
LOG(VIX_t)	-0.165774 [0.289406] (0.5721)
R-squared	0.528785
Durbin-Watson statistic	1.788973

The table shows the coefficients, standard errors […], and p-values (…). P-values with *indicates significant at 10%, ** indicates significant at 5%, *** indicates significant at 1%

The log of volume of shares bought by foreigners LOG(VSBF) was regressed against the macroeconomic indicators, namely the stock market index (SMI) to show whether it was significant in influencing foreign investors, the volume of manufacturing index (VMI), the foreign interest rate (FINT) and the volatility index (VIX). The results from the regression model show that all the variables have correct signs as expected. The R-squared is above 50 percent, which means the results can be relied on for the purposes of drawing some conclusions regarding the factors influencing foreign investor participation in Zimbabwe. The Durbin-

Watson statistic is also close to 2, indicating that the model does not suffer from the problem of auto-correlation. Only the stock market index is significant, which implies that foreign investors are mainly attracted by the industrial index, while the economic growth rate, as proxied by the volume of manufacturing index and foreign factors such as the volatility index and foreign interest rate, are not important.

This implies that the adverse global stock market and interest rate developments do not influence investors to come to Zimbabwe, however since the stock market index is significant, one can see that the performance of the stock market has an influence on foreign investor participation. This may be because the low liquidity in the economy has resulted in the under-pricing of many stocks, and foreign investors believe that once the economy begins to improve, share prices might go up and they may start to realise some gains. These results are also similar to the findings by Akram (2014) and Aduda, Masila and Onsong (2012), who all found that liquidity challenges in the economy have a strong impact on stock prices.

7.7 Summary

This chapter analysed the push and pull factors determining foreign investor participation on the Zimbabwean stock market. The results indicate that only the stock market index was significant, while the economic growth rate, as proxied by the volume of manufacturing index and foreign factors such as the volatility index and foreign interest rate, were not. This could be explained by the low liquidity in the economy, which depressed stock prices. The perception that most shares on the stock market were under-priced could also have attracted foreign investors to participate on the local bourse.

These results are also in line with other research findings, such as those by Gumus and Gungor (2013), who observed that the industrial index was positively related to foreign portfolio investment in Istanbul. Similarly, Anayochukwu (2012) found out that foreign portfolio investment had a positive and significant impact on stock market returns in Nigeria. In terms of causality, the results suggest that there is a unidirectional causality running from stock market returns to foreign portfolio investment in the economy.

The chapter also observed that the stock market index influences foreign investor participation, which is explained by the fact that share prices obtaining in the economy are generally perceived to be lowly priced on account of the low market liquidity in the economy. However, foreign investor restrictions prevent more participation in the economy, thus the government needs to consider easing these restrictions in order to be able to attract additional investment into the economy. This is important as a way of arresting the liquidity challenges currently obtaining in the economy, and could enable companies to raise more capital through the ZSE by issuing additional shares.

CHAPTER EIGHT: CONCLUSION AND POLICY RECOMMENDATIONS

8.1 Introduction

This chapter concludes the study, which it does by outlining the summary of the study, highlighting the objectives of the study, describing the methodology applied, and providing the research findings. The chapter also looks at the policy implications of the study.

8.2 Research summary and major conclusions

This study assessed the impact of the multiple currency system on stock market performance in Zimbabwe. Unlike previous studies, which looked only at the stock market index, this study analysed the performance of all the 54 listed counters on the Zimbabwe stock market to see how they were affected by the multiple currency system. Specifically, the study also sought to understand the impact of macroeconomic factors on stock market performance and the impact of external shocks on stock market performance under the multiple currency regime. The study further sought to assess the impact of the multiple currency system on foreign investor participation on the ZSE.

The study developed a panel regression, with 54 cross-sections representing the 54 counters that make up the total 54 companies listed on the ZSE. The results from the panel regression random effects model indicated that all the variables had correct signs, as specified in the *a priori* expectations. In addition, the R-squared statistic was also reasonably at above 94 percent, implying the strong explanatory power of the model. The Durbin-Watson statistic was close to two, implying that the models did not suffer from autocorrelation.

The study produced very interesting observations concerning the impact of the multiple currency system on stock market performance in Zimbabwe. It was observed that while the external variables, namely the VIX, foreign interest rate and commodity prices, did not influence stock market performance, money supply was a very important factor in explaining stock market performance in Zimbabwe under the multiple currency system, i.e. the multiple

currency system affected the liquidity levels in the economy and hence money supply. The low liquidity situation, which resulted in a constrained money supply in the economy, also affected stock market performance.

It was observed, however, that the foreign exchange rate was the only external factor which was significant in influencing stock prices, while the volatility index and foreign interest rates were insignificant. This was an important observation because the multiple currency system affected the level of liquidity in the economy, since under the multiple currency environment, the government ceased to issue the domestic currency. Money supply under the multiple currency regime was thus largely dependent on the export performance and amount of investment into the country. Based on the results obtained from the panel regression, the stock market performance was being influenced more by money supply, implying that the multiple currency system indeed had an impact on stock market performance.

The study first applied the Ordinary Least Squares estimation technique which was also verified by more advanced estimation techniques, notably, the Generalised Methods of Moments and the Two-Stage Least Squares method. In addition, the bootstrapping technique was also applied for robustness checks as well as to enhance the quality of the analysis. The bootstrapping technique involved three models, namely the MCMB-A and the XY-pair techniques. These models all confirmed the findings obtained from the random effects panel regression model, i.e. that money supply and the exchange rate were the only variables that were significant in explaining stock market performance in Zimbabwe.

To identify the transmission mechanism of external shocks to the domestic economy, the study estimated the external shock variables, which were then regressed against the domestic variables. The study observed that the adverse global stock market and foreign interest rate developments did not directly influence stock market performance, however stock market performance was mainly affected through money supply and not through the economy. Money supply determined overall liquidity in the economy and hence played a major role in influencing activity on the stock exchange. This can be explained by the fact that the adoption of the multiple currency system eliminated the country's ability to print money to influence overall liquidity in the economy. As such, liquidity has mainly been determined by external

factors, notably the performance of exports, remittances, foreign direct and portfolio investments, and the ability of the government to access foreign borrowing. However, these sources of liquidity were also underperforming, thereby adversely affecting money supply.

The results from the foreign investor participation analysis indicated that only the stock market index was important in influencing foreign investors' participation, while the economic growth rate, as proxied by the volume of manufacturing index and foreign factors such as the volatility index and foreign interest rate, were not significant. This could be explained by the low liquidity in the economy, which depressed stock prices. The perception that most shares on the stock market were under-priced could also have attracted foreign investors to participate on the local bourse.

The study generally observed that money supply played an important role in influencing stock market performance in Zimbabwe, and established that the multiple currency system influenced the stock market performance indirectly through its impact on money supply in the economy. Regarding the impact of external factors on stock market performance, the study established that the external variables did not influence stock market performance, while with regard to the push and pull factors influencing foreign investor participation, the study established that only the stock market index was important in influencing foreign investors' participation, while economic growth and foreign factors such as the volatility index and foreign interest rates were not significant. This could be explained by the low liquidity in the economy, which tended to depress stock prices. Overall, money supply was a major factor that influenced stock market performance in Zimbabwe, and the multiple currency system affected the liquidity conditions and hence the money supply in the economy.

In terms of the areas for future research, there will be need for a survey approach to capture some of the qualitative factors on stock market performance in Zimbabwe under the multiple currency system which are not captured through an econometric approach. A qualitative study on the portfolio selection considerations by both local and foreign investors can help unearth more evidence on stock market dynamics in dollarised economies. This will also help explain why some companies closed or were delisted on the ZSE since this study only looked at the firms which were listed on the ZSE during the period from 2009 to 2016.

8.3 Policy implications of the research findings

The study has highlighted the significance of money supply in influencing stock market performance in Zimbabwe. In particular, the tight liquidity conditions ushered in by the multiple currency environment is a cause for concern for both government and monetary authorities. The liquidity situation is also a major concern for Chief Executives and Chief Financial Officers of firms interested in trading on the ZSE. It was highlighted in this study that the role of stock markets is to enable firms to raise capital through selling their shares to investors, however a holder of shares must be able to re-sell the security at any time at a price they would have been bought. As this is impossible in an illiquid market, there is a need for both the government and the Central Bank to find ways of improving liquidity in the economy. The low trading volumes experienced on the local bourse mainly reflect the tight liquidity conditions in the economy, and local companies continue to face limited access to credit, thus limiting their ability to retool or expand. On the other hand, the country continues to experience low aggregate demand as a result of the tight money supply conditions in the economy.

Against this background, there is need for the government and monetary authorities to implement policies aimed at easing the liquidity conditions in the economy and stimulating economic activity. Specifically, the government needs to follow through a road map which ensures that confidence in the banking sector is restored before re-introducing the Zimbabwe dollar. This will allow authorities to be able to control money supply, interest rates and inflation, the key drivers to stock market performance in a normal economy. Maintaining a multiple currency situation is not ideal for a sustainable stock market; generally, holders of securities would like to sell them easily and at least at prices they would have bought them. However, due to the government's inability to influence money supply in a multiple currency situation, a liquidity constraint emerges, leaving security holders in a highly compromised position as prices become less and less attractive, resulting in lukewarm stock market activity.

The study also observed that the stock market index influences foreign investor participation. This is explained by the fact that share prices on the ZSE are generally perceived to be under-priced on account of the low market liquidity in the economy, however foreign investor restrictions prevent more foreign investor participation in the economy. For instance, foreign

investors are not allowed to have more than 15% stake in one company on the ZSE. In addition, the total shares held by foreigners should not exceed 49% in line with the country's indigenisation laws. As such, government needs to consider easing the foreign investment restrictions in order to be able to attract additional investment into the economy. This is important as a way of arresting the currency liquidity challenges, which would enable companies to raise more capital through the ZSE rather than relying on actual loans, which is an expensive way of raising capital for companies.

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Appendix A: Unit Root Test Results

Table A.1: Panel Unit Root Test Results – Share Prices (SP)

Panel unit root test: Summary
Series: D(SP)
Date: 10/26/18 Time: 19:18
Sample: 2009Q1 2016Q4
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 6
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-35.6368	0.0000	54	1599
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-36.5904	0.0000	54	1599
ADF - Fisher Chi-square	1067.27	0.0000	54	1599
PP - Fisher Chi-square	1225.74	0.0008	54	1620

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution.
All other tests assume asymptotic normality.

Table A.2: Panel Unit Root Test Results – Domestic Interest Rates (DINT)

Panel unit root test: Summary
Series: DINT
Date: 10/26/18 Time: 19:29
Sample: 2009Q1 2016Q4
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 5
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-11.5358	0.0000	54	1404
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-25.7828	0.0000	54	1404
ADF - Fisher Chi-square	816.902	0.0000	54	1404
PP - Fisher Chi-square	202.280	0.0000	54	1674

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution.
All other tests assume asymptotic normality.

Table A.3: Panel Unit Root Test Results – Foreign Interest Rates (FINT)

Panel unit root test: Summary
Series: FINT
Date: 10/26/18 Time: 19:30
Sample: 2009Q1 2016Q4
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 7
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-5.29124	0.0000	54	1296
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-8.49391	0.0000	54	1296
ADF - Fisher Chi-square	226.123	0.0000	54	1296
PP - Fisher Chi-square	100.575	0.6814	54	1674

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution.
All other tests assume asymptotic normality.

Table A.4: Panel Unit Root Test Results – Commodity Prices (DCOM)

Panel unit root test: Summary
Series: D(COM)
Date: 10/26/18 Time: 19:41
Sample: 2009Q1 2016Q4
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections
Null: Unit root (assumes common unit root process)			
Levin, Lin & Chu t*	-23.3847	0.0000	54
Null: Unit root (assumes individual unit root process)			
Im, Pesaran and Shin W-stat	-24.3816	0.0000	54
ADF - Fisher Chi-square	715.618	0.0000	54
PP - Fisher Chi-square	704.860	0.0000	54

** Probabilities for Fisher tests are computed using an asymptotic Chi
-square distribution. All other tests assume asymptotic normality.

Table A.5: Panel Unit Root Test Results – Volatility Index (VIX)

Panel unit root test: Summary
Series: VIX
Date: 10/26/18 Time: 19:42
Sample: 2009Q1 2016Q4
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-28.2713	0.0000	54	1674
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-27.2267	0.0000	54	1674
ADF - Fisher Chi-square	817.870	0.0000	54	1674
PP - Fisher Chi-square	817.870	0.0000	54	1674

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution.
All other tests assume asymptotic normality.

Table A.6: Panel Unit Root Test Results – Exchange Rate (EXR)

Panel unit root test: Summary
Series: D(EXR)
Date: 10/26/18 Time: 19:44
Sample: 2009Q1 2016Q4
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-27.0036	0.0000	54	1620
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-30.2939	0.0000	54	1620
ADF - Fisher Chi-square	919.082	0.0000	54	1620
PP - Fisher Chi-square	919.082	0.0000	54	1620

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution.
All other tests assume asymptotic normality.

Table A.7: Panel Unit Root Test Results – Company Size (DSIZE)

Panel unit root test: Summary
Series: D(SIZE)
Date: 10/26/18 Time: 19:45
Sample: 2009Q1 2016Q4
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 6
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-32.7560	0.0000	54	1590
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-34.6414	0.0000	54	1590
ADF - Fisher Chi-square	1068.82	0.0000	54	1590
PP - Fisher Chi-square	1274.62	0.0000	54	1620

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Table A.8: Panel Unit Root Test Results – Volume of manufacturing Index (DVMI)

Panel unit root test: Summary
Series: D(VMI)
Date: 10/26/18 Time: 19:48
Sample: 2009Q1 2016Q4
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-22.4345	0.0000	54	1674
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-20.4850	0.0000	54	1674
ADF - Fisher Chi-square	587.996	0.0000	54	1674
PP - Fisher Chi-square	572.741	0.0000	54	1674

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution.
All other tests assume asymptotic normality.

Table A.9: Panel Unit Root Test Results – Consumer Price Index (DCPI)

Panel unit root test: Summary
Series: D(CPI)
Date: 10/29/18 Time: 12:06
Sample: 2009Q1 2016Q4
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-9.64095	0.0000	54	1566
Breitung t-stat	-14.0407	0.0000	54	1512
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-18.5881	0.0000	54	1566
ADF - Fisher Chi-square	507.452	0.0000	54	1566
PP - Fisher Chi-square	1251.14	0.0000	54	1620

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution.
All other tests assume asymptotic normality.

Table A.10: Panel Unit Root Test Results – Money Supply Growth (MS)

Panel unit root test: Summary
Series: MS
Date: 10/26/18 Time: 19:35
Sample: 2009Q1 2016Q4
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-17.0485	0.0000	54	1674
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-17.1168	0.0000	54	1674
ADF - Fisher Chi-square	479.148	0.0001	54	1674
PP - Fisher Chi-square	500.453	0.0001	54	1674

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution.
All other tests assume asymptotic normality.

Appendix B: Panel Regression Models

Table B.1 Panel Least Squares Results

Dependent Variable: LOG(SP)
Method: Panel Least Squares
Date: 10/29/18 Time: 22:32
Sample (adjusted): 2009Q2 2016Q4
Periods included: 31
Cross-sections included: 54
Total panel (balanced) observations: 1674

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.90058	4.335738	2.975406	0.0030
LOG(SP(-1))	0.991542	0.006311	157.1133	0.0000
MS	1.963694	0.411461	4.772491	0.0000
DINT	1.375060	0.493818	2.784550	0.0054
LOG(CPI)	-1.456062	0.970700	-1.500012	0.1338
EXR	-0.000178	0.030481	-0.005831	0.9953
LOG(VMI)	-1.314170	0.827890	-1.587373	0.1126
LOG(COM)	-0.065324	0.318483	-0.205109	0.8375
FINT	-16.97955	7.783035	-2.181611	0.0293
VIX	-0.002346	0.002807	-0.835615	0.4035
SIZE	2.18E-11	1.83E-10	0.119537	0.9049
DUM	-0.043874	0.028266	-1.552196	0.1208

R-squared	0.948947	Mean dependent var	1.686248
Adjusted R-squared	0.948609	S.D. dependent var	2.456659
S.E. of regression	0.556915	Akaike info criterion	1.674334
Sum squared resid	515.4764	Schwarz criterion	1.713209
Log likelihood	-1389.418	Hannan-Quinn criter.	1.688737
F-statistic	2808.387	Durbin-Watson stat	2.053979
Prob(F-statistic)	0.000000		

Table B.2: Panel Two-Stage Least Squares

Dependent Variable: LOG(SP)
Method: Panel Two-Stage Least Squares
Date: 10/29/18 Time: 22:41
Sample (adjusted): 2009Q3 2016Q4
Periods included: 30
Cross-sections included: 54
Total panel (balanced) observations: 1620
Instrument specification: C LOG(SP(-1)) MS(-1) DINT(-1) LOG(CPI(-1)) EXR(-1) LOG(VMI(-1)) LOG(VMI(-2)) LOG(COM(-1)) FINT(-1) VIX(-1) SIZE(-1) SIZE(-2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	35.08998	45.76202	0.766793	0.4433
LOG(SP(-1))	1.021585	0.160939	6.347655	0.0000
MS	2.554411	0.361245	7.071133	0.0000
DINT	1.180544	0.490625	2.406202	0.0162
LOG(CPI)	-4.769705	4.164331	-1.145371	0.2522
EXR	-0.005064	0.330862	-0.015307	0.9878
LOG(VMI)	-3.074141	6.534358	-0.470458	0.6381
LOG(COM)	0.368793	3.329764	0.110757	0.9118
FINT	-15.61697	7.760301	-2.012419	0.0443
VIX	-0.033138	0.022582	-1.467408	0.1425
SIZE	-2.25E-10	1.76E-09	-0.127691	0.8984
DUM	-2.018579	10.35853	-0.194871	0.8455

R-squared	0.791722	Mean dependent var	1.667365
Adjusted R-squared	0.790298	S.D. dependent var	2.469848
S.E. of regression	1.131024	Sum squared resid	2056.979
F-statistic	2792.235	Durbin-Watson stat	1.830559
Prob(F-statistic)	0.000000	Second-Stage SSR	491.3231
Instrument rank	13	Prob(J-statistic)	0.755477

Table B.3: Panel Generalized Method of Moments

Dependent Variable: LOG(SP)
Method: Panel Generalized Method of Moments
Date: 10/29/18 Time: 22:56
Sample (adjusted): 2009Q3 2016Q4
Periods included: 30
Cross-sections included: 54
Total panel (balanced) observations: 1620
2SLS instrument weighting matrix
Instrument specification: C LOG(SP(-1)) MS(-1) DINT(-1) LOG(CPI(-1)) EXR(-1) LOG(VMI(-1)) LOG(COM(-1)) FINT(-1) VIX(-1) SIZE(-1) SIZE(-2) LOG(SMI)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	16.64799	25.38076	0.655929	0.5120
LOG(SP(-1))	0.986913	0.078059	12.64321	0.0000
MS	2.389542	0.362107	6.598987	0.0000
DINT	1.437533	0.497986	2.886695	0.0039
LOG(CPI)	-3.814032	2.107657	-1.809607	0.0705
EXR	-0.003318	0.187777	-0.017672	0.9859
LOG(VMI)	-0.255414	3.152374	-0.081023	0.9354
LOG(COM)	0.439261	1.909969	0.229983	0.8181
FINT	-16.97955	7.783035	-2.181611	0.0293
VIX	-0.023220	0.013148	-1.766024	0.0776
SIZE	1.68E-10	8.53E-10	0.196670	0.8441
DUM	0.178838	5.029946	0.035555	0.9716

R-squared	0.945942	Mean dependent var	1.667365
Adjusted R-squared	0.945573	S.D. dependent var	2.469848
S.E. of regression	0.576207	Sum squared resid	533.8796
Durbin-Watson stat	2.076608	J-statistic	1.827721
Instrument rank	13	Prob(J-statistic)	0.176397

Appendix C: Bootstrapping Results

Table C.1: XY-Pair

Dependent Variable: LOG(SP)
Method: Quantile Regression (Median)
Date: 11/03/18 Time: 14:10
Sample (adjusted): 2009Q2 2016Q4
Included observations: 1674 after adjustments
Bootstrap Standard Errors & Covariance
Bootstrap method: XY-pair, reps=100, rng=kn, seed=1415709826
Sparsity method: Kernel (Epanechnikov) using residuals
Bandwidth method: Hall-Sheather, bw=0.081825
Estimation successfully identifies unique optimal solution

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.916780	1.926353	2.033262	0.0422
LOG(SP(-1))	0.993891	0.002271	437.7349	0.0000
MS	1.105825	0.266265	4.153096	0.0000
DINT	0.523961	0.243475	2.152007	0.0315
LOG(CPI)	-0.537888	0.383385	-1.402997	0.1608
EXR	-0.012984	0.012980	-1.000314	0.3173
LOG(VMI)	0.038813	0.129403	0.299941	0.7643
LOG(COM)	-0.268488	0.150892	-1.779335	0.0754
FINT	-9.609789	3.570983	-2.691077	0.0072
VIX	-0.004446	0.001182	-3.761304	0.2001
SIZE	1.60E-10	8.84E-11	1.812571	0.0701
DUM	-0.013405	0.010745	-1.247594	0.2124

Pseudo R-squared	0.849857	Mean dependent var	1.686248
Adjusted R-squared	0.848864	S.D. dependent var	2.456659
S.E. of regression	0.565052	Objective	233.4128
Quantile dependent var	1.871802	Restr. objective	1554.606
Sparsity	0.497886	Quasi-LR statistic	21228.86
Prob(Quasi-LR stat)	0.000000		

Table C.2: Residual

Dependent Variable: LOG(SP)
Method: Quantile Regression (Median)
Date: 11/03/18 Time: 14:18
Sample (adjusted): 2009Q2 2016Q4
Included observations: 1674 after adjustments
Bootstrap Standard Errors & Covariance
Bootstrap method: Residual, reps=100, rng=kn, seed=1415709826
Sparsity method: Kernel (Epanechnikov) using residuals
Bandwidth method: Hall-Sheather, bw=0.081825
Estimation successfully identifies unique optimal solution

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.916780	1.476564	2.652631	0.0081
LOG(SP(-1))	0.993891	0.002122	468.4699	0.0000
MS	1.105825	0.158725	6.966915	0.0000
DINT	0.523961	0.154664	3.387738	0.0007
LOG(CPI)	-0.537888	0.321850	-1.671240	0.0949
EXR	-0.012984	0.010382	-1.250620	0.2112
LOG(VMI)	0.038813	0.109070	0.355855	0.7220
LOG(COM)	-0.268488	0.101847	-2.636176	0.0085
FINT	-9.609789	2.463105	-3.901494	0.0001
VIX	-0.001405	0.007791	-0.180308	0.8569
SIZE	1.63E-10	8.86E-11	1.835768	0.0666
DUM	-0.013405	0.010372	-1.292408	0.1964

Pseudo R-squared	0.849857	Mean dependent var	1.686248
Adjusted R-squared	0.848864	S.D. dependent var	2.456659
S.E. of regression	0.565052	Objective	233.4128
Quantile dependent var	1.871802	Restr. objective	1554.606
Sparsity	0.497886	Quasi-LR statistic	21228.86
Prob(Quasi-LR stat)	0.000000		

Table C.3: MCMB-A

Dependent Variable: LOG(SP)
Method: Quantile Regression (Median)
Date: 11/03/18 Time: 14:20
Sample (adjusted): 2009Q2 2016Q4
Included observations: 1674 after adjustments
Bootstrap Standard Errors & Covariance
Bootstrap method: MCMB-A, reps=100, rng=kn, seed=1415709826
Sparsity method: Kernel (Epanechnikov) using residuals
Bandwidth method: Hall-Sheather, bw=0.081825
Estimation successfully identifies unique optimal solution

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.916780	2.000243	1.958152	0.0504
LOG(SP(-1))	0.993891	0.002137	465.0003	0.0000
MS	1.105825	0.247643	4.465406	0.0000
DINT	0.523961	0.219052	2.391944	0.0169
LOG(CPI)	-0.537888	0.444488	-1.210131	0.2264
EXR	-0.012984	0.013730	-0.945666	0.3445
LOG(VMI)	0.038813	0.121864	0.318496	0.7501
LOG(COM)	-0.268488	0.144412	-1.859173	0.0632
FINT	-9.609789	4.014176	-2.393963	0.0168
VIX	-0.001445	0.002404	-0.601082	0.3456
SIZE	1.61E-10	8.85E-11	1.815402	0.0696
DUM	-0.013405	0.009698	-1.382244	0.1671

Pseudo R-squared	0.849857	Mean dependent var	1.686248
Adjusted R-squared	0.848864	S.D. dependent var	2.456659
S.E. of regression	0.565052	Objective	233.4128
Quantile dependent var	1.871802	Restr. objective	1554.606
Sparsity	0.497886	Quasi-LR statistic	21228.86
Prob(Quasi-LR stat)	0.000000		

Appendix D: Stock Market Index Regression Model

Dependent Variable: DSMI
Method: Least Squares
Date: 10/28/18 Time: 14:11
Sample (adjusted): 2009Q2 2016Q4
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DSMI(-1)	0.740186	0.113830	6.502564	0.0000
VMI	-0.004552	0.004748	-0.958786	0.3481
DCPI	0.543277	0.310412	1.750181	0.0940
DINT	0.448253	0.768870	0.583002	0.5658
DMS	-1.654082	0.489982	-3.375799	0.0027
DEXR	-0.207069	0.405107	-0.511147	0.6143
COM	-0.000816	0.002703	-0.301865	0.7656
FINT	-9.609789	4.014176	-2.393963	0.0168
VIX	-0.002932	0.003929	-0.746216	0.4634

R-squared	0.794560	Mean dependent var	4.997600
Adjusted R-squared	0.719855	S.D. dependent var	0.211554
S.E. of regression	0.111973	Akaike info criterion	-1.303417
Sum squared resid	0.275835	Schwarz criterion	-0.887098
Log likelihood	29.20297	Hannan-Quinn criter.	-1.167708
Durbin-Watson stat	1.479737		

APPENDIX E: SECOND STEP: ESTIMATING SHOCKS

Table E.1: Commodity Price Shock

Dependent Variable: LNCOM
Method: Panel Least Squares
Date: 11/30/16 Time: 11:56
Sample (adjusted): 2009Q4 2016Q3
Periods included: 28
Cross-sections included: 20
Total panel (balanced) observations: 560

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.122870	0.113256	18.74393	0.0000
TREND	-0.012996	0.000674	-19.28061	0.0000
LNCOM(-1)	0.568365	0.041773	13.60594	0.0000
LNCOM(-2)	-0.120980	0.048435	-2.497767	0.0128
LNCOM(-3)	0.182093	0.034144	5.333015	0.0000

R-squared	0.923301	Mean dependent var	5.129267
Adjusted R-squared	0.922748	S.D. dependent var	0.231363
S.E. of regression	0.064306	Akaike info criterion	-2.641449
Sum squared resid	2.295047	Schwarz criterion	-2.602807
Log likelihood	744.6058	Hannan-Quinn criter.	-2.626360
F-statistic	1670.261	Durbin-Watson stat	1.970798
Prob(F-statistic)	0.000000		

Table E.2: VIX Shock Impact

Dependent Variable: LOG(VIX)
Method: Panel Least Squares
Date: 11/30/16 Time: 11:54
Sample (adjusted): 2009Q4 2016Q3
Periods included: 28
Cross-sections included: 20
Total panel (balanced) observations: 560

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.454574	0.287751	15.48067	0.0000
TREND	-0.073584	0.008646	-8.511275	0.0000
TREND^2	0.001505	0.000218	6.916418	0.0000
LOG(VIX(-1))	0.066014	0.043384	1.521624	0.1287
LOG(VIX(-2))	-0.242866	0.041795	-5.810878	0.0000
LOG(VIX(-3))	-0.110890	0.042908	-2.584354	0.0100

R-squared	0.296431	Mean dependent var	2.879479
Adjusted R-squared	0.290081	S.D. dependent var	0.282050
S.E. of regression	0.237646	Akaike info criterion	-0.025414
Sum squared resid	31.28744	Schwarz criterion	0.020956
Log likelihood	13.11606	Hannan-Quinn criter.	-0.007308
F-statistic	46.68267	Durbin-Watson stat	2.055634
Prob(F-statistic)	0.000000		

Table E.3: Foreign Interest Rate Shock

Dependent Variable: FINT
Method: Panel Least Squares
Date: 11/30/16 Time: 11:12
Sample (adjusted): 2009Q4 2016Q3
Periods included: 28
Cross-sections included: 20
Total panel (balanced) observations: 560

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.010045	0.002085	4.817568	0.0000
TREND	-0.000498	0.000131	-3.809457	0.0002
TREND^2	1.72E-05	3.56E-06	4.823668	0.0000
FINT(-1)	0.512153	0.040835	12.54196	0.0000
FINT(-2)	-0.257299	0.041644	-6.178537	0.0000
FINT(-3)	0.317693	0.039278	8.088413	0.0000

R-squared	0.774081	Mean dependent var	0.018357
Adjusted R-squared	0.772042	S.D. dependent var	0.003407
S.E. of regression	0.001627	Akaike info criterion	-9.993924
Sum squared resid	0.001466	Schwarz criterion	-9.947554
Log likelihood	2804.299	Hannan-Quinn criter.	-9.975818
F-statistic	379.6420	Durbin-Watson stat	1.877893
Prob(F-statistic)	0.000000		

Table E.4: Exchange Rate Shock

Dependent Variable: LNEXR
Method: Panel Least Squares
Date: 11/30/16 Time: 12:06
Sample (adjusted): 2009Q4 2016Q3
Periods included: 28
Cross-sections included: 20
Total panel (balanced) observations: 560

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.535385	0.090976	5.884899	0.0000
TREND	0.011939	0.001585	7.530497	0.0000
TREND^2	-3.36E-05	6.54E-05	-0.513510	0.6078
LNEXR(-1)	0.718399	0.046681	15.38943	0.0000
LNEXR(-2)	-0.168439	0.055162	-3.053561	0.0024
LNEXR(-3)	0.134106	0.036452	3.678940	0.0003

R-squared	0.968846	Mean dependent var	2.265617
Adjusted R-squared	0.968565	S.D. dependent var	0.255037
S.E. of regression	0.045218	Akaike info criterion	-3.344002
Sum squared resid	1.132729	Schwarz criterion	-3.297631
Log likelihood	942.3205	Hannan-Quinn criter.	-3.325895
F-statistic	3445.771	Durbin-Watson stat	1.988125
Prob(F-statistic)	0.000000		

APPENDIX F: IMPACT OF EXTERNAL SHOCKS ON THE ZSE

Table F.1: Regression Model Showing Impact of External Shocks

Dependent Variable: LOG(SMI)
Method: Least Squares
Date: 12/01/18 Time: 12:02
Sample (adjusted): 2009Q4 2016Q4
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.025148	3.880217	-0.006481	0.9949
LOG(SMI(-1))	0.975772	0.100048	9.752995	0.0000
MS	-0.516119	0.694588	-0.743058	0.4665
LOG(CPI)	-0.327351	0.880987	-0.371574	0.7143
DINT	0.344892	0.471942	0.730794	0.4738
LOG(VMI)	0.345748	0.376903	0.917340	0.3705
RESID_COM	0.320681	0.388255	0.825955	0.4191
RESID_FINT	-0.264992	0.102674	-2.580897	0.0183
RESID_VIX	-12.82610	11.66670	-1.099376	0.2853
RESID_EXR	0.615886	0.604932	1.018108	0.3214

R-squared	0.897996	Mean dependent var	4.993893
Adjusted R-squared	0.849678	S.D. dependent var	0.218453
S.E. of regression	0.084697	Akaike info criterion	-1.832669
Sum squared resid	0.136299	Schwarz criterion	-1.361188
Log likelihood	36.57371	Hannan-Quinn criter.	-1.685007
F-statistic	18.58516	Durbin-Watson stat	1.712628
Prob(F-statistic)	0.000000		

Table F.2: Transmission of External Shocks to Domestic Interest Rates

Dependent Variable: LOG(DINT)
Method: Least Squares
Date: 12/01/18 Time: 12:18
Sample (adjusted): 2009Q4 2016Q4
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.101995	6.469419	-0.943206	0.3568
LOG(DINT(-1))	0.633174	0.132344	4.784293	0.0001
MS	2.029427	1.291209	1.571726	0.1317
LOG(CPI)	0.840542	1.281487	0.655911	0.5194
LOG(VMI)	0.357462	0.653239	0.547215	0.5903
RESID_COM	0.492217	0.631908	0.778938	0.4451
RESID_FINT	-21.17995	18.67933	-1.133871	0.2703
RESID_VIX	0.186894	0.178293	1.048238	0.3070
RESID_EXR	-1.037974	1.019900	-1.017722	0.3210

R-squared	0.800298	Mean dependent var	-1.633945
Adjusted R-squared	0.720417	S.D. dependent var	0.269826
S.E. of regression	0.142672	Akaike info criterion	-0.807413
Sum squared resid	0.407105	Schwarz criterion	-0.383079
Log likelihood	20.70748	Hannan-Quinn criter.	-0.674517
F-statistic	10.01866	Durbin-Watson stat	1.912809
Prob(F-statistic)	0.000016		

Table F.3: Transmission of External Shocks to Money Supply

Dependent Variable: MS
Method: Least Squares
Date: 12/01/18 Time: 12:26
Sample (adjusted): 2009Q4 2016Q4
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.372277	1.623423	2.077264	0.0509
MS(-1)	-0.076038	0.220649	-0.344611	0.7340
LOG(CPI)	-0.919141	0.295833	-3.106955	0.0056
LOG(VMI)	0.194575	0.125602	1.549138	0.1370
DINT	-0.109364	0.158422	-0.690336	0.4979
RESID_COM	0.646568	0.284557	2.272196	0.0343
RESID_FINT	-0.067982	0.031999	-2.124503	0.0463
RESID_VIX	-0.708703	3.954863	-0.179198	0.8596
RESID_EXR	0.249716	0.228427	1.093198	0.2873

R-squared	0.592111	Mean dependent var	0.025862
Adjusted R-squared	0.428955	S.D. dependent var	0.038759
S.E. of regression	0.029289	Akaike info criterion	-3.974065
Sum squared resid	0.017157	Schwarz criterion	-3.549732
Log likelihood	66.62395	Hannan-Quinn criter.	-3.841169
F-statistic	3.629118	Durbin-Watson stat	2.013076
Prob(F-statistic)	0.009162		

Table F.4: Transmission of External Shocks to Consumer Price Index

Dependent Variable: LOG(CPI)
Method: Least Squares
Date: 12/01/18 Time: 12:28
Sample (adjusted): 2009Q4 2016Q4
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.092078	0.139269	0.661156	0.5161
LOG(CPI(-1))	0.821387	0.055928	14.68653	0.0000
MS	-0.045531	0.054561	-0.834494	0.4139
LOG(VMI)	0.038718	0.031948	1.211894	0.2397
DINT	-0.007948	0.039774	-0.199835	0.8436
RESID_COM	0.035960	0.033293	1.080112	0.2929
RESID_FINT	0.333843	0.979148	0.340953	0.7367
RESID_VIX	0.098826	0.050198	1.968731	0.0630
RESID_EXR	-0.019410	0.008331	-2.329781	0.0304

R-squared	0.963338	Mean dependent var	4.576913
Adjusted R-squared	0.948674	S.D. dependent var	0.032174
S.E. of regression	0.007289	Akaike info criterion	-6.755709
Sum squared resid	0.001063	Schwarz criterion	-6.331376
Log likelihood	106.9578	Hannan-Quinn criter.	-6.622813
F-statistic	65.69093	Durbin-Watson stat	1.838095
Prob(F-statistic)	0.000000		

Table F.5: Transmission of External Shocks to Consumer Price Index

Dependent Variable: LOG(VMI)
Method: Least Squares
Date: 12/01/18 Time: 12:31
Sample (adjusted): 2009Q4 2016Q4
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.247674	2.361989	1.374974	0.1843
LOG(VMI(-1))	-0.017569	0.174073	-0.100929	0.9206
MS	0.611848	0.360453	1.697443	0.1051
LOG(CPI)	0.263485	0.456524	0.577155	0.5703
DINT	0.778819	0.234379	3.322910	0.0034
RESID_COM	0.130179	0.053393	2.438117	0.0242
RESID_FINT	5.546842	6.896731	0.804271	0.4307
RESID_VIX	-0.174473	0.233748	-0.746417	0.4641
RESID_EXR	-0.421360	0.345045	-1.221173	0.2362

R-squared	0.610191	Mean dependent var	4.546743
Adjusted R-squared	0.454267	S.D. dependent var	0.068536
S.E. of regression	0.050630	Akaike info criterion	-2.879430
Sum squared resid	0.051267	Schwarz criterion	-2.455096
Log likelihood	50.75173	Hannan-Quinn criter.	-2.746534
F-statistic	3.913396	Durbin-Watson stat	2.163555
Prob(F-statistic)	0.006283		

Table F. 6: Transmission of Domestic Variables to the Stock Market

Dependent Variable: LOG(SMI)
Method: Least Squares
Date: 12/01/18 Time: 14:35
Sample (adjusted): 2009Q2 2016Q4
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.920888	4.950700	-1.195970	0.2429
LOG(SMI(-1))	0.737538	0.104698	7.044419	0.0000
MS	2.439569	0.534183	4.566913	0.0001
DINT	0.584724	0.509108	1.148528	0.2616
LOG(VMI)	-0.446645	0.418462	-1.067348	0.2960
LOG(CPI)	1.983238	0.922158	2.150649	0.0414

R-squared	0.744318	Mean dependent var	4.997600
Adjusted R-squared	0.693182	S.D. dependent var	0.211554
S.E. of regression	0.117182	Akaike info criterion	-1.278185
Sum squared resid	0.343293	Schwarz criterion	-1.000639
Log likelihood	25.81187	Hannan-Quinn criter.	-1.187712
F-statistic	14.55555	Durbin-Watson stat	1.962716
Prob(F-statistic)	0.000001		

APPENDIX G: FOREIGN INVESTOR PARTICIPATION RESULTS

ADF UNIT ROOT TESTS (STATIONARITY TESTS)

Table G.1: Volume of Shares Bought by Foreigners (VSBF) - Levels

Null Hypothesis: VSBF has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.802134	0.2074
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(VSBF)
Method: Least Squares
Date: 12/11/16 Time: 22:47
Sample (adjusted): 2009Q2 2016Q3
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
VSBF(-1)	-0.488076	0.174180	-2.802134	0.0093
C	6870881.	3291452.	2.087492	0.0464
@TREND("2009Q1")	-33756.72	129516.0	-0.260638	0.7963

R-squared	0.228269	Mean dependent var	-468346.6
Adjusted R-squared	0.171103	S.D. dependent var	6739295.
S.E. of regression	6135707.	Akaike info criterion	34.19179
Sum squared resid	1.02E+15	Schwarz criterion	34.33191
Log likelihood	-509.8768	Hannan-Quinn criter.	34.23661
F-statistic	3.993135	Durbin-Watson stat	2.157366
Prob(F-statistic)	0.030255		

Table G.2: Volume of Shares Bought by Foreigners (VSBF)

Null Hypothesis: D(VSBF) has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 0 (Automatic - based on SIC, maxlag=7)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-7.788394	0.0000
Test critical values:	1% level		-4.309824	
	5% level		-3.574244	
	10% level		-3.221728	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(VSBF,2)				
Method: Least Squares				
Date: 12/11/16 Time: 22:49				
Sample (adjusted): 2009Q3 2016Q3				
Included observations: 29 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(VSBF(-1))	-1.420491	0.182386	-7.788394	0.0000
C	193959.5	2594299.	0.074764	0.9410
@TREND("2009Q1")	-47949.41	143663.0	-0.333763	0.7412
R-squared	0.700421	Mean dependent var		-273470.5
Adjusted R-squared	0.677377	S.D. dependent var		11395739
S.E. of regression	6472774.	Akaike info criterion		34.30180
Sum squared resid	1.09E+15	Schwarz criterion		34.44325
Log likelihood	-494.3762	Hannan-Quinn criter.		34.34610
F-statistic	30.39424	Durbin-Watson stat		2.144261
Prob(F-statistic)	0.000000			

Table G.3: Foreign Interest Rate (FINT) - Levels

Null Hypothesis: FINT has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.446540	0.8238
Test critical values:	1% level	-4.323979	
	5% level	-3.580623	
	10% level	-3.225334	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FINT)
Method: Least Squares
Date: 12/11/16 Time: 22:52
Sample (adjusted): 2009Q4 2016Q3
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FINT(-1)	-0.147909	0.102250	-1.446540	0.1615
D(FINT(-1))	-0.220547	0.168252	-1.310809	0.2029
D(FINT(-2))	-0.421756	0.164435	-2.564870	0.0173
C	0.000358	0.002243	0.159702	0.8745
@TREND("2009Q1")	0.000131	4.69E-05	2.789027	0.0104

R-squared	0.447003	Mean dependent var	-0.000179
Adjusted R-squared	0.350830	S.D. dependent var	0.002262
S.E. of regression	0.001822	Akaike info criterion	-9.617069
Sum squared resid	7.64E-05	Schwarz criterion	-9.379175
Log likelihood	139.6390	Hannan-Quinn criter.	-9.544342
F-statistic	4.647891	Durbin-Watson stat	1.936200
Prob(F-statistic)	0.006753		

Table G.4: Foreign Interest Rate (FINT)

Null Hypothesis: D(FINT) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.266020	0.0000
Test critical values:	1% level	-4.323979	
	5% level	-3.580623	
	10% level	-3.225334	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FINT,2)
Method: Least Squares
Date: 12/11/16 Time: 22:55
Sample (adjusted): 2009Q4 2016Q3
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FINT(-1))	-1.799910	0.247716	-7.266020	0.0000
D(FINT(-1),2)	0.492446	0.160540	3.067443	0.0053
C	-0.002653	0.000853	-3.111751	0.0048
@TREND("2009Q1")	0.000147	4.67E-05	3.139431	0.0044

R-squared	0.741783	Mean dependent var	-0.000107
Adjusted R-squared	0.709506	S.D. dependent var	0.003457
S.E. of regression	0.001863	Akaike info criterion	-9.601423
Sum squared resid	8.33E-05	Schwarz criterion	-9.411108
Log likelihood	138.4199	Hannan-Quinn criter.	-9.543242
F-statistic	22.98173	Durbin-Watson stat	1.890564
Prob(F-statistic)	0.000000		

Table G.5: Volatility Index

Null Hypothesis: VIX has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 0 (Automatic - based on SIC, maxlag=7)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-5.518618	0.0005
Test critical values:	1% level		-4.296729	
	5% level		-3.568379	
	10% level		-3.218382	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(VIX)				
Method: Least Squares				
Date: 12/11/16 Time: 22:57				
Sample (adjusted): 2009Q2 2016Q3				
Included observations: 30 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VIX(-1)	-0.916615	0.166095	-5.518618	0.0000
C	22.38509	5.113202	4.377900	0.0002
@TREND("2009Q1")	-0.319033	0.150640	-2.117847	0.0435
R-squared	0.537290	Mean dependent var		-1.026667
Adjusted R-squared	0.503015	S.D. dependent var		8.594583
S.E. of regression	6.058938	Akaike info criterion		6.535586
Sum squared resid	991.1896	Schwarz criterion		6.675705
Log likelihood	-95.03378	Hannan-Quinn criter.		6.580411
F-statistic	15.67592	Durbin-Watson stat		1.995509
Prob(F-statistic)	0.000030			

Table G.5: Volatility Index

Null Hypothesis: VMI has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 6 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.868352	0.0300
Test critical values:	1% level	-4.394309	
	5% level	-3.612199	
	10% level	-3.243079	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(VMI)
Method: Least Squares
Date: 12/11/16 Time: 23:02
Sample (adjusted): 2010Q4 2016Q3
Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
VMI(-1)	-1.351064	0.349261	-3.868352	0.0015
D(VMI(-1))	0.406419	0.253090	1.605826	0.1292
D(VMI(-2))	0.288916	0.226466	1.275761	0.2214
D(VMI(-3))	0.480203	0.215090	2.232572	0.0412
D(VMI(-4))	0.880180	0.201908	4.359320	0.0006
D(VMI(-5))	0.508995	0.235738	2.159160	0.0474
D(VMI(-6))	0.351471	0.187191	1.877609	0.0800
C	137.5386	35.56354	3.867405	0.0015
@TREND("2009Q1")	-0.616267	0.195541	-3.151594	0.0066

R-squared	0.772182	Mean dependent var	-0.962500
Adjusted R-squared	0.650679	S.D. dependent var	7.043641
S.E. of regression	4.163031	Akaike info criterion	5.970360
Sum squared resid	259.9624	Schwarz criterion	6.412130
Log likelihood	-62.64432	Hannan-Quinn criter.	6.087562
F-statistic	6.355251	Durbin-Watson stat	1.655078
Prob(F-statistic)	0.001099		

Table G.6: Stock Matket Index (Levels)

Null Hypothesis: SMI has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.608258	0.2795
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RM)
Method: Least Squares
Date: 12/11/16 Time: 23:05
Sample (adjusted): 2009Q2 2016Q3
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SMI(-1)	-0.283218	0.108585	-2.608258	0.0147
C	56.89922	17.40357	3.269399	0.0029
@TREND("2009Q1")	-0.826690	0.394130	-2.097506	0.0454

Adjusted R-squared	0.261782	S.D. dependent var	21.65908
S.E. of regression	18.60939	Akaike info criterion	8.779849
Sum squared resid	9350.352	Schwarz criterion	8.919969
Log likelihood	-128.6977	Hannan-Quinn criter.	8.824675
F-statistic	6.141907	Durbin-Watson stat	1.088924
Prob(F-statistic)	0.006332		

Table G.7: Stock Maket Index

Null Hypothesis: D(RM) has a unit root Exogenous: Constant, Linear Trend Lag Length: 0 (Automatic - based on SIC, maxlag=7)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-6.543786	0.0000
Test critical values:	1% level		-4.309824	
	5% level		-3.574244	
	10% level		-3.221728	
*MacKinnon (1996) one-sided p-values. Augmented Dickey-Fuller Test Equation Dependent Variable: D(RM,2) Method: Least Squares Date: 12/11/16 Time: 23:07 Sample (adjusted): 2009Q3 2016Q3 Included observations: 29 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RM(-1))	-0.891065	0.136170	-6.543786	0.0000
C	2.395517	6.316666	0.379238	0.7076
@TREND("2009Q1")	-0.275857	0.352422	-0.782745	0.4408
R-squared	0.640815	Mean dependent var		-3.041379
Adjusted R-squared	0.613185	S.D. dependent var		23.55388
S.E. of regression	14.64920	Akaike info criterion		8.304346
Sum squared resid	5579.578	Schwarz criterion		8.445791
Log likelihood	-117.4130	Hannan-Quinn criter.		8.348645
F-statistic	23.19304	Durbin-Watson stat		1.731331
Prob(F-statistic)	0.000002			

Table G.8: Foreign Investor Participation Model

Dependent Variable: LOG(VSBF)
Method: Least Squares
Date: 12/07/16 Time: 13:45
Sample (adjusted): 2009Q2 2016Q3
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	15.38319	6.620119	2.323703	0.0289
LOGVSBF(-1)	0.080191	0.204064	0.392971	0.6978
LOG(SMI)	1.298102	0.478480	2.712969	0.0121
LOG(VMI)	-1.233890	1.257700	-0.981069	0.3363
LOG(VIX)	-0.165774	0.289406	-0.572809	0.5721
FINT	-44.30699	22.02665	-2.011517	0.0556

R-squared	0.528785	Mean dependent var	16.29427
Adjusted R-squared	0.430615	S.D. dependent var	0.520979
S.E. of regression	0.393118	Akaike info criterion	1.147444
Sum squared resid	3.709007	Schwarz criterion	1.427683
Log likelihood	-11.21166	Hannan-Quinn criter.	1.237095
F-statistic	5.386434	Durbin-Watson stat	1.788973
Prob(F-statistic)	0.001848		