

# MIDLANDS STATE UNIVERSITY

## FACULTY OF COMMERCE



## DEPARTMENT OF BANKING AND FINANCE

The impact of foreign portfolio flows on the performance of the Zimbabwe Stock Exchange (2009 – 2013)

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*This dissertation is submitted in partial fulfillment of the requirements of the Bachelor of Commerce Honours Degree in Banking and Finance at Midlands State University.*

May 2014

## APPROVAL FORM

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## RELEASE FORM

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## **DEDICATIONS**

I dedicate this work to my mother.

## **ACKNOWLEDGEMENTS**

To God Almighty who provided me the strength to complete this strenuous task. To my family for the moral and financial support provided throughout my academic career. To my supervisor Dr Nkomazana, I greatly appreciate all your effort and the time you spared to provide direction whenever I needed it.

## **ABSTRACT**

The basic objective of this research was to assess the effect of foreign portfolio flows on the performance Zimbabwe Stock Exchange during the study period. In pursuing this major objective the study also determined the granger causality between foreign flows and returns, the behaviour patterns shown by foreign investors on the local bourse and assessed the impact that certain foreign investor behavior has on stock performance measured by stock return. The research methodology in this dissertation was based on quantitative analytics using the data collected mostly from websites of the Reserve Bank of Zimbabwe, US Federal Bank, and the Zimbabwe Stock Exchange. The study was undertaken for the reference period of approximately five years from 2009-13. The researcher also went on to analyse the data that was gathered in order to come up with viable analysis. The gathered information was analyzed using tools like, graphs and tables as a way of giving a clear view of the results that were found from the research. The key results of the study points out that participation of foreign investors has an effect on domestic stock market returns and that stock market return is mainly affected by unexpected flows and not significantly by the contemporaneous value of expected flows. The price pressure hypothesis is supported, with security prices revised by lags. The base-broadening hypothesis holds, hence, the amount of foreign investment in the market drives up returns and hence performance of the market. Macroeconomic factors, especially the change in exchange rate and risk free rate, are important in determining returns. The results suggest that though portfolio flows in lower the cost of capital and financing growth, promoting local investment and macroeconomic stability is also important in improving performance of the Zimbabwe Stock Exchange. The study concludes by making recommendations aimed at improving market capitalization and foreign investor confidence.

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## LIST OF ACRONOMYS

ACF	Autocorrelation Coefficient
ADF	Augemented Dickey Fuller
AFDB	African Development Bank
ARMA	Autoregressive Moving Average
AIC	Akaike Info Criterion
ASEA	African Stock Exchange Association
LIBOR	London Interbank Borrowing Rate
MSCI	Morgan Stanley Capital Index
PACF	Partial Correlation coefficients
RBZ	Reserve Bank of Zimbabwe
SBC	Schwarz Criterion
VIF	Variance Inflation factor
ZSE	Zimbabwe Stock Exchange

# **CHAPTER 1: INTRODUCTION**

## **1.1 Introduction**

Portfolio inflows reduce the cost of capital in emerging markets and contribute in financing the growth of these markets (Bekaert and Harvey, 2000). However, foreign portfolio flows can be easily withdrawn from an economy (Bekaert et al., 2002). Hence, they may have a drastic impact on an economy and on the value of shares of companies when foreign investors sell off their holdings and destabilise stock markets. This research is aimed at assessing the role that foreign portfolio flows play on the performance of the Zimbabwean Stock Market given the concern that such flows may destabilize fragile markets especially during crises. For instance, much of the volatility experienced in developing countries has been traced back to financial shocks from global financial markets, this is mainly due to globalisation of the financial sector (Frankel, 2011). This chapter furnishes background information to the investigation of the impact of foreign portfolio flows on stock market performance in Zimbabwe. It also provides the problem statement that motivated the researcher to embark on the research. Furthermore, it contains the objectives, which were pursued by the study together with the research questions which the study sought to answer. This chapter also contains the importance of the study and the main assumptions made. The delimitation of the scope of the study and the major challenges or limitations the researcher faced are contained in this part. The penultimate section of this chapter will define key terms of the study. Finally, the organization of the whole study is provided.

## **1.2 Background to the Study**

The liberalisation of the stock market in Zimbabwe and in most developing countries led to integration of developing countries' stock markets to the rest of the world. Liberalisation led to the opening of domestic stock markets to foreign investors as a means to integrating with other markets. Through liberalisation, foreign portfolio flows have been encouraged because they improve market activity and access to foreign capital. Allen et al. (2011) posit that the motivation for foreign investors involvement in emerging markets is to diversify investments, hedge against risk and to get higher returns given the low correlation of emerging markets with

developed ones. The change in investor composition in developing stock markets affects prices of stocks and alleviates the constraint of low domestic savings (Aaron, Leappe & Thomas, 2010). Therefore, foreign portfolio flows are important determinants of market returns and any change or abrupt reversal of foreign portfolio highly affects stock markets.

Since the Zimbabwe Stock Exchange (ZSE) was established in 1896 it only became open to foreign investment since 1993. Since then foreign investor participation increased on the local bourse until it established itself as one of Africa's top exchange based on market capitalization. Sunde and Zivanomoyo (2008) cited in Chikoko and Muparuri (2013), state that between 1994-1996 market capitalisation rose at an average annual rate at 36 % in US dollar terms. By the year 2001 the ZSE was rated as the second best performer in the world's emerging capital markets by Standard and Poors, in terms of returns in US dollar and share prices. The African Stock Exchange Association (ASEA) rated the bourse as the best performing stock exchange in the African continent for 2005. In late 2008, the Zimbabwean dollar lost its power as a legal tender. This period was marked by skyrocketing inflation, which peaked to 231 million % in July 2008, (Reserve Bank of Zimbabwe, 2008). This period became characterized by crippling loss in investor confidence in the economy and its various instruments, the stock exchange included, therefore there was withdrawal of foreign investment capital and even local investment to the state of near collapse of the local bourse and economy.

Since dollarization, foreign transactions increased on the local stock exchange though activity was volatile due to developments in the local and global environment. For instance, between the end of 2009 and early 2010, the local bourse was affected by the uncertainty surrounding the indigenisation policy. The Zimbabwe Stock Exchange recorded a reduction in volumes and values traded from 34 million shares at a value of US\$2.3 million at the end of January 2010 to 8.3 million shares at a value of US\$1.6 million by the end of February 2010 (RBZ, 2010). Positive trends on net foreign inflows were significant after the passing of the new constitution as foreigners had increased in confidence in the Unity Government's ability to function (African Development Bank, 2011). On the global scene, post the global economic crisis opportunities in trade, investment, infrastructure development and energy generation provided substantial growth impetus to economic activity in developing and emerging market economies. Emerging and

developing economies recorded stronger economic growth by the end of 2010 at 7.1%, relative to 2.7% recorded in advanced economies (World Bank, 2010). Growth in emerging market economies was driven by expansion in domestic demand in China, India and other member countries of what has been touted as the 'BRICS' nations. As a result there was a marked increase by the end of 2010 in foreign portfolio flows on the local bourse. The volume of net foreign flows on the local exchange has continued to fluctuate up and down though it remains relatively thin. During the month of July 2013, trading on the ZSE rose as investors took strategic positions prior to the harmonized elections.

The value and number of shares bought by foreigners increased by 29.02 % and 33.95 % respectively although the value and number of share sold declined by 40.18% and 74.11%, respectively (AfDB, 2013). This seems to point out that foreigners were expecting a certain result especially with the follow up reaction after the results of the election. For instance sales by foreign investors were on an increasing trend between September and October 2013. Over this period, sales by foreign investors increased to US\$24.62 million in October 2013, from US\$16.83 million in September 2013. Foreign investor participation only began to take a turn for the better in November 2013, compared to US\$26.37 million in October. Over this period, sales by foreign investors declined to US\$13.75 million, from US\$24.62 million (RBZ, 2013).

Portfolio flows are considered as 'hot capital' because they move at short notice across economies in search of the highest economic returns and stable market conditions. Even if the domestic financial market conditions remain unchanged, portfolio flows may move to other markets because of the presence of better market conditions abroad. The portfolios are known to exhibit 'herd' behavior, because they will move unidirectional in high volumes at the slightest hint of any change in economic policy, market conditions or the political environment. As the Zimbabwean capital market is relatively thin, inflows will have a significant effect on the movement of stock prices. Besides, a sudden surge in portfolio inflows could lead to lower interest rates and the resultant excessive liquidity in the banking system may be channeled towards riskier areas (Aaron, Leappe & Thomas, 2010).

It is against this background of changing foreign portfolio flows that this research is aimed at, assessing the effect that foreign portfolio flows has on domestic stock market performance.

### **1.3 Statement of the Problem**

Foreign portfolio flows can have a positive or negative impact on the stock market. Negative results on the stock market are realized when foreign portfolio flows destabilize stock prices. Whilst a positive influence is realized when returns on asset securities increase. Given the increase in foreign flows during the reference period, the basic problem is that the impact foreign have on the performance of the ZSE is unknown. Therefore, the motivation of this enquiry was to ascertain whether foreign portfolio flows yield a positive or negative influence on the domestic bourse.

### **1.4 Objectives of the study**

The broad objective of the study is to investigate the impact of foreign portfolio investment on stock market performance in Zimbabwe. However, the specific objectives include to;

- ❖ Examine the causality between foreign portfolio flows and stock market returns.
- ❖ Determine the trading behavior of foreign investors using both the expected and unexpected components of foreign flows.

### **1.5 Research hypotheses**

The researcher identified the following broader hypothesis for the study:

$H_0$  – Foreign portfolio flows does not have a significant impact on ZSE's stock market returns

$H_1$  –Foreign portfolio flow have a significant impact on ZSE's stock market returns

Other hypotheses to be tested;

$H_{0i}$  –LN Net foreign portfolio flow does not Granger cause stock market returns

$H_{1i}$  - LN Net foreign portfolio flow Granger causes stock market returns



H<sub>0ii</sub> – Stock market returns does not Granger cause LN Net foreign portfolio flow

H<sub>1ii</sub>- Stock market returns Granger causes LN Net foreign portfolio flow

H<sub>0</sub>:  $\gamma_1 + \gamma_2 = 0$  against

H<sub>1</sub>:  $\gamma_1 + \gamma_2 > 0$ ,

Where,  $\gamma_1$  and  $\gamma_2$  are coefficients of expected and unexpected flows respectively.

H<sub>0</sub>:  $\gamma_3 = 0$  against

H<sub>1</sub>:  $\gamma_3 < 0$

Where,  $\gamma_3$  is the coefficient of lagged unexpected flows

### **1.6 Significance of the Study**

The research will contribute to the existing literature on the effects of foreign capital flows on stock market performance by examining its applicability to developing countries like Zimbabwe. It will therefore help to contextualize the theories to the Zimbabwean situation. Hence the research is expected to benefit the various stock broking firms on the ZSE, to improve marketing strategies to foreign institutes and individuals on the prospects of the Zimbabwe Stock Exchange. Academics will also benefit from the research's findings as it may constitute part of their reference material.

### **1.7 Scope of the Study**

This study covers a period ranging from March 2009 to December 2013, which is a period of improved though fluctuating foreign investor participation since it is after the removal of the unstable Zimbabwean dollar, however mired with uncertainties in policy, macroeconomic and political developments. Availability of monthly data was also a major influence on the length of the reference period. The study will therefore use monthly data for the above mentioned reference period.

## **1.8 Assumptions**

Before the study was undertaken the researcher made assumptions pertaining to how the study would be carried out, these assumptions are:

- ❖ The use of average return on both the mining and industrial index was a better measure of impact on returns rather than use of one index.
- ❖ That the London Interbank Borrowing Rate (LIBOR) is an acceptable alternative to the Risk Free Rate for this study.

## **1.9 Limitations**

The following factors limited the study;

- ❖ There was either limited or no monthly data for foreign investor activity for the time period January 2004 – May 2009, due to insignificant to no participation of foreign on the bourse in the thick of the country's economic crisis. This restricted the researcher to the already mentioned reference period.
- ❖ The study is dependent on use of secondary data therefore due to the confidentiality associated with financial information, it proved to be difficult to access all the required information regarding to recent economic variables after December 2013.
- ❖ Time constraints limited the researcher to gathering all the available information since 1993 when the Zimbabwe Stock Exchange was opened to foreigners.
- ❖ The research would focus on companies listed and quoted on the ZSE and not include other institutions which can be affected by foreign investor participation in the domestic economy, this is because the research aimed only to establish the relationship between foreign portfolio and stock exchange performance in Zimbabwe.

## **1.10 Definition of terms**

**Foreign Portfolio** -These are the total funds that foreigners invest in shares listed or quoted on the Zimbabwe Stock Exchange. Foreign Portfolio Flows are not long lasting interest as compared to Foreign Direct Investment (Mbao, 2005).

**Market Capitalisation-** This is the sum total of the values of all shares of companies listed or quoted on the Zimbabwe Stock Exchange as reflected by their share price. The market capitalization is a product of the outstanding number of shares and its current share price (Mbao, 2005).

### **1.11 Organization of Study**

Chapter one which is the introduction outlined the background of the study with information on the ZSE and trends in foreign portfolio flows. It also contains the scope, limitations, objectives of the research, significance of the study, problem statement, research questions and definition of terms. Chapter two covers literature review that focuses on reviewing related and relevant literature of the study. Hence, the second chapter will review the theoretical and conceptual frameworks of how foreign portfolio flows impact on stock returns. Chapter three gives a concise description of the methodology used to tackle the research objectives, it also presents an overview of the research design, as well as data collection and analysis procedures that were used. The fourth chapter which is the penultimate chapter furnishes a thorough presentation of the research findings and provides analysis of the data gathered. Chapter five contains the summary of the study, conclusions and recommendations, highlights the solutions in addressing the statement of the problem.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.1 Introduction**

In this chapter the researcher cites or quotes various authorities that contributed information that was used to enlighten the researcher on the research topic. The information in the chapter also assisted the researcher in adopting the appropriate model for the study, in addition to forming the basis upon which findings and recommendations will be discussed.

### **2.2 Literature Review**

Postulations, analysis and contentions of various authors are referred to as follows;

#### **2.2.1 Arbitrage Pricing Theory**

The Arbitrage Pricing Theory (APT) posits that stock returns can be explained by reference to the unexpected changes in the macroeconomic variables rather than their levels. The unexpected value of a variable can be defined as the difference between the actual value of the variable and its expected value. The theory does not specify how investors might have formed their expectations and leaves one with the task of constructing measures of expectations (Brooks, 2008).

#### **2.2.2 Base Broadening Hypothesis**

Numerous hypotheses have been postulated to explain the correlation between foreign purchases and stock returns depending on how foreign portfolio flows affect domestic stock prices. The base-broadening hypothesis postulates that foreign inflows cause emerging equity market prices to rise (Demeritte, 2000). This is because foreign investors broaden the investor base, also diversification and risk sharing are increased in so doing reducing the risk premium. Narag (2000) suggests that the resultant entry of new investors can lower the supposed liquidity risk of stocks. Net purchases of foreigners creates shocks to net investor demand as foreign inflows may be based on foreign investors' view that the shares are undervalued or that there are benefits that may be consequential to investing in emerging markets (Richards, 2004).

### **2.2.3 Price Pressure Hypothesis**

The price pressure hypothesis posits that, a rise in prices due to inflows of foreign investment is caused by temporary illiquidity meant to meet increased demand from foreign entry (Demeritte, 2000). Therefore, price increases on securities due to foreign investor activity are quickly restored. He further states that initial price increases are based on expectations and information asymmetry, and that because of the learning process, the prices regress to their original level. This theory suggests that entrance of foreign investors in the domestic market is a sign of good performance and new information. According to Warther (1995), foreign flows move security prices owing to information revelation and price pressure, and that market response to information revelation will make prices move in the same direction as foreign flows, hence flows will be positively correlated with security returns. Bekaert et al (2002) found equity flows to increase after liberalization and suggest that this is caused by portfolio rebalancing. Pavabutr & Yan (2003) showed that exposure to foreign flows is associated with a reduction in risk premium, which diminishes among stocks held by foreigners and eventually decreases after a while as the market becomes more liberalized. According to Warther (1995) however, returns are not negatively related to past flows, in contrast he supports a positive relation linking flows and succeeding returns and a negative relation linking returns and succeeding flows, which is contradictory to the price pressure hypothesis.

### **2.2.4 Positive Feedback Hypothesis**

This hypothesis suggests that there is a correlation between foreign investment inflows and contemporary stock returns, and that a positive price response to liberalization would be possible if foreign investors are positive feedback traders (Bohl & Sikolos, 2008). The trades of foreign investors are extremely correlated, they trade as a herd, which may lead to prices falling as foreign investors sell but rising as they buy. According to Choe et al (1999) positive feedback trading may not destabilize a capital market when trading is attributable to information about fundamentals. Bohl & Sikolos (2008) suggests a contrasting opinion that feedback traders do not base their decisions on fundamental information but react to changes in stock price. In such cases positive feedback trading will destabilize capital markets.

### **2.2.5 Portfolio Flows and Stock Market Prices**

According to Gazioglu (2008) all information pertaining to domestic and international markets is absorbed by capital markets, furthermore, prices in stock markets are driven by information and based on the supply and demand of securities. All these variables are to a great extent affected by the performance of macroeconomic factors (Twerefou and Nimo, 2005). Conversely, price changes determine the return on stocks, which when summed up determine the market return (Nyangoro, 2013).

Investments in equities is based on the flow of information, thus according to Merton, (1987), investors invest solely in an externally determined portfolio of equities, for which they are informed and assume to have high returns. Foreign portfolio flows influence returns by changing the risk premium in the capital market (Twerefou and Nimo, 2005). When foreign investor participation leads to a fall in the risk premium, the discount rate is consequently reduced and the price of stocks appreciates. Considering the stock market as being composed of a portfolio of equities, then the stock market index gives the price for this portfolio (Nyangoro, 2013). This is consolidated by the assertion that the stock price is the primary indicator of risk in emerging markets as investors are more concerned about share price changes (Twerefou and Nimo, 2005). This implies that the risk premium on a portfolio of assets is the risk premium of the market as a whole.

The efficient markets hypothesis suggests that security prices react to the unexpected announcement as the expected part of the announcement would already be included in stock prices (Pearce and Roley, 1984). This is in sync to other researches, for instance Warther (1995), posits that the unpredictable component of flows is the one that influences stock returns.

### **2.2.6 Determinants of Portfolio Flows**

Srikanth & Kishore (2012) posit that foreign investors are lured by the economic stability of the host country, projections of its growth opportunities, and constructive policies of the host government towards promoting foreign investment, privatization and favourable taxation. They further state that foreign portfolio flows are drawn to countries with higher domestic interest rates relative to external rates of interest, coupled with stability in the exchange rates. External factors, such as group or 'herd' mentality in international capital markets, lower foreign interest

rates, recessions, economic crises offshore, a dwindling in the existing profitable investment opportunities, also play a vital role in attracting foreign portfolio investment flows (Enika, 2011).

Since 2008, developed economies experienced near-zero interest rates, along with lower economic growth rates, which propelled investors in those countries to invest in emerging markets (Frankel, 2011). He further states that due to globalisation of the financial sector, a significant volume of foreign investor activity in emerging markets can be traced to originate from financial shocks in developing countries.

### **2.2.7 Impact of Portfolio Flows on Project Evaluation**

The liberalisation of capital market leads to better functioning markets due to foreign investor influence (Stulz, 1999). It leads to better allocation of resources by giving more reliable market signals that may be noisy in closed and thinly traded segmented markets (Demeritte, 2000). According to Sweeney (1993), besides improvement in the allocation efficiency, the project evaluation process would become more tractable. In closed markets, the cost of capital and the risk premium are usually greater than in open or integrated markets (Enika, 2011). The decision process would thus require the identification of relevant factors and the projects exposure to such factors. Identification of relevant factors may be very difficult in a thin capital market for projects that do not have comparable substitutes in the domestic economy (Demeritte, 2000). He therefore suggests that, in an open market, domestic investors can benefit from the knowledge of international investors in identifying and estimating of priced factors.

### **2.2.8 Foreign Portfolio Flows, Stock Market and Economic Development**

In financial theory, a positive link exists between foreign capital inflows for both foreign direct and portfolio investment and the development of the stock market (Henry, 2000). Foreign portfolio investors' activity in capital markets supports the development of emerging markets.

Stulz (1999) contends that the liberalisation of the securities market in a country can result in four possible scenarios; foreign investors purchase domestic securities, valuations of domestic stocks increase, the cost of capital reduces and the economy's growth rate increases. When foreign investors purchase equities of companies listed on the stock exchange, this can enhance the volume and value of domestic stock market transactions, market capitalization and market

liquidity, holding all other variables constant. Foreign portfolio investment into an economy could improve the beneficiary corporations' profitability as well as better the attractiveness of the corporations' stock to investors, which brings forth their active involvement in the market, eventually leading to its development (Enika, 2011). According to, Kim & Signal (1993) net capital flows are negative immediately after liberalisation but following a presumed short period net capital flows turn positive and progressively grow large. However, they posit that net capital inflows to liberalized emerging markets may be hampered by bias in the home market that stop investors from fully utilizing the potential advantages of diversification in international markets.

Stulz (1999) found that the real value of emerging market equity increased by a remarkable 202% from December 1984 to December 1994 relative to a 93.5% increase in the S&P 500 over the same duration. He however suggests that other factors such as changes in macroeconomic conditions that affect stock market performance also contributed towards the marked difference in the two indexes. Henry (1997) measured the increase in stock market valuation due to liberalisation in several emerging markets by controlling for other factors besides foreign portfolio flows that have an effect on these economies such as macroeconomic conditions. He found that liberalisation in these markets caused an average increase in stock market values of 37%.

The effect of the rise in asset values on the cost of capital on liberalized emerging markets was empirically examined by Bekaert & Harvey (1998). These scholars suggest that the ratio of dividends distributed to the share price is a good proxy for the cost of capital. In order to determine the effect of liberalization on the cost of capital they probe how this proxy changes as countries open up to foreign investment. Their findings suggest that liberalization decreases the cost of capital by a small amount.

According to Henry (1997) the fall in the cost of capital should improve economic growth, by making some investment projects that were not profitable before to become profitable due to lower cost of capital. He recorded increases in private investment of 23% in the year after the capital markets were opened to foreign investment and an increase of 24 % in the second year after that. Referring to the findings of this study, Stulz (1999) reached the conclusion that



international portfolio flows benefit countries that liberalise their markets, since positive effects occur on asset valuations and on the cost of capital.

Hargis (1998) observes the result of opening of Latin American stock markets to foreign investors and suggests that it will make them more liquid due to better participation. He also found diversification benefits to increase as more companies will be disposed to issuing securities in a market with greater participation. Considering the increases in market capitalisation, volume of trading and turnover ratio as indicators of stock market development, he concludes that liberalization of Latin American stock markets led to their development. The study also finds a marked increase in price to earnings (P/E) ratios of stocks traded in Latin America after their liberalization of their respective stock exchanges.

### **2.2.9 Foreign Portfolio Flows and Stock Markets Volatility**

Kim & Signal (1993) study if volatility changed after markets opened to foreigners for 16 emerging markets. They found that after the first year following initial foreign investor activity average volatility falls significantly. However, they also show that only three countries in their sample namely, Argentina, Chile and Mexico, had experienced significant increases in their stock market volatility during the first year subsequent to liberalization. Richards (1996) uses a different approach in his study by approximating volatility in emerging markets using weekly data. He concludes that in the period between 1992-1995 volatility was marginally lower than in the rest of the sample period that is 1975 to 1992. This latter period was characterized by lower foreign institutional investors participation in emerging markets.

Kwan & Reyes (1997) examined the impact of stock market liberalisation on the returns, prices and volatility of assets on the Taiwan Weighted Index. The GARCH methodology was used to investigate the distribution of weekly stock returns in a time period of eight years fixed around January 1991 which was the month that Taiwan opened up to foreign investment on its capital market. They found that following the liberalisation of the stock market and subsequent flows of foreign portfolio, volatility of stock returns decreases, while the impact of current news on current stock prices improves. Hargis (1998) who has been already mentioned above, finds a decrease in the monthly standard deviation of the market indices after liberalisation. These

findings suggest that liberalisation reduced the volatility of Latin American stock markets and supports the results of Kwan and Reyes (1997).

Yüce (1997) examined if the Decree No.32 of August 1989, which removed restrictions on the foreign investment in stocks quoted in Turkey had an effect on the distributional characteristics of returns on stocks on the Istanbul Stock Exchange. He contrasted two time periods, January 1988 to August 1989 which is prior to the decree and the period following the decree August 1989 to July 1992. He found that the returns do not have a normal distribution in both of these time periods, and concludes that there is no significant change in average stock returns. However, only the return variances of stocks significantly changed after the decree. This study, furthermore asserted that the average standard deviation of stock returns in the period after the opening up of the ISE to foreign investors is higher than in the period before. Yüce (1997) posited that the foreign activity destabilized the Istanbul Stock Exchange, his findings are contrary to the findings of most empirical literature mentioned above, though it is similar to the expectations of theoretical literature. This contrast maybe due to varying methodologies used.

#### **2.2.10 Foreign Portfolio Flows and Correlation with Developed Markets**

Several scholars have reported correlations of emerging market returns with the market returns in major markets. Most scholars posit that these correlations are undersized in absolute terms as well as relative to those among developed markets. Bekaert & Harvey (1998) use statistical methodology to control for other factors other than correlations to determine the impact of capital market liberalization on correlations. The researchers' findings suggest that, though correlation with global markets increases after markets are opened up to foreign investment, it is implausible that higher correlations will affect global investors seeking to diversify their international portfolios. In brief, even though there might be some increase in correlations after liberalisation, their economic impact would be negligible.

#### **2.2.11 Diversification Benefits Provided to International Investors by Emerging Markets**

Sarkar & Li (2002) examined the benefits of diversification for U.S. investors investing in developed and emerging world markets considering restrictions on short selling of securities in some of these markets. They concluded that benefits of investing in developed markets are

undersized initially and become non-existent when short sales are restricted. On the other hand, they find investments in emerging markets to offer significant diversification benefits even under strict restrictions on short sales. Their findings furthermore suggest that the integration of emerging markets with other world markets reduces the diversification benefits of investing in them.

According to Demeritte (2000) when the removal of capital controls, foreign listings and market reforms lead to full integration among international markets, the increased opportunity set and active foreign participation would allow foreign investors to hold a well diversified global portfolio. Therefore, the welfare of investors would increase following integration. He asserted that under segmentation, local investors hold all local securities and hence cannot achieve an optimal global portfolio.

#### **2.2.12 Destabilizing Effect of Foreign Trading**

Using intraday data of prices and trades by foreign and domestic investors, Choe, Kho & Stulz (1997) examined positive feedback trading and herd behavior of foreign investors prior to and during the Korean crisis in 1997. They computed the proportion of foreign investors buying a stock on a given day against the total of all foreign investors trading that stock on that day. Using the calculated proportion they approximate a daily herding measure for each stock. They concluded that foreign investors herd before the Korean crisis. To check if foreign investors in Korea for the specified time window are positive feedback traders, the authors analyze the trading patterns of foreign investors following negative and positive market returns. They found evidence suggesting that foreign investors purchase stocks following a positive market return and dispose off their holdings following a negative market return. They concluded that foreign investors in Korea before the crisis of 1997 are positive feedback traders.

For the period during the crisis they report weaker evidence of positive feedback trading and some evidence of herding though less significant. This study also examines whether foreign investor activity destabilizes stock prices in Korea and establishes that foreign investor activity is destabilizing if huge foreign trades are followed by further price movements in the similar direction as the price impact of the trades. They find huge buy and sell trades to happen contemporarily with significant positive and negative returns, respectively. However, neither

significant positive returns are noticed after huge buy trades nor significant negative returns are noticed following huge sell trades. The researchers reach the conclusion that foreign investors do not destabilize the Korean stock exchange.

Kim & Wei (2002) also studied the Korean market and contend that foreign investors must be classified before making conclusions about their trading patterns. The researchers were able to categorize foreign investors into four groups namely resident institutional investors for example subsidiaries of foreign institutions, non-resident institutional investors, resident individual investors and non-resident individual investors, then they observe each group's trading pattern relative to others. The study found that resident institutional and individual investors are less inclined to exhibit positive feedback trading behavior and herding than non-resident investors. Their findings support the informational asymmetry hypothesis which postulates that parties with more difficulty in accessing information herd the most.

### **2.2.13 Transmission mechanisms of foreign portfolio flow benefits to host country.**

Foreign portfolio flows are a form of equity finance and are therefore expected to reduce global financial instability (Rogoff, 1999). He posits that equity finance introduces risk sharing, by mitigating the moral hazard of ownership, allocating resources more efficiently and by price signaling on shares. FitzGerald (1999) identified benefits of foreign portfolio flows on the real economy his evidence focuses on equity flows rather than fixed income flows. Three varying schools of thought are prominent in explaining the transmission mechanism of foreign portfolio flows.

First, some studies find positive direct links on economic performance in the long run. For instance, Bekaert & Harvey (1997) in studying emerging markets find private equity flows to have a positive direct effect on macroeconomic performance. Though their investigation chiefly focuses on the cost of capital, they find a positive link between equity capital flows and a multifarious host of macroeconomic indicators, including growth and inflation, using data from 17 emerging markets in the time window 1977 to 1996.

The second group finds positive indirect benefits of liberalisation on economic growth through stock market development also in the long term. Levine & Zervos (1998) delineate a mechanism from liberalisation to stock market development then finally to the real economy. They suggest that liberalisation is usually characterized by increases several indicators of stock market development, such as market size and liquidity. These indicators are also strong determinants of macroeconomic growth. However, most studies that find evidence of positive empirical links between stock market development measures and economic growth are based on samples of developed countries.

Finally some studies have done further research on indirect channels paying close attention on the short term impact of foreign portfolio flows on private investment via increases in equity prices because of decreases in the cost of equity. Henry (2000) found temporary increases in private investment growth rates among a sample of 11 developing countries that opened their stock markets to foreign investment in the time period 1977 to 1994. He, however, argued that the validity of this supposed transmission mechanism requires an intermediate empirical relation between stock prices and investment. He documents a strong correlation between the growth rate of investment and valuation changes, mainly stock price appreciation associated with liberalisation. Other studies report similar positive impacts of flows on stock prices using differing methods. Froot et al. (1998), for example, reports positive correlation lagged equity capital flows and stock market returns using intraday data between 1994 and 1998. Based on lower frequency data with varying degrees of qualification, Bekaert & Harvey (2000) argued that foreign portfolio flows decrease the cost of capital in emerging markets. However these findings face stern criticism by some scholars who query whether liberalisation and levels of flows are strong determinants of market performance, but on the whole, there is some evidence suggesting that foreign portfolio investment has positive real effects, though conditional on other important variables in host countries (Durham, 2000).

#### **2.10.14 Negative Effects of Foreign Portfolio Flows**

Information asymmetries, moral hazards, investor myopia, and contagion are some appearances of market failures in emerging markets. For example, regarding asymmetric information and moral hazard any long run investment whether debt or equity, poses a difficult relationship

between principal and agent, since borrowers are more informed about return prospects than their creditors. This asymmetry is perhaps more oversized across national boundaries because of increased monitoring costs. Therefore, international flows increase the problem of moral hazard founding in finance (Demetterie, 2000).

Financial theory suggests that foreign portfolio inflows increase prices yet when they become outflows they decrease them hence making prices more unstable or volatile (Stulz, 1999). Consequently, capital flows affect valuations only if foreign investors have information that is not yet incorporated in prices. This implies that there is information asymmetry between domestic and foreign investors, which may be due to the fact that foreign investors are less informed about a country hence, they process financial and economic information uniquely based on intellectual or emotional biases thereby, creating dislike towards international investments (Brennan & Cao, 1997).

International capital flows aggravate duration mismatches between short term liabilities and long term assets in recipient countries (Mishkin, 1999). This leaves host country financial intermediaries susceptible to financial panic for example bank runs. He also suggests that these mismatches are also characteristic in developed markets because of the absence of a real international lender of last resort.

Some market failures are particularly relevant to foreign portfolio investment (FPI), for example, in distinction to Multi National Corporations involved in direct overseas investment, international portfolio managers implement minimal direct control over the management of acquired assets using passive investment strategies that involve limited monitoring. Given the limitations on control, international investors have an inducement to invest in shorter term assets to minimise perceived risk (FitzGerald, 1999). Therefore, leading to instability of capital markets as already alluded to earlier.

Since FPI increase market integration they increase co-movements between markets. A shift in one market may affect another emerging market regardless of fundamentals. In a fully integrated global market in which the global risk premia are determined internationally, we expect foreign events to have some minimal and rational impact on a domestic market and lead to co-movement

(Demerritte, 2000). Therefore, when one market gets in a crisis it may have a contagion effect on other markets.

## **2.4 Summary**

This chapter presented the literature survey of the study. The researcher focused on assessing the established understanding of how foreign portfolio flows affect stock returns. The general consensus in the literature is that the price of risk in the domestic market exceeds the price of risk on international markets hence the equity premium is expected to fall when an emerging country liberalizes its stock market, consequently leading to a fall in the aggregate cost of equity capital and an increase of the equity price index. However, there is likelihood that benefits derived from liberalized markets vary based on the policies in place in host markets and the level of stock market development. For instance, though integration of African stock markets has increased in recent times following periods of reforms, these markets generally remain thin and illiquid, which limits financial globalization despite the high returns they sometimes record. This chapter also assisted the researcher to identify the proper research methodology, as will be shown in the following chapter.

## CHAPTER 3: RESEARCH METHODOLOGY

### 3.1 Introduction

In this chapter the researcher furnishes a vivid and succinct description of the methodology used in the determination of the impact of foreign portfolio flows on the stock market performance in Zimbabwe between 2009 and 2013. The researcher presents an overview of the research design, model specification, and justification of variables, data types and sources as well as diagnostic tests that were used. The researcher took particular note of the fact that the methodology lays the basis for the success of any research project by facilitating the acquisition of facts and data on the research hypothesis. Therefore, before the researcher went on to analyze data; he needed to be clear about the methodology and strategies he would use in the data analysis processes.

### 3.2 Research Design

**The researcher used an explanatory research design.** Explanatory research is done when there is already a hypothesis as to why something occurs. Also an explanatory research is compatible with designing of tests to support particular hypotheses, and prove if they are correct or not. Explanatory research goes further than exploratory research in that it can explain the reasons behind a theory or phenomenon. Therefore, the researcher used this design to explain financial theory related to foreign investor, using the hypotheses already mentioned in chapter 1 and designed statistical tests to prove the hypotheses.

### 3.3 Model Specification

The researcher adopted a model from Nyangoro (2013) that captures the impact of foreign portfolio flows on stock returns. Initially, an Arbitrage Pricing Theory (APT) model shall be used that captures stock returns as a function of the risk factors that affect stock returns. Then net foreign portfolio flows are added as another determinant of stock returns combined with the risk factors in the APT model, to produce an aggregate model that assesses the impact of foreign portfolio flows on returns. According to, Nyangoro (2013) the combined model is an



incorporation of the expectation model, into the APT model. This will also test for the impact of new economic information on market returns.

The APT model which captures returns and risk factors according to Nyangoro (2013) is;

$$R_t = \beta_0 + \beta_i Z_t + \epsilon_t \dots \dots \dots (1)$$

Where;

- ❖  $R_t$  - is the stock market return calculated as the monthly log difference in stock price index in a particular month  $t$  [ $R_t = \ln(P_t / P_{t-1})$ ] and  $P_{t-1}$  is the level of the stock market price index in month  $t$ .
- ❖  $Z_t$  - is a set of  $i$  risk factors that have an impact on stock returns.

Foreign portfolio flows are also essential determinants of stock returns, the market usually reacts to surprise changes in portfolio flows compared to expected portfolio flows. Warther (1995) suggests the separation of the anticipated foreign flows from the unanticipated ones to test the market response to each of the portfolio flow components. Therefore according to Nyangoro (2013), after expanding on the APT model the expression becomes:

$$R_t = \beta_0 + \beta_i Z_t + \gamma_1 PF_{at} + \gamma_2 PF_{ut} + \gamma_3 IPF_t + \epsilon_t \dots \dots \dots (2)$$

Where;

- ❖  $PF_{at}$  is the anticipated portfolio flows in month  $t$ , being the difference between actual portfolio flows and unanticipated flows ( $PF_{at} = PF_t - PF_{ut}$ ).
- ❖  $PF_{ut}$  are the unanticipated portfolio flows in month  $t$  and  $IPF_t$  are internal portfolio flows. Anticipated foreign portfolio flows are approximated by modeling using ARMA and the unanticipated foreign portfolio flows are taken as residuals from the ARMA framework.

The researcher added lags to values of unanticipated foreign flows in Equation (2) to ascertain whether the impact of foreign flows on stock prices is maintained for a period of time. According to the price-pressure hypothesis the lagged unanticipated foreign portfolio inflows have

significant negative coefficients. This implies that after changing for Treasury rates and using LIBOR rates and dropping collinear and some insignificant variables on the model used by Nyangoro (2013) in Kenya the expression becomes:

$$ZSE\_RETURN = \beta_0 + \beta_1 \Delta LN MCAP + \beta_2 LN \Delta ZSEVOL + \beta_3 \Delta EXCH + \beta_4 \Delta LIBOR + \beta_5 \Delta INFL + \beta_6 MSCI + \gamma_1 PF_{at} + \gamma_2 PF_{ut} + \gamma_3 PF_{ut-1} + \epsilon_t \dots\dots\dots(3)$$

Where; ZSE\_RETURN is Return on the ZSE equivalent to  $R_t$  in equation (2), LN MCAP is change in natural logarithm of Market capitalization, LN  $\Delta$  ZSEVOL is change in natural logarithm of Volatility,  $\Delta EXCH$  monthly change in exchange rate,  $\Delta LIBOR$  is change in 3 Month - London Interbank Offer Rate, MSCI is return on the global index,  $\Delta INFL$  monthly change in inflation.  $PF_{at}$  anticipated portfolio flows at month t.  $PF_{ut}$  unanticipated portfolio flows at month t.  $PF_{ut-1}$  unanticipated portfolio flows at month t-1.

### 3.4 Justification of variables

The variables used in this study have been used in earlier studies done on emerging markets for instance, Gabor, (2011); Chen et al., (1986); Wei, (2009); Karanikas et al., (2006); Nyangoro, (2013). The variables are;

- ❖ **Return (ZSE\_RET):** This is the dependent variable which we also expect to be a measure of performance of the stock market.
- ❖ **Market capitalization ( $\Delta LN MCAP$ ):** Market capitalization captures the effect of volumes on trading therefore, it is a proxy of the level of investor participation, implying that the higher the capitalization the more likely the higher is the stock market return. Therefore, a positive coefficient is expected between  $\Delta CAP$  and stock market return.
- ❖ **Volatility (LN  $\Delta$  ZSEVOL):** High volatility of stock returns, signifies high uncertainty on investment returns, hence a negative coefficient is expected between ZSEVOL and stock market return.

- ❖ **Change in exchange rate ( $\Delta EXCH$ ):** Change in exchange rate is linked directly to exchange rate volatility implying a high  $\Delta EXCH$  of the long term creates uncertainty in the market about the stability of the macro-economy. Uncertainty tends to dampen confidence in the market, thus asset prices will fall as foreign investors withdraw their holdings on the domestic market. Therefore, change in exchange rate is expected to have a negative coefficient with market returns.
  
- ❖ **Three Month - London Interbank Offer Rate ( $\Delta LIBOR$ ):** The discount rate of a stock includes a risk premium and risk free rate, which gives the nominal return of the market. 3 Month – LIBOR captures the risk free rate, hence the higher the rate is the higher the expectation of increase in stock returns. This variable is meant to proxy the TB rate. A positive coefficient is expected between stock market return and  $\Delta LIBOR$ . The risk free and other related rates, such as the  $\Delta LIBOR$  controls for shifts in market conditions (Boyer and Zheng, 2009). LIBOR can be used to proxy the TB rate in markets without liquid treasury bill markets (Weinman, 2011).
  
- ❖ **Inflation (INFL):** Increase in inflation reduces real monetary value leading to a decline in the value per share. This may cause investors to liquidate their assets thereby making share prices to fall if supply increases ceteris paribus. Thus, rising inflation reduces stock market returns. A negative coefficient is expected between INFL and stock market returns.
  
- ❖ **Foreign portfolio flows (PF):** Basing on financial theory, as foreign portfolio flows increase, or as unexpected foreign portfolio flows increase, the return on the market is expected to go up as postulated by the base broadening and price pressure hypothesis. Hence, a positive coefficient is expected between both anticipated and unanticipated foreign portfolio flows the same is expect.
  
- ❖ **World equity market index (MSCI):** The index is meant to proxy for developments in global stock markets and act as a measure of integration of the domestic market to the global market. If the level of integration is low, then a high return in global markets is

expected to make foreign investors withdraw domestic holdings and increase investments in foreign markets. This would make the stock prices in the domestic bourse to fall leading to a reduction in market returns. The fall in stock prices is a result of domestic stock market prices either not moving unidirectional to the world stock index or moving less marginally because of low integration and hence may have a negative relationship. When the growth in the global index leads to increase in local returns, then it is most probable the domestic stock market is moving unidirectional to MSCI, and with equal or slightly higher magnitude, and the market is integrated with the rest of the world resulting in a positive relationship. Therefore, the coefficient between MSCI and market returns is expected to be positive or negative.

### 3.5 Data Types and Sources

The research will be based on analysis of secondary methods of collecting data. The secondary data was collected from sources such as, the Zimbabwe Stock Exchange and websites. Secondary data refers to relevant information already in existence prior to the carrying out of the research (Aaltio & Pia, 2009). Thus research is historical in nature as it is based on historical data.

Monthly data from March 2009 to December 2013 used were obtained for foreign portfolio flows obtained from the Zimbabwe Stock Exchange (ZSE). The data on foreign trading provides, details of foreign trade including purchases and sales and also market capitalization and volume of domestic trade. Data on LIBOR and exchange rates are obtained from United States Federal Reserve Bank of St Louis websites. Month on month statistics of inflation were obtained from the website of the Reserve Bank of Zimbabwe. Table 3.1 below summarizes data types and sources.

**Table 3.1 Data sources**

<b>Variable</b>	<b>Description</b>	<b>Source</b>
ZSE_RET	Return on Zimbabwe Stock Exchange	Raw data from Zimbabwe Stock Exchange

$\Delta \text{LN MCAP}$	Change in stock market capitalization	Raw data Zimbabwe Stock Exchange
$\text{LN } \Delta \text{ ZSEVOL}$	Change in volatility of the stock market	Raw data Zimbabwe Stock Exchange
$\Delta \text{EXCH}$	Monthly change in US\$/major currencies exchange rate	Federal Reserve (www.stlouisfed.org)
PF	Foreign portfolio flows	Zimbabwe Stock Exchange
INFL	Monthly change in inflation	Reserve Bank of Zimbabwe (www.rbz.co.zw)
$\Delta \text{LIBOR}$	Change in 3 month LIBOR rate	Federal Reserve (www.stlouisfed.org)
MSCI	Global equity index	Federal Reserve (www.stlouisfed.org)

**Return (ZSE\_RET):** Return on the Zimbabwe stock market is calculated as the average of the log difference in monthly stock market price indexes of both the industrial and mining index. Market returns are value-weighted market returns including dividends (Boyer & Zheng, 2009).

**Market capitalization ( $\Delta \text{ LN MCAP}$ ):** It is measured as natural log difference of the monthly change in the capitalization of the Zimbabwean Stock Exchange.

**Volatility ( $\text{LN } \Delta \text{ ZSEVOL}$ ):** This will be measured as natural log difference of monthly volatility of stock returns, (month-on-month) being given by the moving average of the standard deviation of the monthly changes in the return on stocks for a one year period.

**Change in exchange rate ( $\Delta \text{EXCH}$ ):** It is measured as the monthly change in the exchange rate of the US dollar to major currencies. The major currencies are from the Euro- Area, Canada and Japan as published by the Federal Reserve of St Louis.

**Foreign portfolio flows (PF):** Foreign portfolio flows are separated into monthly anticipated and unanticipated portfolio flows. The expected foreign portfolio flows in month  $t$  is given as the difference between actual portfolio flows and unexpected flows. Since the behaviour of foreign portfolio flows is not established or known, the anticipated flows is estimated by modelling actual portfolio flows using the autoregressive integrated moving average (ARMA) model and taking the residuals of ARMA as unanticipated flows, this technique was adopted from Nyangoro (2013), who replicated the approach by Wei (2009) used in estimating the unexpected component of inflation by including lagged unemployment to predict inflation.

**World equity market index (MSCI):** It is proxied by returns in Morgan Stanley Capital Investment (MSCI) World all Equities Index. This will be calculated as log difference in monthly MSCI all equities price index.

**3 Month - London Interbank Offer Rate ( $\Delta$ LIBOR):** It is measured as the monthly change in the 3 Month- LIBOR.

### **3.6 Estimation procedures**

Since the APT posits that the stock returns can be explained by reference to the changes, expected and unexpected components of the macroeconomic variables rather than their levels. The first stage is to generate a set of changes or differences for each of the variables. The researcher will use ARMA model to decompose portfolio flows into expected and unexpected components. ARMA model follows the Box Jenkins methodology in its build-up and will use autocorrelations and partial autocorrelation coefficients to select the appropriate ARMA model for foreign portfolio flows. Box Jenkins methodology, (1976) follows four procedures, identification, estimation, diagnostic checking and forecasting. This is because the behavior of foreign flows is unknown. The residuals of the ARMA model will be used as unexpected foreign flows. Unit root tests will be done on the variables to establish their stationarity nature. Finally before the least squares regression can be applied the variables are tested for colinearity, cointegration and heteroskedascity as they apply to tests done on time series data.

### **3.6.1 ARMA modeling of Net Portfolio flows**

Since the behavior of portfolio flows was not known the researcher used ARMA to model net portfolio flows, and took the residuals of the valid ARMA framework as unexpected flows. Using a correlogram both Autocorrelation and Partial Correlation coefficients (ACF, PACF respectively) are tested for significance at various lags. The rejection criteria is  $(\pm 1.96 * 1/\sqrt{t})$ , where  $t$  is the number of observations (Brooks, 2008). To select the valid model, the researcher will choose one with the least values for the Akaike Info Criterion (AIC) and the Schwarz Criterion (SBC) from the ones with significant ACF and PACF (Brooks, 2008).

### **3.6.2 Unit Root Tests**

A unit root test will be carried for all variables in the multi factor index model. The tests will be done on the trend and intercept for up to 12 lags which is widely considered as the maximum optimal possible since the researcher is using monthly data. Stationary of variables used in regression model is critical to avoid the formation of spurious regressions. If any variables are non-stationary treatment of them to induce stationarity will be made. The null hypothesis is rejected if the test statistic is larger than the critical values at given levels of significance.

### **3.6.3 Multi-collinearity Test**

The researcher will identify multi-collinearity by the Variance Inflation factor (VIF), which is a statistic calculated for each variable in a model. We accept the null of multicollinearity when the VIF is greater than 5. According to, Brooks (2008), multicollinearity rarely affects the model but rather the data and is more common when the data is for the short-run. Since this is considered a less worrying phenomenon than non stationarity, treatment, dropping non-stationary variables or ignoring them is optional to the discretion of the researcher.

### **3.6.4 Co-integration**

The cointegration test will be carried out to see if the variables have a linear combination that is stationary. The test is carried out by the testing the unit root of the residual using Engle-Granger (AEG) tests in Eviews 7. When cointegration exists then there is a long run relationship between

the variables under study. Thus, the model is considered to give reliable forecast estimates. The researcher will use the tau and z-statistics to determine if the variables are stationary.

$H_0$ : The series are not cointegrated

$H_1$ : The series are cointegrated

Also cointegration can be determined by the stationarity of residuals, the null and alternative hypotheses for any unit root test applied to the residuals of a potentially cointegrating regression are;

$H_0$  : residuals  $(\hat{u}_t) \sim I(1)$

$H_1$  : residuals  $(\hat{u}_t) \sim I(0)$ .

Under the null hypothesis there is a unit root in the regression residuals, while under the alternative, the residuals are stationary. Under the null hypothesis, there is no stationary linear combination of the variables. Hence, if this null hypothesis is not rejected, there is no cointegration (Brooks, 2008). However, modified critical values are required since the test is now operating on the residuals of an estimated model rather than on raw data. The residuals are constructed from a specific set of coefficient estimates, and the sampling estimation error in those coefficients will change the distribution of the test statistic.

### **3.6.5 Heteroskedasticity**

Heteroskedasticity is observed when the residuals associated with a regression analysis are not equal thus, the error variance associated with the model is equal across all levels of the independent variable. The researcher will use White Test to test data for heteroskedasticity..

Where the hypotheses are;

$H_0$  : Data is homoskedastic

$H_1$  : Data is heteroskedasticity



### **3.7 Summary**

This chapter discussed the research design, sources of data as well as types of data. Its focus was on giving an insight into the methodology used in conducting the research. The proper combination of the variables, data collection procedures, presentation, analysis and interpretation was considered to be of critical importance in the research study because of its contribution to yielding credible results.

## **CHAPTER 4: DATA PRESENTATION AND ANALYSIS**

## 4.1 Introduction

This chapter focuses on the presentation and analysis of the data calculated using the model mentioned in Chapter 3. It is an in-depth analysis of data where quantitative analysis techniques are employed. Data presentation is done using tables and graphs to give a vivid impression and facilitate easy of analysis. The first part includes descriptive analysis of data, as well as diagnostic tests.

## 4.2 Diagnostic Test

In computing the Arbitrage Pricing Theory (APT) regression model which was employed in this study, the following relevant procedural tests were carried out;

### 4.2.1 Unit Root Tests

The researcher carried out stationarity tests on all variables. Table 4.1 is a summary of various the test results of Augmented Dickey Fuller (ADF). The researcher concluded that all the variables are stationary at I(0).

**Table 4.1 Summary unit root test**

Variable	ADF Statistics	Critical Values	Order of cointegration
ZSE_RETURN	-6.962392	1% -3.550396 5% -2.913549 10% -2.594521	I(0)
ZSEVOL	-7.856046	1% -3.5527 5% -2.9145 10% -2.5950	I(0)
CHANGE __PF_UT-1	- 8.552659	1% -4.133838 5% -3.493692 10% -3.175693	I(0)
CHANGE PF_AT	-4.209129	1% -4.130526 5% -3.492149 10% -3.174802	I(0)

CHANGE PF_UT	-8.688963	1% -4.130526 5% -3.492149 10% -3.174802	I(0)
CHANGE_MCAP	-7.696319	1% -3.5504 5% -2.9135 10% -2.5945	I(0)
CHANGE_LIBOR	-7.755034	1% -3.55502 5% -2.9155 10% -2.5957	I(0)
EXCH	-5.644761	1% -4.127338 5% -3.490662 10% -3.173943	I(0)
INFL	-7.716677	1%-4.127338 5%-3.490662 10%-3.173943	I(0)
MSCI_RET	-7.786375	1%-4.127338 5%-3.490662 10%-3.173943	I(0)
RESIDUAL	-7.590993	1%-3.562669 5%-2.918778 10%-2.597285	I(0)

Source: Raw Data

Where; ZSE\_RETURN is Return, LN MCAP is change in natural logarithm of Market capitalization, LN  $\Delta$  ZSEVOL is change in natural logarithm of Volatility,  $\Delta$ EXCH monthly change in exchange rate,  $\Delta$ LIBOR is change in 3 Month - London Interbank Offer Rate,  $\Delta$ INFL monthly change in inflation, LN  $\Delta$  IF<sub>t</sub> change in natural logarithm of domestic capitalization at month t. PF<sub>at</sub> anticipated portfolio flows at month t. PF<sub>ut</sub> unanticipated portfolio flows at month t. PF<sub>t-1</sub> is lagged portfolio flows

#### **4.2.4 Co-integration**

The cointegration test was carried out to see if the variables have a linear combination that is stationary. The test is carried out by the testing of unit root of the residual using Engle-Granger (AEG) tests in Eviews 7. When cointegration exists then there is a long run relationship between the variables under study. Thus, the model is considered to give reliable forecast estimates, indicating vividly the existence of cointegration.

Also cointegration was also confirmed by the stationarity of residuals. However, modified critical values are required since the test is now operating on the residuals of an estimated model rather than on raw data. The residuals are constructed from a specific set of coefficient estimates, and the sampling estimation error in those coefficients will change the distribution of the test statistic. The test statistic is -7.591 (refer appendix table A9) which rejects the null critical value from the Engle Granger and Yoo (1987) table. Therefore, residuals are stationary thus, making the forecast value obtained using the model statistically and economically reliable for the long run.

#### **4.2.3 Multicollinearity**

Multi-collinearity causes large standard errors in estimating the coefficients. In simpler terms it causes the estimated t-statistics for correlated or multi-collinear variables to be insignificant, thus resulting in significant variables to appear to be insignificant. The researcher identified multi-collinearity by the Variance Inflation factor (VIF), which is a statistic calculated for each variable in a model. We accept the null when the VIF is greater than 5. Based on the results (table A13 appendices) the variable with the highest VIF is inflation with 3.105 hence the researcher rejected the null and concluded the research is free from multicollinearity.

#### **4.2.4 Autocorrelation**

The Durbin Watson test was used to test for the presence of serial autocorrelation of errors. Serial autocorrelation violates one of the fundamental assumptions needed for least squares regression which is independence of errors. Durbin-Watson Statistic is a measure used to detect such correlations. Every model has one measure for Durbin-Watson statistic. Durbin-Watson Statistic, ranges in value from 0 to 4 with an ideal value of 2 indicating that errors are not correlated, however values from 1.75 to 2.25 may be considered acceptable. A value

significantly below 2 indicates a positive correlation and a value significantly greater than 2 suggests negative correlation.

Thus, the Dublin Watson test statistic of 2.056971 of the model (refer to appendices table A12) lies in the zone of no autocorrelation. The researcher concluded that there was no autocorrelation in the model and thus the model is valid.

#### **4.2.5 Heteroskedasticity**

Simplified, heteroskedasticity is observed when the residuals associated with a regression analysis are not equal thus, the error variance associated with the model is equal across all levels of the independent variable. The researcher used White Test to test data for heteroskedasticity. The results show, p- values greater than 0.05 (i.e least being 0.0967) which leads to acceptance of the null of homoskedastic data. Also the F statistic is 1.821 which is insignificant as it is less than the F critical 2.143, therefore it is concluded that the data is homoscedastic.

#### **4.2.6 Autocorrelation and Partial Correlation coefficients (ACF, PACF)**

Since the Arbitrage Pricing theory uses expected and unexpected components of explanatory variables the researcher chose to model behavior of portfolio flows was not known the researcher used ARMA to model net portfolio flows, and took the residuals of the valid ARMA framework as surprise flows. From the table A14 in appendices both Autocorrelation and Partial Correlation coefficients (ACF, PACF respectively) are significant only for the 1<sup>st</sup> lag. For Autocorrelation ( $\pm 0.2596$ ) is the rejection criteria using ( $\pm 1.96 * 1/\sqrt{57}$ ), where 57 is the number of observations (Brooks, 2008). According to Brooks (2008), the model suitable in this situation is AR (1) since PACF is only significant at lag 1 the valid model should not have Moving Average (MA).

To validate the model selected, the researcher chose to use the Akaike Info Criterion (AIC) and the Schwarz Criterion (SBC). This was done by calculating the AIC and SBC for several ARMA model and picking the one with the least values for these indexes. According to C. Brooks (2008) the best ARMA model is the one with the least AIC and SBC. Using this technique AR(1) had the least values compared to all worked down from (5,5) the ARMA (1,1) had the second smallest values as shown below table A16 - 18 in appendices.

### 4.3 Data Presentation

Having done all procedural tests the following findings were made;

#### 4.3.1 Granger Test

In this test the researcher did not separate portfolio flows into surprise and expected flows as the objective was to determine the direction of causality between returns and foreign flows. Surprise and anticipated flows are derived from net foreign flows. Using the Granger test we do not reject the null that the natural logarithm of net foreign portfolio flows does not Granger cause stock market returns at 10 per cent. However, we reject the null that stock returns does not granger cause net foreign portfolio flows at 10 per cent (p-value 0.05966). These results are confirmed by an *F*-test of Granger non-causality of the variables presented in (Table A.21). The Granger causality establishes whether there is any feedback effect between returns and standardized flows. This shows that investment by foreigners may be for return purposes rather than for hedging, which seems to be logical considering that foreigners seem to be skeptical about investing on the local bourse given the negative correlation of anticipated foreign flows with stock return (Table A.12).

The tested hypotheses were,

$H_{0i}$  -LN Net foreign portfolio flow does not Granger cause stock market returns

$H_{1i}$  -LN Net foreign portfolio flow Granger causes stock market returns

$H_{0ii}$  – Stock market returns does not Granger cause LN Net foreign portfolio flow

$H_{1ii}$ - Stock market returns Granger causes LN Net foreign portfolio flow

From the p- values at the 10% significance  $H_{1ii}$  is accepted.

#### 4.3.2 Regression of Stock Returns to Net Foreign flows and other variables

After regressing the R squared was over 70% which means the dependent variable in the model is well explained. The adjusted R squared shows the model explains approximately 65% of the variations after taking into account the degrees of freedom. The probability of the F-statistic tests

the significance of the whole model and it is significant since it is less than 0.05, also the F-statistic is significant because it is greater than 5 (refer to appendices table A12).

**Table 4.3 Regression Results**

<b>Variable</b>	<b>T-stat</b>
PF_UT	1.991771
CHANGE_MCAP	6.934879
CHANGE_LIBOR	2.042230
EXCH	-2.261812
MSCI_RET	1.767076

Source: Raw Data

The results show that expected flows affect stock market returns with an elasticity of about -0.02. Unexpected flows have a positive effect on stock market returns with an elasticity of 0.03 that is highly significant at 5%, however at first lag the elasticity drops to -0.02 and becomes insignificant. The results show, a 1 per cent increase in unexpected flow leads to 0.03 per cent increase in stock market returns. The results present the likelihood of positive contemporaneous relation between foreign unexpected portfolio flows and stock market returns. The presence of positive and significant relation between contemporaneous foreign flows and stock market returns depicts existence of positive feedback trading and a positive autocorrelation between foreign flows and returns (Boyer and Zheng, 2009).

The stock market returns are elastic to the change in natural log of market capitalization and change, with the coefficient being highly significant even up to the 1% level. Though stock market returns are inelastic to the change in LIBOR at 0.003 the correlation is significant at the 5% level. This implies that activity in the stock market, and hence the market return, will improve with improvements in stock market capitalization and with increase in risk free rate proxied by LIBOR. Twerefou and Nimo (2005), however found a negative relation of unexpected short term interest rate to stock market returns using industry level data in Ghana. This was not the expected behaviour, but they attribute it to particular inefficiencies in the market. Change in exchange rate, has a negative coefficient of -0.02. Depreciation of the currency reduces the market dollar value of domestic equities and erodes investors' wealth at the stock market, thereby resulting to a fall in stock returns.

Based on the empirical results, expected foreign flows have negative insignificant effect on returns. However the coefficient of unexpected flows is positive and highly significant indicating that as unexpected flows increase the market return is adjusted upwards by the value of this coefficient. This presents the likelihood of the base-broadening hypothesis that as the size of the investor base broadens, market prices rise. However, the significance of this possible effect will be examined further.

Since unexpected flows are significant initially, the researcher used lagged unexpected flows to check whether unexpected flows have a temporary effect on returns. The results show that lagged unexpected flows become insignificant after one month, which tends to support the price-pressure hypothesis that unanticipated flows will initially increase prices but the prices revert back to reflect prior the state of the market. Based on empirical results past returns do not significantly affect current returns. This may be explained by the fact that information on past returns are already taken into account by foreign investors making their actual investment decisions.

The returns are determined by world stock market index though the coefficient is a positive 0.33 it is significant at the 10% level (t stat greater than 1.66), showing a medium level of integration to the world market. Similar to findings by Nyangoro (2013) the researcher also failed to establish the impact of certain macroeconomic variables known to affect returns, such as, inflation. Wei (2009), suggested that using the market index aggregates individual stock returns with different sensitivities to unexpected inflation and may result in weaker aggregate response to inflation news.

#### **4.3.3 Base broadening and Price Pressure Hypothesis**

The researcher carried out the test for base-broadening hypothesis by putting Walds restrictions on coefficients of expected and unexpected flows (refer appendix table A19), that is,  $H_0: \gamma_1 + \gamma_2 = 0$  against  $H_1: \gamma_1 + \gamma_2 > 0$ , thus, testing that the sum of coefficients of expected and unexpected flows is equal to zero. Using the F-test where  $F(1,46) = 0.021684$ , implies rejection of restricted model which is the null hypothesis at 5 per cent level (i.e., less than 4.052). Therefore the



researcher rejected the null and concluded that sum of the coefficients are not equal to zero. The unrestricted model holding implies that the base-broadening hypothesis holds (Nyangoro, 2013).

In testing the price-pressure hypothesis, the researcher tested if the coefficient of lagged unexpected flows is zero or negative (refer appendix table A20), that is,  $H_0: \gamma_3 = 0$  is tested against  $H_1: \gamma_3 < 0$ . Using the F-test where  $F(1,46) = 0.745822$ , implies rejection of the null hypothesis at 5 per cent level (i.e., less than 4.052) and concludes that price pressure exists and is significant at 5 per cent level. The results imply that increase in the number of foreign investors will tend to push up stock prices as demand increases, thereby increasing stock market returns. However, the price increase due to foreign portfolio inflows is later reverted when the impact of foreign entry in the market has been factored in stock prices.

#### **4.4 Summary**

The researcher analyzed the data, basing on the cited research hypotheses. The critical findings made by this chapter were that on the ZSE the unexpected foreign flows have a significant impact on returns relative to contemporaneous expected flows. The lagged unexpected flows become insignificant after one month. The behavior of foreign portfolio flows significantly meets the price pressure and very highly significantly the base broadening hypothesis. The analysis laid the foundation for conclusions and recommendations to be made in the next chapter.

## **CHAPTER 5: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

### **5.1 Introduction**

This chapter seeks to summarize and conclude the study, as well as make recommendations based on the results presented and the related theory covered in the literature review. It focuses

on showing a clear understanding of the research problem by carefully linking the recommendations to the findings and, in the process, addressing the hypotheses of the study.

## **5.2 Summary**

The basic objective of this research paper was to assess the impact of foreign portfolio flows on the performance Zimbabwe Stock Exchange during the study period. In pursuing this major objective the study also determined the granger causality between foreign flows and returns, the behaviour patterns shown by foreign investors on the local bourse and assessed the impact that certain foreign investor behavior has on stock performance measured by stock return. The general consensus in the literature was that the price of risk in the domestic market exceeds the price of risk on international markets hence the equity premium is expected to fall when an emerging country opens its stock market to foreigners, leading to a fall in the aggregate cost of equity capital and an increase of the equity price index. The research methodology in this study was based on quantitative analytics the data that was collected mostly from websites of the Reserve Bank of Zimbabwe, US Federal Bank, and from the Zimbabwe Stock Exchange. The study was undertaken for the reference period of approximately five years from 2009-13. The researcher also went on to analyse the data that was gathered in order to come up with viable analyses. The gathered information was analyzed using tables as a way of giving a clear view of the results that were found from the research. The key results of the study points out that participation of foreign investors has an effect on domestic stock market returns and that stock market return is mainly affected by unexpected flows and not significantly by the contemporaneous value of expected flows. The price pressure hypothesis is supported, with security prices revised by lags. The base-broadening hypothesis holds, hence, the amount of foreign investment in the market drives up returns and hence performance of the market. Macroeconomic factors, especially the change in exchange rate and risk free rate, are important in determining returns.

## **5.3 Conclusions**

- ❖ Causality only runs from returns to portfolio flows. Foreign investors are therefore, mainly attracted in the market for returns rather than risk diversification and hedging

purposes. This further augments the researcher's assertion that foreign investors are not entirely confident on the ZSE.

- ❖ The stock market return is affected by contemporaneous unexpected flows and not by its lagged value. The price pressure hypothesis is supported, with the positive relation impact on security prices becoming non-significant with a lag in unexpected flows. The base-broadening hypothesis is also supported even though, the coefficient of contemporaneous expected flows are negative contemporary unexpected flows have a highly significant positive coefficient. Therefore, the volume of foreign investment in the stock market increases returns and hence performance of the market.
- ❖ The negative relation of contemporaneous expected flows is associated to low foreign investor confidence. Foreign portfolio flows push stock prices up when they come in which may be due to increased demand. Prices respond less significantly to successive period's unexpected flows.

## **5.4 Recommendations**

Based on the research findings and conclusions the researcher recommends the following;

### **5.4.1 Maintenance of dollarisation**

Since the researcher found exchange rate stability to have a significant positive effect on returns, he believes that it is not prudent for the government to consider the introduction of the Zimbabwe dollar until certain socio-economic conditions have been met, including the restoration of public confidence in the RBZ. The maintenance of dollarisation is critical since it helped lower inflation and interest rates also it reduces conversion fees and the risk of devaluation for foreign participation on the local bourse. As stated in the Mid Term Plan by the Ministry of Finance, we expect government to maintain dollarisation at least up to 2015. This credibility and predictability promotes foreign investment.

### **5.4.2 Intergration and stimulation of foreign participation**

Since empirical evidence shows, net portfolio flows to increase stock returns, the researcher recommends that regulators find ways to increase foreign investor participation. Though the

turnover ratio for foreign purchases increased from 0.48% in June 2009 to 1.31% in January 2014 foreign participation on the ZSE still lags behind other regional counters and can still significantly increase. However, it is primal that increased foreign participation be realised with stable inflows, because though inflows in net equity flow has a decreasing impact on return volatility, an outflow of net equity has an increasing impact on volatility of stock returns (Umtulu, Akdeniz, Altay-Salih, 2006).

#### **5.4.3 Favourable negotiations on the indiginasition policy**

Policies especially on indigenisation and empowerment are likely to give sway on the extent of the funds availed for investment locally. According to African Development Bank (AfDB) the indigenization policy has been a major determinant of confidence by foreign investors in the local economy since it gathered momentum in 2011. Since the researcher concluded foreign investor confidence to be low as signified by the insignificance of contemporary expected portfolio flows, he suggests favourable negotiation of the indigenisation bill to result in an increase in business confidence and consequently longer term investment.

#### **5.4.4 Improve liquidity**

Since the researcher found market capitalization to have a significant impact on returns and by causality also net portfolio flows, he suggests the improvement of liquidity to improve portfolio flows. The liquidity crunch affects investment decisions of both local and foreign investors as it became difficult to buy and sell stocks with ease. Hence the researcher expects improvements in liquidity to improve foreign investor participation and market capitalization.

#### **5.4.5 Demutualization of the ZSE**

To enhance accountability in the manner in which ZSE is run, the researcher suggests the implementation of plans to demutualise the bourse. Demutualization refers to the transformation of a member-owned stock exchange into a shareholder stock exchange (Mpofu, 2011). Demutualization reduces likelihood of cartel formations which can dictate affairs on the bourse, and pose credibility crises. Once the bourse lacks investor confidence it would struggle to attract more investors.

#### **5.5 Suggestion for future research**

It is proposed that since this research was carried out for aggregate returns complementary studies of impact of foreign flows be carried out for individual returns. Specifically the

researcher suggests studying for the impact of foreign equity flow on the individual stock return volatility. The stock return volatility should be decomposed into components like global volatility to account for global market volatility, local volatility to account for volatility on the domestic front and idiosyncratic volatility to account for volatility component of individual firm's returns. Decomposing volatility into varying components would be meant to account for the partially segmented nature of markets due to globalization and intergration (Umtulu, Akdeniz, Altay-Salih, 2006).

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## APPENDICES

### Appendix A

#### STATIONARITY TESTS

##### Table A1 ZSE Returns

Null Hypothesis: AVERAGE\_ZSE\_RETURN has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=10)

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	t-Statistic	Prob.*
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Augmented Dickey-Fuller test statistic		-6.962392	0.0000
Test critical values:	1% level	-3.550396	
	5% level	-2.913549	
	10% level	-2.594521	

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

Augmented Dickey-Fuller Test Equation  
 Dependent Variable: D(AVERAGE\_ZSE\_RETURN)  
 Method: Least Squares  
 Date: 05/01/14 Time: 17:28  
 Sample (adjusted): 2009:04 2013:12  
 Included observations: 57 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AVERAGE_ZSE_RETURN(-1)	-0.927502	0.133216	-6.962392	0.0000
C	0.004297	0.018140	0.236881	0.8136
R-squared	0.468470	Mean dependent var		0.001797
Adjusted R-squared	0.458806	S.D. dependent var		0.186129
S.E. of regression	0.136928	Akaike info criterion		-1.104272
Sum squared resid	1.031204	Schwarz criterion		-1.032586
Log likelihood	33.47175	Hannan-Quinn criter.		-1.076412
F-statistic	48.47491	Durbin-Watson stat		1.550665
Prob(F-statistic)	0.000000			

### Table A2 ZSE Volatility

Null Hypothesis: ZSEVOL\_MONTH\_ON\_MONTH\_SD has a unit root  
 Exogenous: Constant  
 Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.856046	0.0000
Test critical values:	1% level	-3.552666
	5% level	-2.914517
	10% level	-2.595033

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

Augmented Dickey-Fuller Test Equation  
 Dependent Variable: D(ZSEVOL\_MONTH\_ON\_MONTH\_SD)  
 Method: Least Squares  
 Date: 05/01/14 Time: 17:40  
 Sample (adjusted): 2009:05 2013:12  
 Included observations: 56 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ZSEVOL_MONTH_ON_MONTH_SD(-1)	-0.879731	0.111981	-7.856046	0.0000

	C	0.076938	0.014739	5.220127	0.0000
R-squared		0.533346	Mean dependent var		-0.008381
Adjusted R-squared		0.524704	S.D. dependent var		0.108157
S.E. of regression		0.074566	Akaike info criterion		-2.319214
Sum squared resid		0.300241	Schwarz criterion		-2.246880
Log likelihood		66.93800	Hannan-Quinn criter.		-2.291171
F-statistic		61.71745	Durbin-Watson stat		1.742641
Prob(F-statistic)		0.000000			

Table A.3 Change in Market Capitalisation

Null Hypothesis: CHANGE\_MCAP has a unit root  
 Exogenous: Constant  
 Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.696319	0.0000
Test critical values:		
1% level	-3.550396	
5% level	-2.913549	
10% level	-2.594521	

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

Augmented Dickey-Fuller Test Equation  
 Dependent Variable: D(CHANGE\_MCAP)  
 Method: Least Squares  
 Date: 05/01/14 Time: 18:00  
 Sample (adjusted): 2009:04 2013:12  
 Included observations: 57 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CHANGE_MCAP(-1)	-1.043070	0.135528	-7.696319	0.0000
C	65172793	48236800	1.351101	0.1822
R-squared	0.518529	Mean dependent var		-10455539
Adjusted R-squared	0.509775	S.D. dependent var		5.09E+08
S.E. of regression	3.57E+08	Akaike info criterion		42.25627
Sum squared resid	6.99E+18	Schwarz criterion		42.32795
Log likelihood	-1202.304	Hannan-Quinn criter.		42.28413
F-statistic	59.23332	Durbin-Watson stat		1.828880
Prob(F-statistic)	0.000000			

Table A.4 Change in LIBOR

Null Hypothesis: CHANGE\_LIBOR has a unit root  
 Exogenous: Constant  
 Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*

Augmented Dickey-Fuller test statistic		-7.755034	0.0000
Test critical values:	1% level	-3.550396	
	5% level	-2.913549	
	10% level	-2.594521	

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

Augmented Dickey-Fuller Test Equation  
 Dependent Variable: D(CHANGE\_LIBOR)  
 Method: Least Squares  
 Date: 05/01/14 Time: 18:09  
 Sample (adjusted): 2009:04 2013:12  
 Included observations: 57 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CHANGE_LIBOR(-1)	-1.046978	0.135006	-7.755034	0.0000
C	1.503707	0.989395	1.519825	0.1343
R-squared	0.522323	Mean dependent var		-0.041529
Adjusted R-squared	0.513638	S.D. dependent var		10.49147
S.E. of regression	7.316719	Akaike info criterion		6.852659
Sum squared resid	2944.391	Schwarz criterion		6.924345
Log likelihood	-193.3008	Hannan-Quinn criter.		6.880518
F-statistic	60.14055	Durbin-Watson stat		1.980597
Prob(F-statistic)	0.000000			

Table A.5 Exchange rate.

Null Hypothesis: \_\_EXCH has a unit root  
 Exogenous: Constant, Linear Trend  
 Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.644761	0.0001
Test critical values:	1% level	-4.127338
	5% level	-3.490662
	10% level	-3.173943

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

Augmented Dickey-Fuller Test Equation  
 Dependent Variable: D(\_\_EXCH)  
 Method: Least Squares  
 Date: 05/01/14 Time: 18:17  
 Sample (adjusted): 2009:04 2013:12  
 Included observations: 57 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
__EXCH(-1)	-0.731799	0.129642	-5.644761	0.0000
C	-0.576419	0.312292	-1.845773	0.0704
@TREND(2009:03)	0.016478	0.009321	1.767796	0.0827

R-squared	0.371411	Mean dependent var	-0.005307
Adjusted R-squared	0.348130	S.D. dependent var	1.377569
S.E. of regression	1.112229	Akaike info criterion	3.101804
Sum squared resid	66.80083	Schwarz criterion	3.209333
Log likelihood	-85.40143	Hannan-Quinn criter.	3.143594
F-statistic	15.95334	Durbin-Watson stat	1.868973
Prob(F-statistic)	0.000004		

**Table A.6 Anticipated Portfolio Flows**

Null Hypothesis: PF\_AT has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.209129	0.0081
Test critical values:		
1% level	-4.130526	
5% level	-3.492149	
10% level	-3.174802	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(PF\_AT)

Method: Least Squares

Date: 05/01/14 Time: 18:26

Sample (adjusted): 2009:05 2013:12

Included observations: 56 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PF_AT(-1)	-0.474610	0.112757	-4.209129	0.0001
C	0.611132	0.180241	3.390631	0.0013
@TREND(2009:03)	-0.007400	0.003842	-1.925851	0.0595

R-squared	0.251897	Mean dependent var	0.005968
Adjusted R-squared	0.223667	S.D. dependent var	0.488209
S.E. of regression	0.430160	Akaike info criterion	1.202763
Sum squared resid	9.806979	Schwarz criterion	1.311263
Log likelihood	-30.67735	Hannan-Quinn criter.	1.244828
F-statistic	8.922935	Durbin-Watson stat	2.132292
Prob(F-statistic)	0.000457		

**Table A.7 Lagged unanticipated Portfolio Flows**

Null Hypothesis: \_T\_1\_\_PF\_UT has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-8.552659	0.0000
Test critical values:		
1% level	-4.133838	

5% level -3.493692  
 10% level -3.175693

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

Augmented Dickey-Fuller Test Equation  
 Dependent Variable: D(\_T\_1\_\_PF\_UT)  
 Method: Least Squares  
 Date: 05/01/14 Time: 18:30  
 Sample (adjusted): 2009:06 2013:12  
 Included observations: 55 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
_T_1__PF_UT(-1)	-1.165737	0.136301	-8.552659	0.0000
C	0.419088	0.207045	2.024137	0.0481
@TREND(2009:03)	-0.013407	0.006136	-2.184854	0.0334
R-squared	0.584500	Mean dependent var		0.009203
Adjusted R-squared	0.568519	S.D. dependent var		1.064911
S.E. of regression	0.699510	Akaike info criterion		2.176127
Sum squared resid	25.44431	Schwarz criterion		2.285618
Log likelihood	-56.84350	Hannan-Quinn criter.		2.218468
F-statistic	36.57525	Durbin-Watson stat		2.011929
Prob(F-statistic)	0.000000			

Table A.8 Unanticipated Portfolio Flows

Null Hypothesis: PF\_UT has a unit root  
 Exogenous: Constant, Linear Trend  
 Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-8.688963	0.0000
Test critical values:		
1% level	-4.130526	
5% level	-3.492149	
10% level	-3.174802	

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

Augmented Dickey-Fuller Test Equation  
 Dependent Variable: D(PF\_UT)  
 Method: Least Squares  
 Date: 05/01/14 Time: 18:42  
 Sample (adjusted): 2009:05 2013:12  
 Included observations: 56 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PF_UT(-1)	-1.168553	0.134487	-8.688963	0.0000
C	0.412644	0.197353	2.090889	0.0413
@TREND(2009:03)	-0.013740	0.005896	-2.330149	0.0236

R-squared	0.587822	Mean dependent var	-0.004185
Adjusted R-squared	0.572268	S.D. dependent var	1.059931
S.E. of regression	0.693207	Akaike info criterion	2.157108
Sum squared resid	25.46843	Schwarz criterion	2.265609
Log likelihood	-57.39902	Hannan-Quinn criter.	2.199173
F-statistic	37.79263	Durbin-Watson stat	2.019584
Prob(F-statistic)	0.000000		

**Table A.9 MSCI Return**

Null Hypothesis: MSCI\_RET has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.786375	0.0000
Test critical values:		
1% level	-4.127338	
5% level	-3.490662	
10% level	-3.173943	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(MSCI\_RET)

Method: Least Squares

Date: 05/01/14 Time: 18:49

Sample (adjusted): 2009:04 2013:12

Included observations: 57 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MSCI_RET(-1)	-0.979628	0.125813	-7.786375	0.0000
C	0.032851	0.015877	2.069089	0.0433
@TREND(2009:03)	-0.000553	0.000470	-1.176493	0.2446

R-squared	0.530446	Mean dependent var	0.003087
Adjusted R-squared	0.513056	S.D. dependent var	0.083478
S.E. of regression	0.058252	Akaike info criterion	-2.796874
Sum squared resid	0.183239	Schwarz criterion	-2.689345
Log likelihood	82.71092	Hannan-Quinn criter.	-2.755085
F-statistic	30.50142	Durbin-Watson stat	1.832815
Prob(F-statistic)	0.000000		

**Table A.10 Residual**

Null Hypothesis: D(RESID) has a unit root

Exogenous: Constant

Lag Length: 2 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.590993	0.0000
Test critical values:		
1% level	-3.562669	

5% level -2.918778  
 10% level -2.597285

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(RESID,2)

Method: Least Squares

Date: 04/29/14 Time: 12:56

Sample (adjusted): 2009:09 2013:12

Included observations: 52 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RESID(-1))	-2.641327	0.347955	-7.590993	0.0000
D(RESID(-1),2)	0.824366	0.251766	3.274332	0.0020
D(RESID(-2),2)	0.267465	0.125012	2.139509	0.0375
C	0.001540	0.008778	0.175453	0.8615
R-squared	0.807751	Mean dependent var		0.000865
Adjusted R-squared	0.795736	S.D. dependent var		0.139958
S.E. of regression	0.063255	Akaike info criterion		-2.609484
Sum squared resid	0.192057	Schwarz criterion		-2.459389
Log likelihood	71.84660	Hannan-Quinn criter.		-2.551941
F-statistic	67.22550	Durbin-Watson stat		2.046070
Prob(F-statistic)	0.000000			

Appendix B

Cointegration Test

Table A.11 Engle Granger Test

Date: 04/29/14 Time: 12:48

Series: AVERAGE\_ZSE\_RETURN MSCI\_RET CHANGE\_LIBOR CHANGE\_PF\_AT CHANGE\_PF\_UT \_\_EXCH \_\_INFL ZSEVOL\_MONTH\_ON\_MONTH\_SD

\_\_LN\_MCAP\_\_DIFFERENCE\_\_

Sample (adjusted): 2009:05 2013:12

Included observations: 56 after adjustments

Null hypothesis: Series are not cointegrated

Cointegrating equation deterministics: C

Automatic lags specification based on Schwarz criterion (maxlag=10)

Dependent	tau-statistic	Prob.*	z-statistic	Prob.*
ZSE_RETURN	-8.717929	0.0001	-60.50745	0.0002
MSCI_RET	-8.172269	0.0003	-60.53580	0.0002
CHANGE_LIBOR	-8.148289	0.0003	-60.64615	0.0002
CHANGE_PF_AT	-6.590122	0.0131	-49.06791	0.0116
CHANGE_PF_UT	-8.083294	0.0003	-60.23162	0.0003
__EXCH	-5.740818	0.0744	-41.53586	0.0716
__INFL	-7.155457	0.0035	-52.08086	0.0048
ZSEVOL	-6.247814	0.0274	-46.34035	0.0238
__LN_MCAP__DIFFERENCE__	-9.387109	0.0000	-67.28423	0.0000

\*MacKinnon (1996) p-values.



Intermediate Results:

	AVERAGE_ZS E RETURN	MSCI_RET	CHANGE_LI BOR	CHANGE_PF AT	CHANGE_PF UT	EXCH	INFL	ZSEVOL_MO NTH_ON_M ONTH_SD	_LN_MCAP _DIFFEREN CE
Rho - 1	-1.100135	-1.100651	-1.102657	-0.892144	-1.095120	-0.755197	-0.946925	-0.842552	-1.223350
Rho S.E.	0.126192	0.134681	0.135324	0.135376	0.135479	0.131549	0.132336	0.134855	0.130322
Residual variance	0.002995	0.002351	44.31320	0.101915	0.475222	0.889656	1.20E-05	0.004369	0.001466
Long-run residual variance	0.002995	0.002351	44.31320	0.101915	0.475222	0.889656	1.20E-05	0.004369	0.001466
Number of lags	0	0	0	0	0	0	0	0	0
Number of observations	55	55	55	55	55	55	55	55	55
Number of stochastic trends**	9	9	9	9	9	9	9	9	9

\*\*Number of stochastic trends in asymptotic distribution

## Appendix C

### Regression Results

#### Table A12 Regression

Dependent Variable: AVERAGE\_ZSE\_RETURN

Method: Least Squares

Date: 05/01/14 Time: 16:39

Sample (adjusted): 2009:05 2013:12

Included observations: 56 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.011207	0.028310	0.395869	0.6941
ZSEVOL_MONTH_ON_MONTH_SD	-0.121564	0.140340	-0.866216	0.3910
_T_1__PF_UT	0.018203	0.022281	0.816978	0.4182
PF_AT	-0.024153	0.028934	-0.834769	0.4083
PF_UT	0.028850	0.014485	1.991771	0.0525
CHANGE_MCAP	2.31E-10	3.34E-11	6.934879	0.0000
CHANGE_LIBOR	0.002849	0.001395	2.042230	0.0470
__EXCH	-0.021416	0.009468	-2.261812	0.0286
__INFL	-3.829466	2.745355	-1.394889	0.1699
JAN	0.026238	0.038962	0.673423	0.5041
MSCI_RET	0.334853	0.189495	1.767076	0.0840
R-squared	0.709827	Mean dependent var		-0.004804
Adjusted R-squared	0.645344	S.D. dependent var		0.117619
S.E. of regression	0.070046	Akaike info criterion		-2.305164
Sum squared resid	0.220789	Schwarz criterion		-1.907327
Log likelihood	75.54460	Hannan-Quinn criter.		-2.150924
F-statistic	11.00799	Durbin-Watson stat		2.056971
Prob(F-statistic)	0.000000			

## Appendix D

### MULTICOLINEARITY TEST

#### Table A 13 VIF

Variance Inflation Factors

Date: 04/29/14 Time: 13:48

Sample: 2009:03 2013:12

Included observations: 56

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.000222	3.747930	NA
MSCI_RET	0.028890	1.645318	1.623905
CHANGE_LIBOR	1.01E-06	1.716641	1.716352
CHANGE_PF_AT	0.000468	2.770523	2.769345
CHANGE_PF_UT	0.000135	2.387698	2.385644
__EXCH	8.90E-05	1.431699	1.431689
__INFL	7.791170	3.155290	2.233287
ZSEVOL_MONTH_ON_MONTH_SD	0.017035	3.081618	1.318906
__LN_MCAP__DIFFER ENCE_	0.009617	1.098704	1.094008

## Appendix E

### HETEROSKEDACITY TEST

Table A 14 White Test

Heteroskedasticity Test: White

F-statistic	1.821020	Prob. F(8,47)	0.0967
Obs*R-squared	13.25063	Prob. Chi-Square(8)	0.1035
Scaled explained SS	11.20646	Prob. Chi-Square(8)	0.1903

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 04/29/14 Time: 11:18

Sample: 2009:05 2013:12

Included observations: 56

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002283	0.001154	1.979181	0.0537
MSCI_RET^2	0.075043	0.168176	0.446217	0.6575
CHANGE_LIBOR^2	-2.57E-07	2.89E-06	-0.088807	0.9296
CHANGE_PF_AT^2	-0.004384	0.002715	-1.614539	0.1131
CHANGE_PF_UT^2	0.000394	0.000504	0.782055	0.4381
__EXCH^2	0.001074	0.000393	2.730414	0.0089
__INFL^2	0.335895	24.03529	0.013975	0.9889
ZSEVOL_MONTH_ON_MONTH_SD^2	0.002310	0.038724	0.059641	0.9527
__LN_MCAP__DIFFERENCE_^2	-0.017935	0.072510	-0.247350	0.8057
R-squared	0.236618	Mean dependent var		0.003383
Adjusted R-squared	0.106681	S.D. dependent var		0.005289
S.E. of regression	0.004999	Akaike info criterion		-7.612945
Sum squared resid	0.001175	Schwarz criterion		-7.287442
Log likelihood	222.1625	Hannan-Quinn criter.		-7.486748
F-statistic	1.821020	Durbin-Watson stat		2.061234
Prob(F-statistic)	0.096725			

## Appendix F

### ARMA BUILDING PROCESS

Table A15 correlalogram of net flows.

Date: 04/26/14 Time: 14:46

Sample: 2009:03 2013:12

Included observations: 58

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob	
.  **	.  **	1	0.262	0.262	4.2001	0.040
.  .	.  .	2	0.028	-0.044	4.2477	0.120
.  *	.  *	3	0.126	0.140	5.2479	0.155
.  *	.  .	4	0.102	0.036	5.9181	0.205
.  *	.  *	5	0.127	0.106	6.9831	0.222
.  .	.  .	6	0.044	-0.029	7.1133	0.311
.  .	.  .	7	-0.014	-0.027	7.1265	0.416
. * .	. * .	8	-0.132	-0.166	8.3441	0.401
. * .	. * .	9	-0.149	-0.102	9.9163	0.357
.  .	.  .	10	-0.047	-0.007	10.073	0.434

Table A 16 ARMA authentication, AR(1)

Dependent Variable: NET\_FLOWS

Method: Least Squares

Date: 04/26/14 Time: 15:16

Sample (adjusted): 2009:04 2013:12

Included observations: 57 after adjustments

Convergence achieved after 2 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6657565.	1226155.	5.429628	0.0000
AR(1)	0.259138	0.129413	2.002416	0.0502
R-squared	0.067954	Mean dependent var		6657546.
Adjusted R-squared	0.051007	S.D. dependent var		7040044.
S.E. of regression	6858147.	Akaike info criterion		34.35423
Sum squared resid	2.59E+15	Schwarz criterion		34.42592
Log likelihood	-977.0956	F-statistic		4.009943
Durbin-Watson stat	1.989217	Prob(F-statistic)		0.050173
Inverted AR Roots	.26			

Table A 17 ARMA(1,1)

Dependent Variable: NET\_FLOWS  
 Method: Least Squares  
 Date: 04/26/14 Time: 15:18  
 Sample (adjusted): 2009:04 2013:12  
 Included observations: 57 after adjustments  
 Convergence achieved after 13 iterations  
 Backcast: 2009:03

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6853243.	1373569.	4.989370	0.0000
AR(1)	0.577128	0.347054	1.662934	0.1021
MA(1)	-0.378801	0.400346	-0.946184	0.3483
R-squared	0.072441	Mean dependent var		6657546.
Adjusted R-squared	0.038087	S.D. dependent var		7040044.
S.E. of regression	6904674.	Akaike info criterion		34.38449
Sum squared resid	2.57E+15	Schwarz criterion		34.49202
Log likelihood	-976.9580	F-statistic		2.108672
Durbin-Watson stat	1.917201	Prob(F-statistic)		0.131286
Inverted AR Roots	.58			
Inverted MA Roots	.38			

Table A 18 ARMA(1,2)

Dependent Variable: NET\_FLOWS  
 Method: Least Squares  
 Date: 04/26/14 Time: 15:19  
 Sample (adjusted): 2009:04 2013:12  
 Included observations: 57 after adjustments  
 Convergence achieved after 12 iterations  
 Backcast: 2009:02 2009:03

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6657547.	1338512.	4.973840	0.0000
AR(1)	0.587696	0.654295	0.898213	0.3731
MA(1)	-0.312083	0.673546	-0.463344	0.6450
MA(2)	-0.114039	0.243023	-0.469253	0.6408
R-squared	0.081769	Mean dependent var		6657546.
Adjusted R-squared	0.029794	S.D. dependent var		7040044.
S.E. of regression	6934375.	Akaike info criterion		34.40947

Sum squared resid	2.55E+15	Schwarz criterion	34.55284
Log likelihood	-976.6699	F-statistic	1.573231
Durbin-Watson stat	2.025629	Prob(F-statistic)	0.206716

Inverted AR Roots	.59		
Inverted MA Roots	.53	-.22	

## Appendix G

### Coefficient Tests

Table A19 Wald test 1.

Wald Test:  
Equation: Untitled

Test Statistic	Value	df	Probability
t-statistic	0.147254	46	0.8836
F-statistic	0.021684	(1, 46)	0.8836
Chi-square	0.021684	1	0.8829

Null Hypothesis:  $C(5) + C(6) = 0$   
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(5) + C(6)	0.004571	0.031045

Restrictions are linear in coefficients.

Table A20 Wald test 2.

Wald Test:  
Equation: Untitled

Test Statistic	Value	df	Probability
t-statistic	0.863610	46	0.3923
F-statistic	0.745822	(1, 46)	0.3923
Chi-square	0.745822	1	0.3878

Null Hypothesis:  $C(7) = 0$   
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(7)	0.019093	0.022109

Restrictions are linear in coefficients.

## Appendix H

### Granger Causality

#### Table A21 Granger causality Test

Pairwise Granger Causality Tests

Date: 04/20/14 Time: 15:59

Sample: 2009:03 2013:12

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
LN_NET_PORTFOLIO_FLOWS_T does not Granger Cause ZSE_RETURN	56	0.18637	0.83053
ZSE_RETURN does not Granger Cause LN_NET_PORTFOLIO_FLOWS_T		2.98090	0.05966