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The bond market in South Africa: efficiency and investment issues

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THE BOND MARKET IN SOUTH AFRICA: EFFICIENCY AND INVESTMENT ISSUES

A thesis submitted in partial fulfillment of the
Requirements for the degree of

MASTER OF MANAGEMENT IN FINANCE AND INVESTMENT

Of

UNIVERSITY OF WITWATERSRAND

By

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ABSTRACT

This research studies the bond market in South Africa and other emerging bond markets. Comparison will be made to distinguish the South African bond market from the East Asian and Latin American bond markets. Private and public sectors use bond markets to raise capital either for investment or current expenditures; to measure the effectiveness of the bond market, the criterion used are Liquidity, Diversified investor base, Sound regulatory and legal framework and Well coverage of Maturity Structure and reliable bond yield curve.

This paper will make use of the Efficiency Market Hypothesis to test the South African bond market and prove that it is a weak-form efficient. The concept of the efficient market hypothesis theory asserts that the financial markets are informational efficient. There are three common forms of markets stated in the efficient market hypothesis, i.e. weak form efficient market, semi-strong form efficient market and strong form efficient market. These three forms of the efficient market imply that the price cannot be forecast.

In order to test the efficiency of the selected bonds, two models will be used in this paper, i.e. simple regression model with time varying parameters and test of evolving efficiency (TEE). The simple regression model cannot capture the nature of the returns on assets, because it assumes that the variance of the return is constant, thus cannot detect changes in efficiency of the market; whereas the TEE, using a GARCH approach with time-varying parameters, is able to capture changes in weak-form efficiency of market through time. However, the GARCH model requires the underlying series to be stationary and a conditional variance that is not constant.

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ACKNOWLEDGEMENTS

First of all, I want to thank Lord Jesus, who gave me the wisdom and strength to complete this thesis, without God's mercy this research would not have been possible. I should also like to express my sincere gratitude to my supervisor, Professor Eric Schaling, for his excellent supervision and guidance. The advice and comments received from Professor Kalu Ojah are also highly appreciated.

I would like to give a special thank you to Richard Hu, who provided me with the technical support; your prayers are also priceless. May the Lord bless you always.

Staff members in the Treasury Department of the Bank of China have been supportive; the data in this thesis was obtained from the Bloomberg database, my appreciation goes to Randolph Chan and Andy Liu for their help and time.

Lastly, thank you to my dearest family, my mom Mrs. Xiaoxiao Shen and Isaac Liu, you are always there for me, without your inspirational support, I should not be who I am now. May the Lord's goodness and mercy follow you all the days of your life.

DECLARATION

This master's thesis represents my own work and acknowledgement is given in the references where information is derived from another source; it has not been submitted at any other University for degree purposes.



Signed……

Date: May 16, 2013

CHAPTER ONE: INTRODUCTION

1.1 Problem Statement

A bond is a debt instrument requiring the issuer (also called the debtor or borrower) to repay to the lender /investor the amount borrowed plus interest over a specific period of time. (Fabozzi 2000). The United States' bond market is the largest bond market in the world, and the South African bond market is the largest economy in the African countries. Although it is still an emerging market, the South African bond market is more developed than that of other African countries.

The rationale to study the South African bond market and other emerging bond markets is, firstly, South Africa has equity and public debt markets that are unusually large relative to the size of the economy even by developed countries' standards (RMB 2001). Secondly, although the government bond markets in emerging markets including South Africa, has been encouraging, there are still some concerns which need to be considered; for example, many corporate bond markets in emerging markets are still underdeveloped, their secondary markets are illiquid, offering relatively low quality of bonds and the bond issuance sizes are also small (International Organization of Securities Commissions, 2011). Thirdly, a robust domestic bond market is an alternative source for debt financing and can also help reduce the reliance on bank financing, thus providing greater diversification of the sources of funding across several asset classes, so it can be seen as a source of stability, especially during periods of financial crisis (IOSCO 2011). Fourthly, developing emerging markets domestic bond markets can facilitate the efficient pricing of credit risks, risk management can benefit from the reliable credit curve by

introducing the various risk management instruments, thus limiting the impact of exposures by investors (IOSCO 2011).

In this study of the South African bond market, the Bond Exchange of South Africa (BESA) was used as a benchmark when comparing it with other emerging markets and developed markets. The rationale infusing BESA is firstly, it is an independent licensed exchange in terms of Securities Service Act, 2004, constituted as a public company, and it is responsible for operating and regulating the debt securities and interest rate derivative markets in South Africa. Secondly, South Africa has a relatively liquid bond market and the Turnover Velocity of Exchange is the indicator of liquidity of the bond market. It shows that market capitalization turn-over increased from 17.7 times to 23.4 times per annum in 2008 (BESA, 2008). Lastly, BESA has never had a liquidation default in its history and no claims are made on its Guarantee Fund. The Guarantee Fund is utilized when the member of the JSE defaults and the investors suffer losses that cannot be covered by the Fidelity Insurance Policy, or the investors are not compensated by the defaulting member of their holdings of cash and securities.

In the South African bond market, the Efficient Market Hypothesis (EMH) can be examined. The EMH was first introduced by Fama in 1970; he states ‘’a market in which the prices always fully reflected the available information is called efficient.’’ The EMH asserts that financial markets are "informational efficient", or that prices on traded assets (*e.g.,* stocks, bonds, or property) already reflect all known information about them and would instantly change to reflect new information. Therefore, according to the theory, it is impossible to consistently outperform the market by using any information that the market has already known. Information or news under the EMH is defined as anything that may affect the price of the underlying asset. However, there are times

when the asset price over-reacts or under-reacts to the arrival of information; it is difficult to verify situations of over- and under-reaction. This paper will show both conceptually and empirically whether in South Africa the bond market is a weak form hypothesis.

1.2 Purpose of the study

The purpose of this study is to provide a detailed investigation of the South African bond market and why this market is more efficient than other emerging markets and to compare the South African bond market to those of other countries. The paper will also aim to find out whether the South African bond market is a weak form hypothesis.

1.3 Research questions

i. Is the South African bond market more efficient than the other emerging markets, if so why?
ii. What are the differences between the South African bond market and the other emerging markets?
iii. Is the South African bond market a weak form efficient?

1.4 Significance of the study

This paper will give the overall outlook of the South African bond market, which is one exposition of relevance because South Africa has equity and public debt markets that are unusually large relative to the size of the economy, even by developed countries standards. This is the reason why it is worth studying. Another reason is because understanding the South African bond market can help individuals to invest more intelligently in the market. That is why this paper shows whether South African bond market is weak form efficient or not.

1.5 Methodology Overview

The major way to gather information and data about the differences between the South African bond market and other countries' markets would be through reading various papers and journals, with relevant text books and retrieved services platforms. This would give the researcher enough information to draw sensible inferences. The author will also run a simple regression model and a test of evolving efficiency model to test whether the bond market is a weak form efficient. So in this paper, both concepts and empirical tests will be applied.

1.6 Outline of the study

The paper is divided into 5 chapters. Chapter 2 will provide a brief discussion of the South African bond markets and the BESA's role, then compare it with other emerging countries' bond markets. This chapter will answer the first two

research questions. Chapter 3 shows the empirical tests about the efficient market hypothesis of South African bond market, and the researcher will combine both concepts and empirical test to demonstrate, and thus, answer the last research question in chapter 4. Chapter 5 will contain the conclusion of the paper.

CHAPTER TWO: LITERATURE REVIEW OFTHE MARKET EFFICIENCY HYPOTHESIS

2.1 Introduction

2.1.1 Background

The Efficient Market Hypothesis (EMH) was developed by Fama (1965) and this concept was then introduced into the academic literature. For many years, the efficient market hypothesis was widely accepted and considered as a fundamental proposition in the financial world. Many theoretical models and empirical studies of security prices used the efficient market hypothesis as a primary assumption.

Fama (1965) '…an "efficient" market for securities, that is, a market where, given the available information, actual prices at every point in time represent very good estimates of intrinsic values.' Intrinsic value is the actual value of a company or an asset based on an underlying perception of its true value including all aspects of the business, in terms of both tangible and intangible factors.The concept of the efficient market hypothesis theory is quite simple, it basically asserts that the financial markets are informational efficient, which means when the information of tradable assets (securities, bonds, or properties) arises in the market, the news will spread very quickly without any delay and the price will fully reflect the information. Therefore, every piece of information will be incorporated into the tradable assets' price, which makes it impossible for investors to generate excess returns over those the markets suggest.

2.1.2 The three forms of the Efficient Markets Hypothesis (EMH)

There are commonly three forms of efficient market hypotheses. They are a weak-form efficient market, semi-strong-form efficient market and strong-form efficient market. Each one has its characteristics and implications.

In a weak-form efficient market, it is implied that every piece of information known in the past has already been incorporated into the price. This means that the future price of the underlying tradable asset cannot be predicted by using this kind of information, thus excess returns cannot be earned in the long run by adapting investment strategies based on historical data. This implies that technical analysis will not be able to forecast future price movement if the weak form efficient market hypothesis holds, hence technical analysis is of no more use than randomly selecting stocks. However, fundamental analysis may still provide excess returns.

In semi-strong-form efficient market, it is implied that every piece of information known to the public spreads quickly and the price adjusts rapidly to this information in an unbiased manner. This means that excess returns cannot be made on this type of information if the semi-strong form efficiency holds. Semi-strong-form of efficiency implies that neither fundamental nor technical analysis will be reliable to generate excess returns.

Different stock exchanges have different levels of required disclosure, hence it would be reasonable to expect different markets to have different levels of efficiency. For example, the NYSE (New York Stock Exchange), which requires high level of disclosure, should be more efficient than a market with limited

disclosure requirements. However, even if information is public available, there will be costs involved obtaining this type of information quickly and accurately. The cost of obtaining additional information could outweigh the additional returns that it might generate (The Actuarial Education Company 2009).

To test a semi-strong-form of efficiency is relatively more difficult than to test a weak form of efficiency, as because the information given to the public is difficult to obtain timeously, and to process the information as well as to examine if the price reflects the information is costly. In addition, it may not be sufficient to only gather information from local newspaper or company's announcement. While the semi-strong-form of efficiency has formed the basis for most empirical researches, recent researches had included the test of the weak-form efficiency since the degree of the efficiency continues to be disputed (The Actuarial Education Company 2009).

In a strong-form of efficient market, it is implied that the insider trading is inefficient in a sense that the application of inside information will not be able to enable the "investors" to generate excess returns above those the markets suggest even if the information is known only to themselves and not to the general public (The Actuarial Education Company 2009).

Stock markets around the world are subject to regulations. These regulations are put in place to prevent sensitive information being obtained and used to make personal gains by those who have access to this information before it becomes publicly known, for example, senior management involved in take-over talks are often banned from trading stocks of their company. However, such regulations would not be necessary if the strong-form of efficiency held; to test strong-form efficiency is problematic since the researcher will be required to access inside information which seems

impossible.

2.1.3 Further refinement of the notion of efficiency

The notion of efficiency has been refined to improve the definition of the returns considered. The most significant refinement has been the consideration of the net of the various costs. Such costs include obtaining additional information from the company and analyzing the information obtained, namely transaction costs.

Transaction costs and trading restrictions have changed the way the tests of market efficiency perform in some important ways, as addressed by Timmermann and Granger (2004). In their paper of efficient market hypothesis and forecasting, they argued that predictable patterns would only invalidate the EMH when these patterns are able to generate large enough returns to cover the size of the transaction cost, for instance, if an investor predicted that one specific underlying security would outperform the market by 2%, but if the transaction cost is 3%, then there is no point in exploiting the opportunity. Brock, Lakonishok, and LeBaron (1992) had found that fairly simple technical trading rules would actually be able to make a prediction on the Dow Jones Industrial Average and that enables technical analysis to make a profit even if the market is expected to be efficient. Nevertheless, subsequent research found that even the gains that would be obtained by applying the fairly simple technical trading rules, the cost of the transaction would not be compensated by the gains.

It may be possible to forecast some market movements, but the cost of analyzing the information as well as the transaction cost to execute the “profit”

deal, which was predicted to generate excess returns would not be covered by the excess return; to demonstrate there is an exploitable opportunity, the opportunity must be large enough even after all the costs have been taken into account.

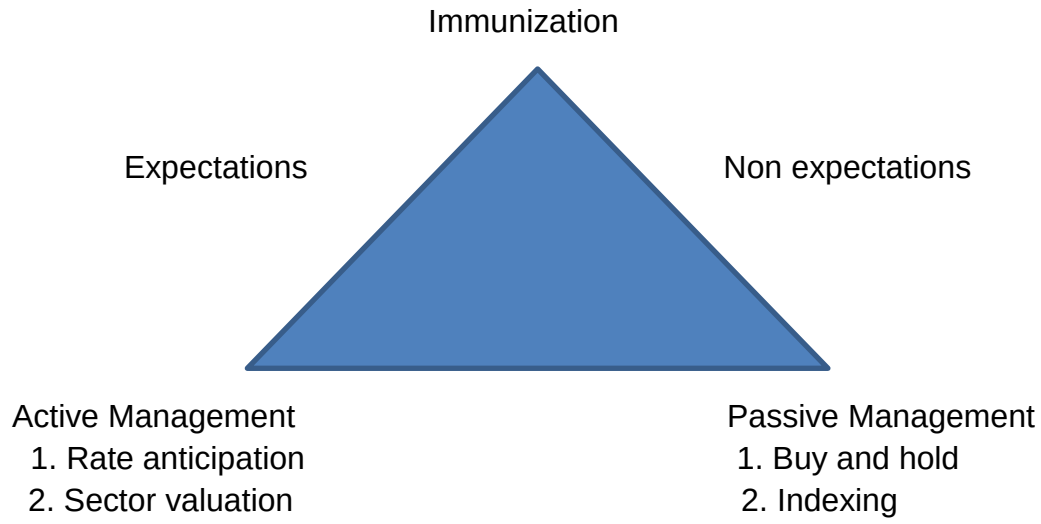
2.1.4 Active versus passive investment management

Investment management relies heavily on the implications of the efficient markets; therefore whether or not the market is efficient has great impact on those investment decisions.

Active fund managers actively seek opportunities and attempt to make excess returns on those exploitable mispricing, this essentially relies on both expectations and managers' abilities to have superior forecasting skills. Passive funder managers, simply aim to diversify across the markets, they act on behalf of investors who desire returns from a passive managed fund or index fund and seek liquidity in balancing the transaction. The strategy assumes the market's expectation is essentially correct and has no reason to disagree with these expectations. By setting the profile identical to the benchmark's profile and pursuing the passive investment strategy, managers or investors are willing to accept the average risks and returns (as defined by benchmark's risk and return) and do not need to make independent forecasts because they are closely tracking the benchmark index.

As the figure shown below, the tools used by active management are rate anticipation and sector valuation with expectation of interest-rate change or sector spread (yield difference from Treasury securities).Passive management is made up of buy and hold strategy or indexing. Key difference here is whether the management is "expectationally driven" or "non-expectational".

Figure 1: Logic of Active and Passive Management



Source: Frank J. Fabozzi and T. DessaFabozzi (1995): The handbook of Fixed Income Securities, pp. 834

When a market is efficient, it should be expected that neither active nor passive fund managers would gain excess returns. When a market is inefficient, it implies that certain predictable patterns can be detected, and active portfolio management would be expected to achieve higher than average returns. Many studies that have been done on assets' pricing have shown that markets, especially stock markets, do exhibit somewhat predictable patterns. Campbell *et al* (1997) concluded that stock markets at least exhibit some partially predictable patterns.

Therefore, a question remains: What strategy is the winning strategy? Malkiel (2003) had an answer. In his study, he argues that regardless of whether or not a market is efficient and whether or not predictable patterns exist, they do not give rise to profitable investing strategy. In other words, he believed that

passive investment strategy would be the best strategy. However, Ivkovic, Sialm, and Weisbenner (2004) found evidence that for individual investors, some fund managers who hold concentrated portfolios outperformed those fund managers who simply hold diversified portfolios. This finding was also confirmed by Kacperczyk, Sialm and Zheng (2005); they examined the performance of actively managed equity mutual funds from 1984 to 1999 while constraining the level of the concentration of the funds. They concluded that the concentrated funds performed better than the funds that were diversified across all industries. This attributes to the difference between active and passive management.

2.2 Literature Review

2.2.1 The reality of three forms of efficient market

Ever since the introduction of the efficient market hypothesis, many studies have been carried out on the efficient market hypothesis. Among these studies many researches had concluded that efficient markets do exist, so does the efficient market hypothesis. The following literature reviews the reality of the efficient market hypothesis in terms of weak-form, semi-strong form and strong form of market efficiency.

- Weak -form of efficient market

The three forms of the efficient market imply that the price cannot be forecast. Much empirical research has associated random walk hypothesis with efficient market hypothesis. Samuelson (1965) contributed to the efficient market hypothesis in his article entitled “Proof that Properly Anticipated Prices

Fluctuate Randomly". Malkiel (2003) also states that if market prices fully reflect the information and expectations of the participants in the market, the price must be random since the information arriving in the market is random and hence the future events cannot be predicted by the past events.

Clarke, Jandik & Mandelker (2001) state that the random walk logic behind efficient market hypothesis implies that the consecutive price movements should be independent of each other, which means that the historical price pattern cannot be used to predict future price movement and this is in line with the definition of a weak-form efficient market. In several studies, the correlation of underlying stock had been tested to verify whether a market is efficient, the correlation tested is between return on one stock and the return on that stock in the previous period. These studies have shown that a positive serial correlation between returns of consecutive periods indicates that higher than average returns are likely to be followed by higher than average returns, whereas negative serial correlation indicates that lower than average returns are likely to be followed by lower than average returns. If the random walks were held, in other words, if the efficient market hypothesis were true, we would expect no correlation between such returns. Consistent with this theory, Fama (1965) further calculated the serial correlation coefficients between returns on daily stock for a sample of 30 Dow Jones Industrial stocks during a period of 1957 - 1962 , even though the coefficients are statistically significant, they were still too small (close to zero) to be of interest for utilization.

If a weak-form efficient market hypothesis held, technical analysis would be of no use to predict future outcomes. However, does technical analysis not work at all for a weak-form efficient market? After examining the gains from technical analysis, Brock, Lakonishok, and LeBaron (1992) found that certain relatively simple trading rules would actually result in predicting the pattern of

the price movement even if the weak-form efficient market holds. However, subsequent studies have found that even if these trading rules do make excess gains, the transaction cost involved in implementing these rules actually offset the excess gains. Hence, adopting technical analysis when a market is a weak-form efficient market would not create advantage.

Many early studies also concluded that the markets were featured by randomness. The earliest study on random walk concept was conducted by Bachelier (1900) although he did not use the random walk term. He concluded that commodities prices followed a random walk process. Osborne (1959) concluded that the movement of stock price somewhat resembled the Brownian motion which is the movement of physical particles and that the logarithms of returns were independent of each other. Robert (1965) also found that the time series of the U.S. stock had the same appearance as a time series generated from a sequence of random numbers.

Nevertheless, recently, a number of studies have indicated that market prices do not strictly follow a random walk. Some patterns do exist from which future movement can be predicted. Studies found that over a short period of time, the price of an underlying security tends to have momentums, meaning that after a decrease or an increase of market price it is likely the same movement will follow. Studies also found that over a long period of time, that price of an underlying security exhibits some kind of mean reversion, meaning the price will temporarily deviate from its mean value. These two scenarios are evidences of violation of a weak-form efficient market as both scenarios imply some kind of prediction of movement of future price.

Malkiel (2003) has given two explanations for the existence of the momentum effect. The first one can be attributed to behavioral effects. Investors see

market prices rising and would normally raise their expectations accordingly. This in turn will cause the mainstream to follow and form a temporary perception that the market prices will continue to increase. The second one can be attributed to sluggish response to the new information arriving. Investors do not adjust their expectations as quickly as new information arrives, especially when the return of a company has been exceeding the market average.

The short-term momentum effect has been supported by evidence in research. Carhart (1997) considered the momentum effect to be one of pricing factors in terms of explaining the returns of the security and mutual funds. Asness et al (2010) has actually identified, in an investment fund portfolio, that underlying securities with positive momentum are over-weighted. Both analyses are done based on the date of rolling 12 months which is up to two months prior to the investigation and going back 12 months; this is how long a predictable pattern, if any, is derived. Positive momentum is defined as the strong relative performance over that period.

The mean reversion effect has not always been consistent over different periods as many studies suggested. Studies have shown that during the great depression in the U.S. the patterns of mean reversion were not generated as well as some other period of the time. Mean reversion of returns of stock and bond is very closely associated with interest rates. Malkiel (2003) states that the mean reversion of the returns of the market as a whole is consistent with the functionality of the market. This can be seen from the mean reversion of the interest rate.

The movement of interest rates determines the price of an underlying stock and bond. This is due to how customers and businesses react to the interest

movement. For instance, if the banks increase the interest rate which in turn will make it difficult for business to take loans to expand or make households pay more on their mortgage and credit cards, that will lead to less discretionary income. If a company is cutting back its spending or is making less profit through either higher debts spend or less revenue from customers, then the estimated amount of the future cash flow will be less and so is the present value – the price of underlying stock price. Therefore the interest rate also determines the returns of stock and bond. The price of underlying stocks and bonds are in negative correlation with interest rates, therefore, when the interest rates raise, the price of stock and bond prices will fall, whereas when the interest rates fall, the price of stock and bond prices will rise. The appropriate models for interest rates should always exhibit some elements of mean reverting. Therefore, if the interest rates revert to mean over a period of time, so will the return of the stocks and bonds. This is consistent with the functionality of the market.

- Semi-strong form of efficient market hypothesis

Semi-strong form of the efficient market hypothesis perhaps has been one of the most widely researched topics. It asserts that the public information is fully incorporated into the price. Therefore the fundamental analysis is of no use when used to predict the future movement of the price. The assumption of semi-strong form efficiency is much stronger than that of weak-form efficiency. If the market is a semi-strong form efficient market, it does not only imply that the market has characteristics and implications of a weak-form efficient market but also that of semi-strong form efficient market. Therefore, investors should not be able to generate excess returns by trading on publicly available information as well as historically available information.

Fundamental analysis is one of the analyses that fund managers would

normally adopt. Fundamental analysis is based on information that specifically relates to companies and the information is available to everyone. Some actively and skillful fund managers are thought to beat the market as they consistently enjoy higher than average returns by using fundamental analysis. However, some studies suggested otherwise. Michael Jensen (1968) found that over the period from 1955 to 1964 the overall returns, after the risks were adjusted, that were made by mutual fund managers were approximately zero percentage excess return each year. More recently studies have shown that on average the return of mutual funds do not exceed the return which the market suggests. This has been found in both large and small markets where the small market is a less efficient market.

Clarke, Jandik and Mandelker (2001) had included a case study in their article which compares the performance of equity funds with different fees charged over a period of time. One would expect that high-fees charged equity funds would perform better as those funds charged as high-fees normally imply a more comprehensive analysis of the funds. However they found that, after taking fees into consideration, the low-fees charged fund actually performed slightly better than those charged with higher fees.

The test of semi-strong form of efficient market hypothesis normally involves the examination of how rapidly the new information is incorporated into the price. Multiple studies have been done on how events such as mergers, demergers, dividends announcement and acquisitions, etc. influence the market prices.

Numerous studies have found that the market reacts quickly to the announcement of these events. Fama et al.(1969) looked at the splits on equity price. Although the splits on equity price do not improve the market

value of the equity, it does indicate the potential increase in dividends and it also provides perceptions about the direction in which the enterprise is moving. Normally, splits will lead to an increase in market value, but the market seems to adjust for this information quickly. Although excessive returns can be achieved before the splits announcement, there is no evidence suggesting that excess returns can be made after the announcement.

There is substantial evidence in the financial literature suggesting that the takeover action is to aim to gain significantly at the announcement of the acquisition. Clarke, Jandik and Mandelker (2001) had shown in their study that even though there is a small uptrend in the stock price of the acquired company prior to the announcement, this might be explained by potential information leaking, there is no evidence showing the abnormal changes in the price after the release of this public information.

Mergers will normally result in an increase in market price, but evidences show that the market adjusts to this type of information fully and quickly. Dodd (1981) and Keown and Pinkerton (1981) found that the market price fully reflects the information and there is no abnormal change of the price after the announcement of the merger. Keown and Pinkerton (1981) have also examined the speed as to how quickly the market incorporates the release of this type of information. They found that the market reacts to the announcement very quickly and the market prices begin to respond to the announcement only 10 to 15 minutes after the disclosure.

While many studies have demonstrated the existence of the semi form of efficient market, some studies do not support efficient market hypothesis. One of the most enduring anomalies is the empirical observation, which is the stock price only response to the earnings a year after the announcement.

Ball (1978) found that the stock price did not fully react to the earnings announcement. He also found that abnormal returns could be obtained in some period after the announcement. Rendelman, Jones, and Latané (1982) also found that the unexpected earning announcement would not be fully reflected in the stock price and abnormal returns could be obtained by purchasing the share of the companies with positive earnings surprises. The above two studies demonstrate the anomaly of under reaction.

Another piece of evidence which questions the existence of the efficient market hypothesis is the predictive pattern being discovered. Basu (1977) found that the portfolio of stocks with lower price-earnings ratios (P/E) tend to generate more returns than those with higher P/E. By adopting a different valuation criterion, Fama and French (1992, 1998) found that portfolios of stocks with low ratios of price-to-book value (P/BV) tend to provide more returns than those with higher P/BV. These anomalies appeared to present inefficiency in the market.

- Strong-form of efficient market hypothesis

Studies on the strong-form of efficient market hypothesis have mainly focused on empirical tests of the profitability of insider trading. If the strong-form of efficient market were true, then inside trading would not generate excess returns for the investors who have privilege to access and used inside information. However, since the inside information is regulated to be prevented from leaking and is not really available to the public, it is very difficult to test how market prices react to information as such. Majority tests for strong form of efficient market are based on the performance of mutual funds.

There are some studies suggesting that insider trading is actually profitable,

Firer (1989) rejected the strong form efficient market hypothesis and concluded that the insider trading would be able to generate abnormal returns. However, Gilbertson (1976) found considerable evidence that supports strong form efficient market hypothesis.

2.2.2 Efficiency in Bond Markets

The majority of studies looked at stock markets, whereas there are limited studies that have been done on bond markets. However, both bonds and stocks claim on the value of the company's assets, therefore, the information that affects the company's assets will have an impact on both bond and stock price.

Hotchkiss and Ronen (2002) found overall the behaviour of the bond price is similar to that of the stock price even on a daily basis. Blume, Keim, and Patel (1991) found that a strong contemporaneous relationship between the returns of corporate bonds and returns of stock. This finding was confirmed in different studies later on. Kwan (1996) had further extended this finding to conclude that this relationship between the bond returns and stock report returns exhibits a positive and significant correlation between them. He found that the stock returns have predictive power of what the bond yields, whereas bond returns provide no explanation of what future stock returns might be.

Studies have suggested both efficiency and inefficiency in the bond market. Hotchkiss and Ronen (2002) considered the impact of the specific information relating to the company and found that both corporate bond and stock prices response quickly to the company earnings release. They finally concluded that the actively traded bonds are informational efficient.

The day-of-the-week effect has been demonstrated to exist in some bond markets. Keim and Stambaugh (1984) first documented the weekend effect and further on concluded the day-of-the-week effect which has significantly negative average returns on Monday and large positive returns on Saturday. The hypothesis of equal mean across days of the week could be rejected.

Jordan and Jordan (1991) used CRSP (The Centre for Research in Security Prices) data on the Dow Jones Composite Bond Average index to analyse the seasonality of the bonds in daily return. They tested for a day-of-the-week and they could not reject the equal mean hypothesis.

Gibbons and Hess (1981) report a strong day-of-the-week effect for U.S. treasury bills, however they have not been able to find the explanation for their conclusion. Farantzmann (1989) analysed the pricing anomalies in German bond markets and found a significant strong day-of-the-week effect.

CHAPTER THREE: THE ROLE OF BOND MARKETS IN SOUTH AFRICA AND OTHER EMERGING MARKETS

3.1 Introduction

This chapter conducts the review of the South African bond market and other emerging markets' development. A review will be provided on the development of the role of Bond Exchange of South Africa (BESA), its history, structure, functions and performance. The critical role BESA plays in the South African bond market development will be outlined. The characteristics of an effective bond market will be studied and these features will be used as the benchmark to determine the effectiveness of the South African bond market, the Asian bond market and the Latin American bond market.

A bond is a debt instrument requiring the issuer (also called the debtor or borrower) to repay to the lender /investor the amount borrowed plus interest over a specific period of time (Fabozzi, 2000). Both private and public sectors use bonds to raise capital either to satisfy their investment needs or to fund current expenditures. Most countries also issue government bonds to finance current projects. Government bonds are the backbone of most fixed- income securities markets in both developed and developing countries. They can provide a reliable benchmark yield curve for corporate bond markets as well as the secondary markets and also help to establish the overall credit curve (World Bank, 2000); as we know, a credit curve is the default probability of an entity over a period of time and a tightened spread means the entity is healthy and unlikely to default, so the credit curve is a good indicator of the future default probability for investors. Government bonds are typically considered less risky than corporate bonds or even risk-free because they are backed by the "creditworthiness and faith" of the government instead of guaranteed by

financial/physical assets or private institutions.

Normally, the bond issuer borrows money from the bondholder, and at the same time, the issuer promises that the full borrowing amount will be repaid. The bondholder will be exposed to the risk of lending funds, so the bond purchaser would require an interest to be charged on the principal borrowing amount. The coupon payments are a form of interest charges that are a fixed amount of money. To determine the interest rate that the bondholder can profit from the investment is by looking at both the price of the bond that the bond purchaser pays and the coupon payment of the bond guaranteed (Strong, 1993).The lower the creditworthiness of the bond issuer, the higher the volume of risk faced by the bond purchaser or investor, and also in order to satisfy the issuer's funding needs, the bond issuer has to provide a higher bond yield (higher coupon values) to attract bond purchasers and convince them to invest their money. Because bonds have different maturities and coupon rate, the bond yield instead of the bond price is used as an important benchmark to be considered. There is an inverse relationship between bond price and interest rate, as the interest rate increases and eventually above the coupon rate, the bond value/price will decrease and is traded at a discount. Government bonds are generally considered risk-free, which means it virtually has no default risks and have lower returns than junk bonds (this is a rule of thumb that high risk is associated with high return, so risky junk bonds offer high yields).Besides the government that can issue bonds, private firms and corporations can also raise capital by issuing their company bonds to the investors; this is referred to as a corporate bond.

3.2 The overview of South African Bond Market

3.2.1 Introduction

South Africa is the largest economy among African countries. Although it is still an emerging market, the South Africa bond market is more developed than that of other African countries. The South African bond market is also a leader among emerging market economies. In 2008, the total volume of bonds traded in South Africa was over R19 trillion. The government issued bonds to dominate South Africa's domestic bond market, and there is a centralized exchange in place to monitor, regulate and modify the bond market in South Africa, known as the Bond Exchange of South Africa Limited (BESA).

3.2.2 The South African Bond Market: A conceptual overview

South Africa has a relatively liquid bond market and the Turnover Velocity of Exchange is the indicator of liquidity of the bond market. It shows that the market capitalization turnover increased from 17.7 times to 23.4 times per annum in 2008 (BESA, 2008).

Figure 1 shows the Annual Bond turnover on BESA. Monthly turnover rose consistently due to the monetary policy changes since the Reserve Bank tightened its interest rate and this resulted in the steadily increased turnover in the bond market, Repo transactions continued to constitute a substantial portion (61%) of the turnover recorded on BESA, with spot trades accounting for 35%.

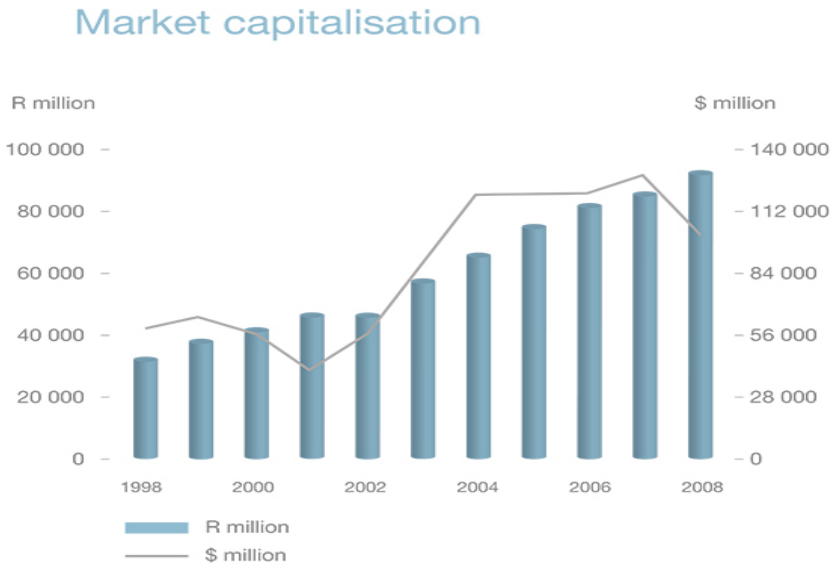
Figure 2: Annual turnover on BESA



Source: BESA annual report 2008

Figure 2 shows the Market capitialzation of the South Afircan bond market, as the turnover activity was robust, the local bond market witnessed a strong exodus of capital. Outflows from the bond market as measured by BESA, amounted to R59 billion in 2008.

Figure 3: Market Capitalization



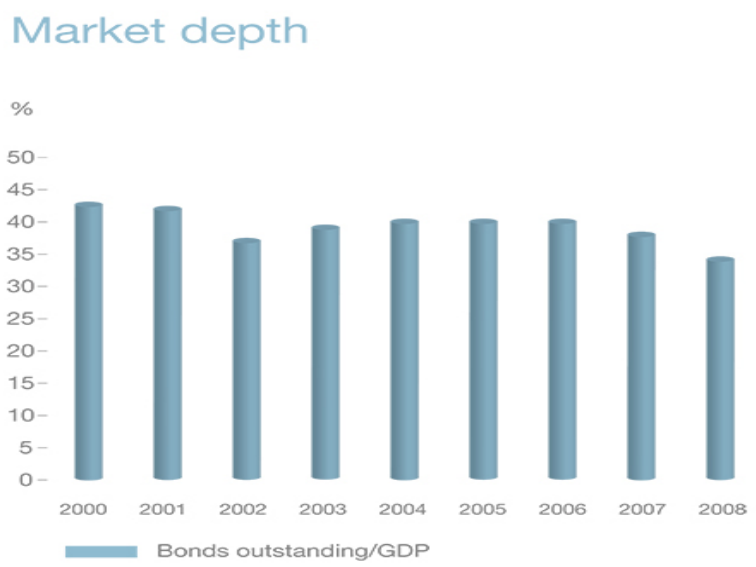
Source: BESA annual report 2008

While the global credit crisis placed a dampener on domestic debt issuance, it boosted activity in the secondary market, particularly given that South Africa has one of the most liquid bond markets in the world. If nothing else, the global financial crisis has highlighted the importance of well-functioning financial markets (bond and equity market). Indeed, while South Africa ranks 50th among 142 countries for overall global competitiveness, for financial market development it ranks 4th in the world and for regulation of securities exchanges it ranks 1stin the world (Global Competitiveness Report, 2011-2012).

The market depth in the bond market is measured by the ratio of the nominal value of bonds issued at the end of the year over the GDP; in the South African domestic fixed-income primary market, the bond issuance conditions tightened and GDP growth persisted which had negatively impacted the market depth. As the result, market depth declined in 2008.

Figure 3 shows the Market Depth of the South African bond. In 2008, both government and corporate bonds were responsible for the contraction in market depth, whereas in 2007 market depth contracted entirely because of the lower government debt issuance (BESA, 2008).

Figure 4: Market Depth



Source: BESA annual report 2008

From the macroeconomic policy perspective, rather than totally relying on the South African Reserve Bank (SARB) to finance the government budget deficit, the South African government bond market provides an alternative source to fund budget deficits, and thereby reducing the need for direct and potentially damaging monetary financing of government deficits and avoiding a build-up of foreign-currency denominated debt (World Bank, 2000).

Heavily relying on foreign-currency debt could be dangerous for the country because it is more difficult to roll over compared to the local-currency debt and also the foreign exchange rate is another risky element. For example, the Asian crisis during 1997-98 was caused by the mismatch between short-term foreign-currency debt and long-term domestic investment (these were mismatches of both maturity and currency), Asian economies held significant amounts of short-term foreign-currency denominated debts to fund their long-term domestic investments, and when the foreign loans could not be

rolled over, this resulted in the value of the currencies declining substantially and impacting the Asian economies severely. The other benefit of having a sound government bond market is to help achieve the monetary targets or inflation objectives because it can strengthen and enhance the implementation and transmission of the monetary policy, and can also enable the use of market-based indirect monetary policy instruments (World Bank, 2000). When unexpected events or shocks occur, countries with a sound government bond market would be able to smooth the consumption and investment expenditures in the response, governments are also able to reduce the adverse impact of interest rate, currency, and other financial risks if sound debt management is incorporated. With the development of active liquid and deep government bond market, countries that focus on a more market-oriented funding of government budget deficits would have less debt-service costs over the medium to long term.

3.2.3 Why it needs to develop the domestic bond market

In considering the usefulness of the domestic bond market, Kahn (2005) states that at the macroeconomic policy level, the bond markets usually send insightful signals for macroeconomic policy, while the financing of fiscal deficits could be difficult without the existence of an effective bond market. Domestic debt not only plays an important role in terms of fiscal policy, but it is also needed for monetary policy purposes such as controlling the inflows of foreign exchange because more capital will be allocated to local currency denominated debts. PECC (2004) argued that the bond market is one of the key components to establishing an efficient economic system. By developing the bond market, l benefits include adding value to the existing financial system, especially when foreign investors are attracted, diversification of

benefits and offering more investment opportunities for both individual and institutional investors, thus helping deepen the financial markets associated with other instruments such as equity, derivatives etc. Bond market can also help to provide an alternative source of financing; it reduces concentration of intermediation in banks (Kahn 2005).

The benefit of a domestic bond can also be seen from the potential costs of foreign and domestic debts. Even if the foreign debts are significantly cheaper than domestic debts, the foreign exchange requirement may be a risky element and foreign debts may be more difficult to roll over than domestic bonds. So the more reliance of the country on the foreign debt rather than domestic debt, the more vulnerable the country is to the foreign exchange crisis and cessation of the loans. Compared to other emerging markets, South Africa relies more on its domestic bond market than on international borrowing.

Figure 5: The Total Foreign debt and the ratio of total external debt to GNI of African countries

Country	Total external debt, 2010 ($ millions)	Ratio of total external debt To GNI (%)
South Africa	45165	15
Angola	18562	26
Botswana	1709	13
Burundi	537	39
Central African Republic	358	19
Chad	1773	27
Congo, Dem. Rep.	5774	52
Congo, Rep.	3781	47
Côte d'Ivoire	11473	52

Djibouti	751	65
Ethiopia	7141	24
Ghana	8368	30
Kenya	8400	24
Lesotho	726	31
Liberia	228	31
Madagascar	2295	26
Malawi	922	20
Mozambique	4124	44
Nigeria	7883	4
Rwanda	795	15
Swaziland	616	20
Tanzania	8664	40
Uganda	2994	19
Zambia	3689	28
Zimbabwe	5016	92

Source: World Bank Global Development Finance 2012: External Debt of developing countries

From figure 5 above, the GNI is the gross national income and although South Africa has relative large portion of foreign debts compared to other African countries, the ratio of external debt to GNI is the third smallest, where Nigeria has the least proportion of external debt to GNI and Zimbabwe is considered as having the most reliance on foreign debt in Africa.

3.3 The role of Bond Exchange of South Africa (BESA)

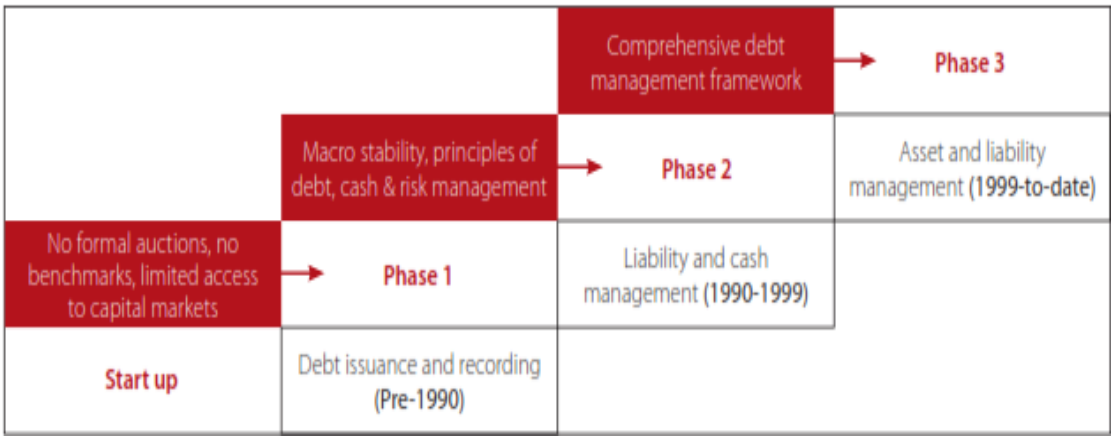
3.3.1 Introduction

The Bond Exchange of South Africa as a public company is an independent licensed exchange, and it operates, monitors and regulates the debt securities and interest rate derivatives markets in South Africa. BESA was granted its exchange license in 1996; it has made a substantial contribution to market development in South Africa over the past twelve years. As an exchange, BESA is committed to building an overall better market through its provision of a range of platforms and services to the capital market participants to address their needs, and to be the issuers to issue securities, the market makers that set the standard market prices, as well as traders or investors.

3.3.2 The development of Bond Exchange of South Africa (BESA)

The South African bond market was very informal during early 1970s to 1980s, at that time, the South African government ran a large deficit which was 6% of the GDP. The government had to finance the budget deficit in the domestic bond market, and large non-bank financial institutions provided the demand for these bonds (Mboweni, 2006). Government and state-owned enterprises debts dominated the domestic bond market at that time. There was a lack of transparency because there were no established regulatory bodies to oversee the markets; also no real pricing benchmark was available due the lack of an efficient market mechanism existence. Figure 6 provides the diagrammatic development of South Africa Debt market.

Figure 6: Evolution of debt management in South Africa



Source: National Treasury 2011/12

During the late 1980s to 1990s, a number of structural improvements were made, including government bonds that were consolidated into a few bonds, a benchmark bondsman appropriated yield curve was developed and a well-communicated and structured program was introduced by the government in terms of which it issued bonds at regular auctions (Mboweni 2006). In the meantime, the South African Reserve Bank (SARB) played an active role in developing the secondary bond market. It acted both as an informal market maker to set the prices and as a leading player in the trading of bond derivatives to help improve the turnover, liquidity and marketability of government bonds in the secondary market. A major revolution took place during mid-1980s in terms of the establishment of the Bond Market Association (BMA) to formalize the South African bond markets.

After the 1990s, South African bond market moved into a more technological and sophisticated form in terms of market breadth and depth, for example, to improve the market infrastructures and trading mechanism with a broader number of investors and larger market sizes; this was because BMA was granted an exchange license and transformed into BESA in 1996. The new reform brought about regulation and better exchange services; it introduced

the electronic trading platform, matched and settled the transactions, immobilized and then dematerialized the bonds listed on BESA, developed a series of total return indices for government and corporate bonds, and developed a more refined benchmark yield curve (Mboweni 2006).

Although the South African Reserve Bank played an active role in the history of the development of the South African bond market, by the late 1990s, the local secondary bond market had developed substantially and the South African Reserve Bank considered it to be mature enough for SARB to decrease its market making role, eventually the private sectors started to play a much more active role in this market. There were twelve primary dealers appointed in 1998 to form a panel, this served the purpose of improving the efficiency and transparency of the secondary market, the panel included those registered South African local banks and branches of foreign banks (AACB 2006).

3.4 The implication of Emerging Bond Markets

3.4.1 Introduction

This section will conduct a review of literature on the domestic bond market development in emerging markets. The various problems faced by emerging markets (i.e. Asia except Japan and Latin America) to develop their bond markets will be discussed, and compared to South Africa, why our bond markets are more efficient and relatively well developed compared to most of other emerging-market countries.

Information is gathered by studying the reports from world-wide recognized financial institutions such as the Bank for International Settlements (BIS), World Bank, World Federation of Exchanges, International Monetary Fund

(IMF), Asian Development Bank (ADB) and other various journals and working papers.

3.4.2 The critical elements for developed bond market

The United States (U.S.) is the biggest and most developed bond market (both sovereign bond market and corporate bond market) in the world. Appendix 1 and 2 will include the table of Domestic debt securities and International bonds and notes by the Residence of issuer; this shows that the U.S. outstanding bonds under All-issuers dominated the total outstanding volume over the world. The U.S. market will be used as a model to assess various emerging markets and some critical elements for the developed bond markets.

Leigland's (1997) stated a frame of assessing the efficiency of the municipal bond markets, as is seen in figure 7. There are some key elements mentioned and the way in which the U.S addressed these issues is demonstrated.

Figure 7: The Framework for assessing the municipal bond market develop

Supply/demand	Essential market strengths	U.S. market characteristics
Demand for municipal bonds: Investor attraction	❖ Investor familiarity and confidence ❖ Ability to trade securities ❖ Freedom to invest ❖ Acceptable investment return ❖ Strong credit quality ❖ Information regarding risks ❖ Assistance in interpreting information	❖ 200yearsof legal/ procedural development ❖ Active secondary market ❖ Absence of government controls ❖ Tax-exemption for interest income ❖ Tax-supported debt ❖ Revenue-backed debt ❖ Separate corporate issuers ❖ Standardized legal/ Financial data ❖ Financial intermediaries(rating
Supply of municipal bonds: Issuer attraction	❖ Tolerable borrowing costs ❖ Long-term debt amortization ❖ Assistance for small borrowers ❖ Facilitative formal oversight	❖ Low interest rates/ Issuance costs ❖ Extended maturities ❖ Bond banks, pooled borrowing, etc ❖ Responsible self- regulation

Source: Leigland (1997)

To be efficient, the World Bank (2000) defined that the bond market should

have:

- Competitive market structure
- Low transaction costs
- Low level of fragmentation
- A robust and safe market infrastructure and
- High levels of heterogeneity among the market participants

If countries experience or have an expectation of a high inflation rate, high risks of default or large devaluation, both domestic or international investors and institutions would be reluctant to purchase the government bonds and thus make the bond markets less attractive and inefficient.

However, in order to improve the development of the government bond market, the banks and the banking system are key elements, Hawkins (2002) said a sound banking system can help with the stability of the financial markets, particularly during times of financial stress, the banks, as the important intermediates and users of the bond markets, can either act as:

i. Purchaser of the bonds,
ii. Guarantor of bonds to pay off other's debts if these entities default on the loan obligation,
iii. Securitizor bonds to pool the assets and restructure them into different segments or asset classes and then sell them to investors with different risk appetites,
iv. Underwriter of bonds to administer and distribute the bonds from the issuers through its underwriting network,
v. Issuers of the bonds.

If the banks and the banking system of a country are financially unhealthy, the secondary markets will be illiquid and inefficient.

3.4.3 The current situation and characteristics of South African bond market

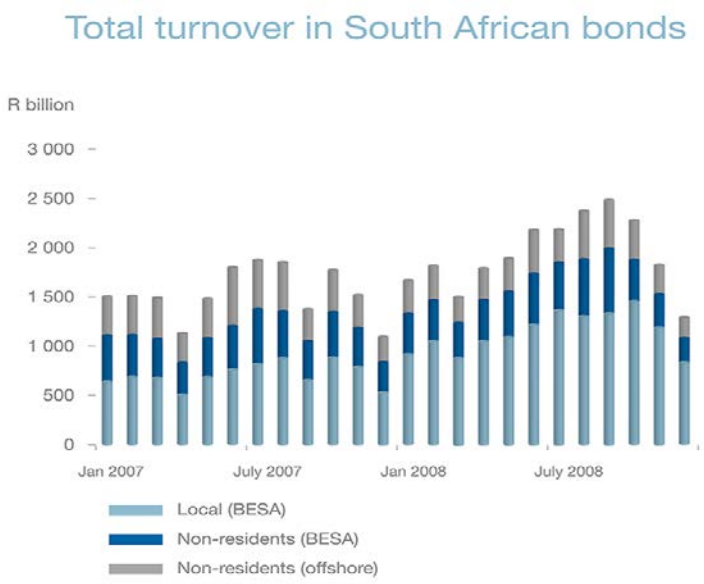
The South African bond market is well developed compared to other emerging markets; unlike many African and emerging markets countries, South Africa relies more on its domestic bond markets than on international borrowing.

The following characteristics of the South African bond market will be discussed.

i. Liquidity and Activity

The South African bond market is considered one of the most liquid bond markets in the world, especially the secondary domestic debt markets. Over the past 10 years, the Turnover Velocity recorded by BESA accelerated from 17.7 to 28.5, indicated that one bond was traded 28.5 times in the secondary market per year (BESA 2008). The transactions executed by foreigners (with either one domestic or foreign party at the opposite ends of the transaction) through BESA accounted for 27% of the total secondary bond market turnover recorded in 2008. Figure 8 illustrates the total turnover in South African bond by both local and non-residents transactions.

Figure 8: Total turnover in South African bond market



Source: BESA annual report 2008

It can be seen that the South African bond market attracts foreigners to come and trade while a high volume of trading activities helps to improve bond market efficiency. Several reasons exist to attract foreign investors, which are also the favorable characteristics of the South African bond market, and these will be discussed later in this section.

Mboweni (2006) mentioned two criteria for the efficiency bond market. First is Market depth, depth also means the liquidity, the greater the depth, the more ability the market participants have to execute sizable transactions quickly and cheaply, at the same time such transactions would not have too much impact on the prices. As discussed earlier, evidence shows that South Africa has good liquidity.

The second criterion is Market breadth, this is described by the number of market participants in the market as well as the size of a market. The total value of bonds traded in South African was USD 2898 billion in 2011 and

counted as the third largest exchange in the world. Figure 9 gives the ranks of the total value of bonds traded by different countries in 2011. Appendix A-3 will give the full information of each country's Exchange total value of bond traded. Figure 10 shows that there were 1084 bonds listed on BESA by 2012 and 132 different issuers listed, representing the central government, state-owned enterprises, local governments, as well as the private corporations. Appendix A-4 and A-5 will provide the number of bond listed and number of bond issuers in each country.

Figure 9: Largest exchanges by total value of bonds traded, 2011, in USD terms

	Exchange	USD bn 2011	USD bn 2010	% change in USD	% change in local currency
1.	BME Spanish Exchanges	17 412	11 041	57.7%	48.6%
2.	London Stock Exchange Group	5 394	4 029	33.9%	26.4%
3.	Johannesburg Stock Exchange	2 898	2 321	24.9%	23.7%
4.	NASDAQ OMX Nordic Exchange	2 674	2 626	1.8%	-2.7%
5.	Colombia Stock Exchange	915	1 138	-19.6%	-21.7%
6.	Korea Exchange	747	506	47.7%	40.9%
7.	Oslo Bors	590	554	6.6%	-2.4%
8.	Istanbul Stock Exchange	518	446	16.2%	27.9%
9.	MICEX	301	233	29.3%	23.7%
10.	Tel Aviv Stock Exchange	246	203	21.2%	16.6%

Source: World Federation of Exchanges Market Highlight 2011

Figure 10: Summary of listings, 31 March 2012

	Issuers	Listings	Nominal listed		Market capitalisation	
			R million	%	R million	%
Central government	1	85	819 332	59.1	947 363	60.7
Municipal	3	11	13 266	1.0	14 638	0.9
State-owned companies	7	40	168 214	12.1	183 419	11.8
Water authorities	4	11	17 687	1.3	24 351	1.6
Banks	9	207	177 389	12.8	197 832	12.7
Securitisation	29	189	61 657	4.4	62 181	4.0
Other corporates	38	89	67 846	4.9	69 453	4.5
Credit-linked notes/Default notes	8	298	22 687	1.6	22 860	1.5
Commercial paper	27	125	33 129	2.4	32 982	2.1
Dual listings/inward listings	4	27	5 450	0.4	5 648	0.4
Inward listings-foreign referenced assets	1	1	-	0.0	-	0.0
Exchange traded funds	1	1	500	0.0	-	0.0
Total	132	1 084	1 387 157	100	1 560 727	100

Source: National Treasury 2011/12

ii. Structural improvement and stable political environment

South Africa is one of the few countries in Africa that has never had a civil war . Since 1994, after apartheid, the new South African government has created a stable democratic political environment, and the government has also taken various steps to develop market structural improvements. These can be supported by the implementation of Accelerated and Shared Growth Initiative for South Africa (AsgiSA) in 2007, AsgiSA set the targets to halve unemployment and significantly decrease poverty by the end of 2014; government would contribute more to investment in infrastructure and to boost the economic growth under such environment (DTI, 2011:25). Subsequently, the government launched the New Growth Path (NGP) program in 2010; this framework aims to enhance employment creation, growth and equity, and the target is to create 5 million jobs over next 10 years.

iii. Appropriated macroeconomic policy and regulatory system

Kahn (2005) states that a country will benefit from a developed bond market if it has a stable macroeconomic policy, on both fiscal and monetary sides.

Default risks and high inflation are important impediments to the health of bond markets.

Harwood (2000) also supports the importance of the macroeconomic and political environment. The bond markets can only grow steadily under the stable macro and political environments. To attract investors and prompt the issuers to play in the markets, economic growth must be strong with a stable moderate interest rate and low inflation rate.

BESA has never had a liquidation default in its history and no claims have been made on its Guarantee Fund. The South Africa Reserve Bank implements the inflation target range to control the inflation effectively from the monetary perspective, while the South African government has little intervention on the capital market and allows the currency to fluctuate at competitive levels.

South Africa has adopted very restricted regulatory regulations, and it was one of the earliest emerging-market countries to adopt the Basel II accord. South Africa's securities exchange regulation ranks among the best in the world, and soundness of banks rank the second place in the world (Global Competitiveness Report 2011-2012).The FSB (Financial Services Board Act, No 97 of 1990) is also responsible for supervising and regulating the financial markets and overseeing the financial service industries.

iv. Reliable Benchmark yield

Parrenas (2000) states that benchmark yield curves can provide a reliable reference or benchmark to price the corporate bonds/ debts in both primary and secondary markets, thus if the yield curves only reach up to 5 to 10 years, it will be difficult to price corporate bonds in secondary markets especially if the

bonds have long time-to-maturity dates.

IOSCO (2011) also affirms the crucial function of the benchmark yield curve in the primary and secondary markets, the inefficient benchmark yield curve will create an impediment to price corporate bonds in the primary and secondary markets. Having a universal reliable government benchmark yield curve can enhance and improve the development of the corporate bond market. The government debt market is also a good form of yardstick to price corporate bonds and other debt instruments.

South Africa has a long history of bond issuance since 1970's. When the Bond Market Association (BMA) was transformed into Besa, a few major developments were made, for example it introduced the electronic trading platform, matched and settled the transactions, immobilized and then dematerialized the bonds listed on BESA, developed a series of total return indices for government and corporate bonds, and developed a more refined benchmark yield curve (Mboweni 2006).The bond types are varied with Fixed-rate bonds, Inflation-linked bonds, Treasury bills, Floating-rate bonds, etc. Figure 11 will provide the construction of government debt portfolio. In Figure 12 and 13, the maturities of fixed rate-bond and Inflation-linked bond will be stated.

Figure 11: Government debt portfolio, 31 March 2012

	R million	% of total
Fixed-rate bonds	668 274	56.20
Inflation-linked bonds	220 973	18.58
Treasury bills	155 159	13.05
Corporation for Public Deposits	13 105	1.10
Floating-rate note	0	0.00
Zero-coupon bonds	984	0.08
Retail savings bonds	12 060	1.01
Other loans	46	0.09
Total domestic debt	**1 071 601**	**90.12**
Foreign currency bonds	98 953	8.32
Other foreign currency loans	18 464	1.55
Total foreign currency debt	**117 417**	**9.88**
Total government debt	**1 188 018**	**100**

Source: National Treasury 2011/12

Figure 12: Fixed-rate bonds auction performance, 2011/12

Bond code	Issuance R million	Weighted average yield %	Average bid to cover ratio times	Term-to- maturity years
R203 (8.25%:2017)	15 833	7.62	2.77	+5
R204 (8.0%:2018)	11 983	7.93	2.77	+7
R207 (7.25%:2020)	14 783	8.09	2.75	+8
R208 (6.75%:2021)	19 286	8.23	2.76	+9
R186 (10.5%:2026)	12 694	8.45	2.78	+15
R213 (7.00%:2031)	16 472	8.76	2.79	+19
R209 (6.25%:2036)	11 581	8.67	2.78	+24
R214 (6.50%:2041)	17 467	8.79	2.76	+29
Total	**120 099**			

Source: National Treasury 2011/12

Figure 13: Inflation-linked bonds auction performance, 2011/12

Bond code	Issuance R million	Weighted average yield %	Average bid to cover ratio times	Term-to- maturity years
R212 (2.75%: 2022)	9 280	2.36	2.8	+9
R210 (2.60%: 2028)	8 320	2.49	3.3	+16
R202 (3.45%: 2033)	10 287	2.52	2.8	+21
Total	**30 117**			

Source: National Treasury 2011/12

The above figures show that the South African bond maturities coverage is well diversified in the short-, medium- and long term. The government will

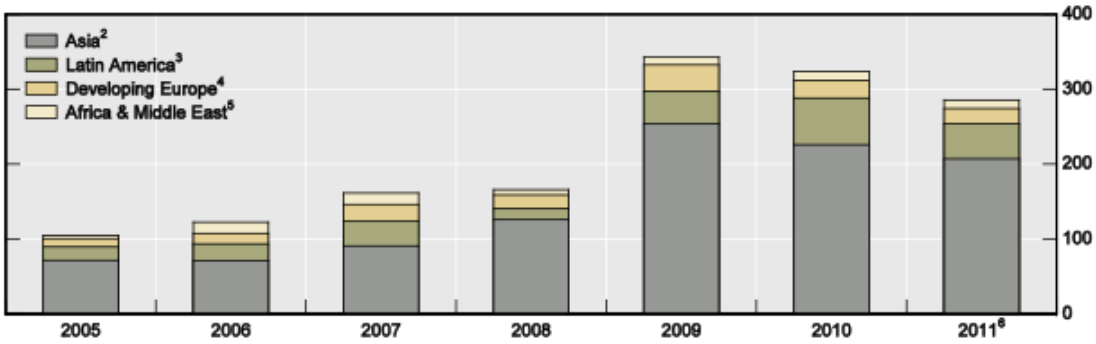
launch five new domestic long-term bonds in 2012/13; such new bonds introduction aims to create new benchmark bonds and to smooth the maturity coverage profile. The two fixed-rate bonds will have 11-year and 36-year maturities, and the three inflation-linked bonds will have 13-year, 26-year and 39-year maturities (National Treasury 2011/12).The Treasury bill maturities are varied through 91-days, 182-days, 273-days and 364-days which are all short-term.

3.4.4 The Asian bond market

In Asia and the Pacific, the domestic debt markets have made substantial and rapid growth since the 1997/98 Asian financial crisis after those crisis-exposed countries realized the important role of domestic debt markets in the functioning of stabilizing the economy and avoiding unexpected financial stresses, thus the Asian countries have made efforts to develop their government bond markets and to fix the flaws in their debt securities market system, and it has been seen that in major Asian-Pacific economies, great progress was made especially after the Asian financial crisis. According to Shim (2012), the outstanding domestic debt market value almost doubled from $10.5 trillion in September 2004 to $20.8 trillion by March 2011, while in this huge amount, the emerging Asia has enjoyed the fastest growth speed of domestic bond market, as it more than tripled from $2.0 trillion to $6.1 trillion.

Parrenas (2000) found that, except for Japan, most Asian countries' debt markets are still underdeveloped compared to those of developed nations, and the emerging Asia bond market is relatively small in terms of volume size, market participants and number of instruments. It turns out the debt markets in emerging Asian countries have very minor and less important roles to play compared to the more developed financial markets.

Figure 14: Emerging market corporate bond issuance (In billions of US dollars)



Source: Dealogic DCM Analytics[1]

Figure 14 shows the size of the corporate bond markets in emerging markets, and it is clear that the Asia bond issuances dominate in the emerging economies. Shim (2012) found out that China and Korea are the two largest corporate bond markets in terms of the absolute amount of the bonds outstanding, where Korea, Malaysia and Thailand are the three largest markets in terms of the size of the corporate bond market relative to GDP. There are a few factors that can be attributed for the rapid growth of Asia bond issuance, such as active support of local credit rating agencies and attraction of foreign participation and capital inflows. China, India, Korea, Malaysia and Thailand have very active local credit rating agencies in existence and most of these agencies were set up under governmental initiatives or in joint ventures with large international rating agencies. Such local credit rating agencies have supported the issuance of corporate bonds in the region.

[1] *Asia includes Azerbaijan, Bangladesh, China, Chinese Taipei, Hong Kong SAR, India, Indonesia, Korea, Kyrgyz Republic, Malaysia, Pakistan, the Philippines, Singapore, Thailand, Uzbekistan and Vietnam. Latin America includes Argentina, Brazil, Chile, Colombia, Dominican Republic, Jamaica, Mexico, Peru, Trinidad and Tobago, Uruguay and Venezuela. Developing Europe includes Belarus, Bulgaria, the Czech Republic, Croatia, Hungary, Latvia, Lithuania, Poland, Russia, Turkey and Ukraine. Africa and Middle East includes Saudi Arabia, South Africa and the United Arab Emirates. Botswana, Egypt, Ghana, Iran, Israel, Liberia, Morocco, Nigeria, Qatar.*

There are some characteristics of the Asian bond market, which distinguish it from the developed countries:

i. Liquidity

The bonds issued in Asian countries are usually in small sizes and with irregular intervals. The study by Parrenas (2000) shows that 'buy and hold' strategies are popular and commonly adopted by investors in Asian emerging markets, this passive trading strategy makes the bid/offer spreads very wide and the transactions become costly. The liquidity and secondary market turnover ratios in Asian emerging markets are generally lower than matured bond markets such as US, Australia and Western Europe. The bond market growth in the future would be constrained by low liquidity and market turnover ratios. The lack of secondary market capacity to absorb the supply may also present obstacles to bond trading by investors (Asian Development Bank February 2011).

The following figure shows the bond trade turnover in Asian emerging markets.

Figure 15: Bond trade turnover by country (period: quarterly)

	Government bond		Corporate bond	
	Mar. 2005	Sep. 2010	Mar. 2005	Sep. 2010
China	0.25	0.99	0.08	1.41
Hong Kong	12.30	34.71	0.06	0.05
Korea	0.86	1.19	0.16	0.25
Indonesia	0.19	0.27	0.06	0.13
Malaysia	0.41	0.65	0.24	0.07
The Philippines	1.32	0.99	N.A.	N.A.
Singapore	0.68	1.01	N.A.	N.A.
Thailand	0.42	0.83	0.05	0.04
Japan	1.16	1.18	0.19	0.07

Source: Asian Bonds Online, compiled by DIR

However, the turnover ratios of individual bond markets cannot be used to compare each other, this is because the bond trade turnover is based on the

maturities of the bonds, and each market has different structure maturities. For example, from Figure 15, it is noticed that Hong Kong has unusually high trade turnover for Government bonds, this is caused by the high volume of short term trading of exchange fund bills that being used for operating the currency board system (Asian Development Bank February 2011). Thus, the different bond markets turnovers cannot be simply compared in a chronological way.

Another indicator that measures the level of liquidity is trading spreads, a narrower trading spread shows a higher level of market liquidity, this is a result of low trading costs and it is relatively cheap to execute the transaction, thus liquidity can increase in this case.

Figure 16: Trading spread in each countries /economies

(bps)

	Gov't bond		Corp bond	
	2000	2010	2000	2010
China	15.0	2.2	n.a.	5.7
Hong Kong	3.5	5.1	8.0	12.5
Korea	1.8	1.1	5.0	2.6
Indonesia	100.0	31.7	100.0	99.7
Malaysia	4.9	2.6	15.0	16.0
The Philippines	47.5	3.1	40.0	30.5
Singapore	1.6	3.0	10.5	10.4
Thailand	2.8	3.1	10.0	11.1
Vietnam	n.a.	13.2	n.a.	25.0

Source: ADB Asia Bond Monitor-2010 November and Asia Bond Monitor-2006 November, compiled by DIR

The improvement can be seen from 2000 to 2010 that the entire Asian region is continuing to narrow down the spread except Hong Kong, Singapore and Thailand.

ii. Maturity Structure and Unreliable bond yield curve

Parrenas (2000) states that Benchmark yield curves can provide a reliable reference or benchmark to price the corporate bonds/ debts in both primary

and secondary markets, thus if the yield curves only reach up to 5 to 10 years, it will be difficult to price the corporate bonds in secondary markets especially those bonds with long time-to-maturity dates.

There are also factors that can lead to Asian bond market illiquidity and deviations from Maturity structure. Fabella and Madhur (2003) argued that the bond maturities in most East Asian are lopsided and their issuances concentrated on short- and medium terms. Korea's government issues bonds primarily on short- and medium-term; Malaysian bond issuances concentrate on short- and medium-terms; Treasury bills with maximum maturity of one year are dominant in the Philippines debt market; In Thailand, the bond markets were lopsided on short-term corporate bills with few longer term, but the government has taken initiatives to extend its bond maturity recently; Bond issuances in Indonesia and Taiwan China concentrate on short- and medium-term maturities. Only Hong Kong China and Singapore bond markets appear to have better cover in short-, medium- and long term maturities. For those countries with lopsidedness of bond maturities coverage, the government bond yield curve cannot appropriately reflect and price the corporate bonds, and government bond markets are not able to provide a reliable benchmark yield, but this is not the case in those advanced bond markets, where government bonds yield can be used as the benchmark.

iii. Investor Base and Composition of Issuers

The investor base for bond markets in most East Asian countries are less diversified and limited. Fabella and Madhur (2003) state that the investor base of developed bond markets is widely diversified, financial institutions are well developed and market players such as local and foreign banks, fund managements insurance companies and other saving institutions are formed as the investor base to actively participate in the bond market. However in

most East Asian countries, these financial institutions lag behind those in the mature markets thus the heterogeneity among the investors in bond markets is limited, as a result, the investment of market participants in Asian bond markets will be imbalanced.

In Hong Kong China, private banks are the major absorbers of the bond issuances; In Singapore, the government provident fund is the largest purchaser of bonds and then private banks are the second largest buyers; Bond issuances in Korea are largely absorbed by the banks; whereas in Malaysia, employee pension funds take the majority position in purchasing bonds; and in the Philippines, private commercial banks play a more important role in terms of bond absorption; pension funds denominate the bond markets in Indonesia and Thailand; in Taiwan China, approximately half of bond issuances depend on private banks and the other half portion are absorbed by contractual savings institutions (Fabella and Madhur 2003).

Thus in most East Asian markets, there is only a limited number of institutional investors trading in the debt securities markets and such imbalanced investment by the local institutional participants could impede the development and growth of an effective bond market. For those small numbers of institutional investors who actively trade in the markets, the trading strategies they apply are buy-and-hold and indexing strategy, and these passive strategies do not support the establishment of a liquid secondary market.

Gyntelberg, Ma and Remolona (2006) found that the issuers in East Asian bond markets are also highly concentrated and not diversified. The large corporates in a matured market are able to raise capital and issue bonds, while the investors can assess the available market information to determine the company's credit quality, and the issuer/company with funding needs will

compensate its bond buyers for any risks they are taking. The existence of non-resident foreign issuers also sends a positive signal that the market is fair and regulated to attract foreigners and provide funds on terms that are competitive with those available in foreign credit markets.

Asian bond issuers are concentrated at those high credit quality ranges. For example, in Malaysia, approximately 40% of the total issuers in the market have high credit ratings of AAA and the remaining 40% of the total issuers hold AA credit ratings; while in Korea, about 60% of the issuers in the market are assigned with triple-A ratings; on the other hand, quasi-government issuers play a major role in China and India and also comprise more than one third of the bond market in both Indonesia and Philippines.

iv. Market infrastructure and Regulatory framework

The presence of an effective legal and regulatory framework is extremely important and crucial to govern bond markets, a sound regulatory system and market infrastructure will help to create a more efficient bond market, this is particular the case in emerging markets. The bond markets should be supervised and governed by one or more regulatory bodies to ensure the good functioning of the market.

The following two figures, figure 17 and 18 show the qualitative assessments of Regulatory frameworks and Market infrastructure across the East Asian countries (with some developed nations).

Parrenas (2000) states that in most East Asian countries, bond issuers do not disclose their transaction procedures properly and clearly. Since they do not comply with adequate and strict disclosure requirements, this encourages low confidence among the bond purchasers. The investors from emerging Asian

markets are not well protected especially during the conduct of over-the-counter debt transactions when they are not backed by clearing houses, or when more complicated financial instruments are involved such as derivatives on bonds, thus measurement need to be taken into account as to the way in which investors' rights and interests can be improved, this can be done by developing a sound effective legal framework and compliance system.

Figure 17: Indicators of Quality of the Legal and Regulatory Framework(0 to 10 scale, higher is better)

	Contract Realization	Lack of Corruption	Rule of Law	Bureaucratic Quality	Accounting Standards	Press Freedom	Total Score	Ranking
Hong Kong, China	8.82	8.52	8.22	6.90	7.3	6.72	7.75	1
Singapore	8.86	8.22	8.57	8.52	7.9	3.44	7.58	2
Taipei,China	9.16	6.85	8.52	n/a	5.8	7.16	7.5	3
Korea, Rep. of	8.59	5.30	5.35	6.97	6.8	7.36	6.73	4
Malaysia	7.43	7.38	6.78	5.90	7.9	3.90	6.55	5
Thailand	7.57	5.18	6.25	7.32	6.6	6.02	6.50	6
Philippines	4.80	2.92	2.73	2.43	6.4	5.54	4.14	7
Indonesia	6.09	2.15	3.98	2.50	n/a	2.86	3.52	8
United States	9.00	8.63	10.00	10.00	7.6	8.72	8.99	
Japan	9.69	8.52	8.98	9.82	7.1	7.92	8.67	
Australia	8.71	8.52	10.00	10.00	8.0	9.12	9.06	

Source: Fabella and Madhur (2003)

Figure 18: Indicators of Quality of the Financial Infrastructure(0 to 10 scale, higher is better)

	Delivery and Settlement	Benchmark Yield Curve	Public Issuance Modality	Private Issuance Modality	Average Score	Ranking of East Asian Countries
Hong Kong, China	8	8	8	8	8.0	1
Singapore	8	8	8	8	8.0	1
Taipei,China	8	4	8	8	7.0	2
Korea, Rep. of	6	6	8	6	6.5	3
Malaysia	6	4	6	6	5.5	4
Thailand	4	4	4	4	4.0	5
PRC	2	0	2	0	2.0	6
Philippines	2	0	4	0	1.5	7
Indonesia	2	0	2	0	1.0	8
US	10	10	10	10	10.0	

Source: Fabella and Madhur (2003)

From the figures above, it can be shown that in Hong Kong China and Singapore, the bond markets are relatively free and there are few obstructions to investing, although the market sizes are not big, but they have better legal and regulatory frameworks than other emerging Asian markets, both markets are quite open to foreign investors and they have comprehensive reporting requirements, the market infrastructure in Hong Kong China and Singapore is also more developed, Fabella and Madhur (2003) said that in many respects, Hong Kong China and Singapore belong to the first tier in bond market development in East Asia.

To conclude, the Asian Development Bank developed a spider chart that captures market participants' perceptions of the importance of the following structural and policy issues in strengthening and deepening local currency bond markets.

- *Greater diversity of investors and traders*
- *Easing restrictions on market access*
- *Easing foreign exchange regulations and restrictions,*
- *Availability of funding for market participants*
- *Tax treatment*
- *Settlement and custody*
- *More efficient hedging instruments*
- *Transparency*

Market participants characterized each of the above issues by degree of importance, with a corresponding numerical score, as they affect market structure and liquidity:

- *Not important (1)*
- *Somewhat important (2)*
- *Important (3)*
- *Very important (4)*

Figure 19: The Local Currency Government Bond market structure issue



Source: Asian Bonds Monitor Nov 2011, Asian Development Bank

The most important structural issue for market participants perceived was investor diversity, which had a score of 3.5, followed by hedging mechanisms, transparency, and foreign exchange regulations, all with scores of 3.0, and transaction funding with a score of 2.9. The lowest scores were for settlement and custody (2.6), market access (2.6), and tax treatment (2.4).

The scores for individual Asian government and corporate bond markets are included in Appendix 6 and 7 respectively. The countries to be assessed are Mainland China, Hong Kong China, Korea, India, Indonesia, Philippines, Singapore, Malaysia, Thailand and Vietnam.

3.4.5 The Latin American bond market

Like most Asian bond markets, Latin American bond markets also lag behind those of industrialized countries. They have, overall, small bond markets due

to the small size of government segments. Braun and Briones (2006) has explained what a well-developed bond market should have. Braun and Briones (2006) said that a well-developed bond market should have a large size relative to GDP in all market segments. It also should have a fairly stable composition between private and public issuers. Lastly, financial institutions should become increasingly important compared to non-financial corporations.

However, domestic bond markets in Latin America have remained underdeveloped. This is mainly due to a number of policies that have been implemented to almost prevent free investing and due to structural impediments. These policies and impediments include a poor record of performance of macroeconomic management, a deep and diversified investor base not in existence, the development of primary and secondary market activities are restricted heavily by government regulation and lastly, the lack of adequate infrastructure for the debt securities issuers in the private sector.

i. Liquidity and Market size

The capitalization of Latin American bond markets, measured as a percentage of GDP, is significantly lower. The following two figures show the bond issued as a percentage of the country GDP by different economies and various Latin American countries.

Figure 20: Stocks of public and private bonds relative to GDP (By economies)

The State of Bond Markets, 2004

	Developed economies	East Asia	Latin America	Other emerging markets
Bonds issued as percent of GDP:				
Private	70.9	22.0	9.0	3.9
Financial	44.6	11.8	4.8	2.6
Corporate	26.3	10.2	4.3	1.2
Government	59.6	29.3	22.3	47.1
Total	130.5	51.3	31.3	50.9

Source: Borensztein, Cowan, Eichengreen and Panizza (2008)

Figure 21: Stocks of public and private bonds relative to GDP (By countries)

Bond Markets in Latin America, 2004

	Argentina	Brazil	Chile	Colombia	Mexico	Peru
Bonds issued as percent of GDP:						
Private	9.8	12.6	23.3	0.6	3.4	4.5
Financial	3.4	12.0	11.1	0.0	0.8	1.3
Corporate	6.3	0.7	12.2	0.6	2.6	3.2
Government	5.0	48.9	21.3	30.4	22.4	5.8
Total	14.7	61.5	44.5	31.0	25.7	10.4

Source:Borensztein, Cowan, Eichengreen and Panizza (2008)

The smaller size or market breadth of bond markets in Latin America will result in the market becoming inefficient and illiquid as Mboweni (2006) mentioned as the second criteria of efficiency. Total volume of bond traded and bid-ask spreads are other good indicators of secondary market liquidity. From Appendix 3, that is, the total volume of bonds traded, it clearly shows that the total bond value traded by Latin America is very similar to Asia Pacific, and compared to UK, US, Spain and South Africa, it is significantly lower.

Jeanneau and Tovar (2006) said the tightness of the market, which is also the efficiency and the bond bid-ask spreads, gives a good approximation of the costs incurred for market participants and helps them execute the transactions. Figure 21 provides bid-ask spread size of fixed rate government bonds among the Latin American countries. It can be seen that markets of fixed rate government securities do not seem to be very tight when comparing to the market in the US. In fact, the bid-ask spreads are significantly higher in Latin America than those in the United States. However there are major differences within the region which also need to be considered. In Colombia and Mexico the bid-ask spreads are narrow; whereas in Argentina, Peru and Venezuela, the bid-as spreads are quite wide.

Figure 22:Indicators of secondary market liquidity in local government securities markets (Bid and Ask spread)

Indicators of secondary market liquidity in local government securities markets in 2005				
	Annual turnover		Bid-ask spread	Average size of transaction related to bid-ask spread
	In billions of US dollars	As a percentage of outstanding securities		
Argentina	91.5	187	10–50 bp on fixed rate and inflation-indexed bonds	ARS 2–10m
Brazil	433.0	79	5 bp on fixed rate bonds	BRL 10–50m
Chile	26.0	98	5 bp on fixed rate bonds	CLP 100m
			5–10 bp on inflation-indexed bonds	UF 100,000
Colombia	45.0	132	3–5 bp on fixed rate bonds	COP 2bn
Mexico	696.7	494	3–5 bp on fixed rate bonds	MXN 50–100m
			5–15 bp on inflation-indexed bonds	MXN 5–10m
Peru	2.6	46	10–20 bp on fixed rate bonds	USD 1m
Venezuela	2.8	39	50–100 bp on floating rate bonds	VEB 2.4bn
Total	1,297.6	160	...	...
Memo:				
United States	*138,756.0*	*2,186*	*0.8–1.6 bp on fixed rate bonds*	*USD 25m*

Source:Jeanneau, S and Tovar, E. C (2006)

McCauley and Remolona (2000) calculated a rough estimate of market capitalization threshold for a bond market to be deep and liquid. The estimate is around $100 billion. In this region, according to the figure shown above, only Brazil and Mexico exceed that threshold.

ii. Investor Base

Jeanneau and Tovar (2008) found that without a broad and diversified investor base in Latin America, it is very difficult for Latin American markets to develop into a deep bond market. In most emerging countries, institutional investment does not play an important role as in developed countries except in Chile as it is more developed than the rest of the Latin American countries. However, even when institutional investment plays a large role, it is still considered difficult to seize investment opportunities. This is because the restrictions placed on asset holdings are especially on lower-rated or private sector securities.

Crabbe (2005) found that institutional investment has not played an extensive role, especially in most emerging countries in Latin America. In Chile the pension fund had gradually increased to 70% of GDP in 2004, whereas in other countries in Latin America, similar holdings present much lower percentages in proportion to GDP, for instance, in Mexico it is 6% and 14% in Argentina.

Most mutual fund industry is underdeveloped in Latin America except in Brazil. Jeanneau and Tovar (2008) found that there are not many insurance companies in this region, and the local hedge fund industry essentially does not exist. In some countries within this region, for example Chile, pension funds have played a dominant role in securities markets.

iii. Regulatory and Policy framework

In Latin American countries, the policies and regulatory restriction has impeded the development of an efficient bond market. Jeanneau and Tovar (2006) stated that limitations on interest rate control and restrictions on investment are the main factors inhibiting active trading. Taxation has also created an impediment to trading. Furthermore, market liquidity has been constrained due to insufficient support from infrastructure for trading in government bonds. Jeanneau and Tovar (2006) also suggest areas that need to be improved to have a proper infrastructure include a system that obligates primary investors to provide two-way quotes and the availability of repurchase agreements and interest rate derivatives. For instance, in Brazil, foreign investors must register when investing in the local securities market with the Brazilian securities regulator. The Central bank will also nominate a legal representative to monitor the whole process. The foreigner will also be liable for at least two types of taxes. In Colombia, foreign investors are only allowed

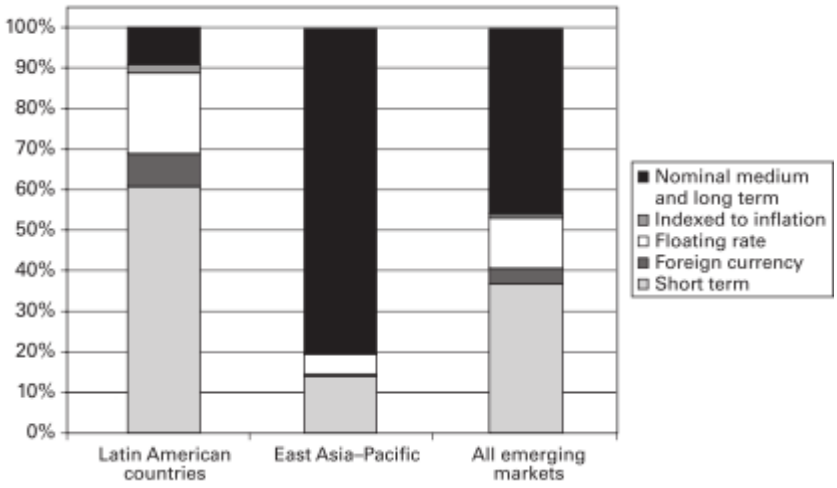
to invest in local securities through an investment trust and a withholding tax is also in place, depending on the maturity of the securities.

It is clear that foreign investors in Latin American countries only constitute a very small proportion of the local market, says Jeanneau and Tovar (2006). This is due to the prevalence of capital control which is the case in Argentina, Brazil, Colombia and Venezuela. Trading is also inhibited by various restrictions on interest rate and tax.

iv. Maturity Structure and Unreliable bond yield curve

There is a lack of long-term government benchmarks placed in the pricing of corporate liabilities in Latin America. Borensztein, Cowan, Eichengreen and Panizza (2008) found that the majority of long-term securities issued in Latin American markets are either subject to floating interest rates or are indexed to inflation or the exchange rate. Figure 22 shows the total composition of different types of domestic bonds issued in Latin American countries compared to Asia-Pacific and the overall emerging market.

Figure 23: The composition of domestic government bonds issued in Latin America



Source:Borensztein, Cowan, Eichengreen and Panizza (2008)

From the diagram above, it is found that short-term, floating rate and inflation-indexed securities account for the majority portion of the outstanding domestic government securities. Without universal coverage of bond maturities, the government bond yield could not be a reliable source to price the corporate bond market. However, Jeanneau and Tovar (2008) have discovered that in recent years government debt in local currency in Latin American countries had become more structurally mature. This is partially due to the shift from short-term debts to fixed rate long-term bonds and the maturity of fixed bond being lengthened. Mexico and Peru issued their first 30-year bonds in 2006. Brazil has made important progress in recent years, which is evidenced by the 20-year bond issuance. Colombia now also issues 15 and 20 years bonds on top of its common 10-year bond. Chile has issued 10-year bonds in an effort to reduce the degree of inflation-linked or indexation of its government debt market. Longer-term issuance has also been made available in Venezuela which is due to the excess liquidity resulting from capital controls. The longer-term debts have become increasingly available across Latin American countries; this has provided a useful representation of term structure of interest rates in the region.

3.5 Summary

The literature review on the South African bond market and other emerging markets has highlighted the importance of the bond market development. The criteria to become an efficient bond market are, firstly, the country must have a liquid market; this can be supported by the large size of bond market in relative to the total volume traded. McCauley and Remolona (2000) estimated the size should be greater than 100 billion USD to be considered as a liquid market. South Africa has much larger size and higher value of bonds traded than Asian

countries and Latin American countries with total volume of bonds of $2898 billion. Secondly, the country should have a well-covered bond maturities and reliable bond yield curve. This can be implemented by issuing different types of government bonds from short-, medium- and long term, thus the government bond yield curve can be used to price the corporate bonds. Unlike most East Asian countries, except Hong Kong China and Singapore, that concentrate on short- to medium fixed rate bonds, and Latin American countries that focus on short-term and floating rate bonds, South Africa has a diversified range of different issued bonds varied with Fixed-rate bond, Inflation-linked bond, Treasury bills, Floating-rate bond, Zero-coupon bond, Corporation for public deposits, Retail saving bond and some other foreign currency bonds and loans (National Treasury 2011/12). Thirdly, a country should also have a well-diversified investor base and market participants. In most Asian countries, different investors heavily absorb the bond issuance, either state-owned commercial banks, private banks or other saving institutions. In Latin American countries, institutional investors are still underdeveloped, while in South Africa, institutional investors have active roles in the bond markets and are well developed, the Government and the South African Reserve Bank have played significant roles in the development of the South African bond market. However, as soon as a certain level of market depth was reached, the private sector started to play a much more active role in the market (Mboweni 2006). Lastly, the country must have a stable political environment, and a sound legal and regulatory framework to govern the bond market. In East Asian countries, except Hong Kong China and Singapore, the disclosure requirements for debt issuers are inadequate and regulation is not restrictive. In Latin American countries, regulations impede the investment by foreign investors and they are also not very open to foreign investors. However, South African security exchange regulation was ranked 1st place among 142 countries by the Global Competitiveness Report. The regulatory system is well developed and South

Africa has various bodies to supervise and regulate the financial markets and oversee the financial service industries.

Thus, based on the key points addressed in the previous sections, the conclusion would be the South African bond market is more efficient than East Asian countries except Hong Kong China and Singapore. In comparison to the Latin American countries, South Africa is also more developed, but since countries like Brazil, Mexico and Colombia are still developing and restructuring of their bond markets, further study will be required to monitor the efficiency in these markets.

CHAPER FOUR: METHODOLOGY

4.1 Methodology

4.1.1 Introduction

This section is to test the weak-form of efficient market hypothesis on three bonds in South Africa, one being government bond, one being corporate bond (Absa) and the last one is All Bond Index (ALBI). The government bond was chosen based on the earliest issued date, whereas the corporate bond was chosen based on its high rating. ALBI is the accurate indicator in terms of its representative and comprehensive characteristic because it is the average index for the bond market performance.

The bond market has been tested to determine the underlying market efficiency. In this paper the researcher will test the bond market in a fashion in which a stock market is tested and finally draw conclusions on the bond market efficiency.

4.1.2 Simple regression model with time varying parameters

If an underlying security market follows a random walk it is considered to have the characteristics and implications of that of a weak form efficient market that is, prices fully reflect the information contained in the historical changes in price. In these circumstances, historical price information provides no opportunities to make a profit. An efficient market follows a random walk, and hence is unpredictable. An efficient market is unpredictable, in principle it can be tested using a simple model, which was used by Jefferies and Smith (2005) when testing the market efficiency.

$$r_t = \beta_0 + \beta_1 r_{t-1} + \mu_t \qquad (1)$$

Where $r_t = P_t - P_{t-1}$and P_t is defined as $P_t = \log(S_t)$, S_t is asset price at time $t.\beta_0$ is the intercept and β_1 is the slope. If the market is an efficient market then $\beta_1 = 0$, which indicates that:

$$P_t = \beta_0 + P_{t-1} + \mu_t \qquad (2)$$

Campbell *et al* (1997) discovered three successively weaker versions, depending on the assumption made about the increments$\{\mu_t\}$, with Random Walk 1, RW1, increments are independently and identically distributed with zero mean and constant variance, denoted by $\mu_t \sim \mathrm{IID}(0, \sigma^2)$,with RW2, the increments are independent but not identically distributed, which allows for unconditional heteroskedasticity in the $\{\mu_t\}$, and with RW3 the increments are uncorrelated but not independently and not identically distributed and under RW3 the volatilities of the increments are changing over time.

Equation (1) has constant beta parameters and the disturbance is assumed to have a normal distribution with zero mean and constant variance. However, as Jefferies and Smith (2005) found that with emerging markets, the assumption of constant parameters may be inappropriate as the markets develop and become mature the parameters are expected to change in line with the markets.

This can be improved by substituting β_0 and β_1 with β_{0t} and β_{1t} into equation (1), the new parameters are defined as follow:

$$\beta_{0t} = \beta_{0t-1} + v_{0t} \;; \qquad v_{0t} \sim N(0, \sigma_0^2) \qquad (3)$$

$$\beta_{1t} = \beta_{1t-1} + v_{1t} \ ; \qquad v_{1t} \sim N(0, \sigma_1^2) \qquad (4)$$

Now this model has parameters that change through time and the increment is RW1. The time varying parameters is to account for the development of emerging markets. From the equation (3) and (4), we can see that the parameters are now changing in line with the time period.

There is, however, another problem associated with this model, that is, the variance of the return is assumed to be constant. Empirical evidence has frequently shown that the variance of the return does change systematically. This problem will be addressed in the next section. We will use the model to test the market efficiency.

4.1.3 Test of evolving Efficiency

Emerson *et al* (1997) and Zalewska-Mitura and Hall (1999) have developed a test for evolving efficiency (TEE) which detects changes in weak form efficiency through time where the error process does not have a full set of NIID properties. This test adds a GARCH term into the model we defined in the last section, the reason of the addition of a new term is to solve the problem of having a constant variance.

The test defined and developed by Emerson *et al* (1997) and Zalewska-Mitura and Hall (1999) is based on the following model in which returns depend on past returns and the conditional variance

$$r_t = \beta_{0t} + \beta_{1t} r_{t-1} + \delta h_t + \mu_t \qquad (5)$$

$$\mu_t | \psi_{t-1} \sim N(0, h_t) \qquad (6)$$

$$h_t = \alpha_0 + \alpha_1 \mu_{t-1}^2 + \gamma_1 h_{t-1} \qquad (7)$$

$$\beta_{0t} = \beta_{0t-1} + v_{0t} \;; \qquad v_{0t} \sim N(0, \sigma_0^2) \tag{3}$$

$$\beta_{1t} = \beta_{1t-1} + v_{1t} \;; \qquad v_{1t} \sim N(0, \sigma_1^2) \tag{4}$$

in which h_t is the conditional variance of the error term and ψ_t is the information set available at time t; this model has two important characteristics. Firstly, the intercept, β_{0t} and slope coefficient, β_{1t}, can change through time. However, the special cases where either or both of these are constant are also included. Secondly, this model incorporates an error process in which the variance changes systematically over time. A maximum likelihood search procedure with a standard Kalman filter is used to estimate the model with equation (5), the measurement equation, and the set of equations given by (7), (3) and (4), the stated equations. The Kalman filter sequentially updates coefficient estimates and generates the set of $\beta_{it}s,\ i = 0,1$for$t = 1 \ldots T$ and their standard errors.

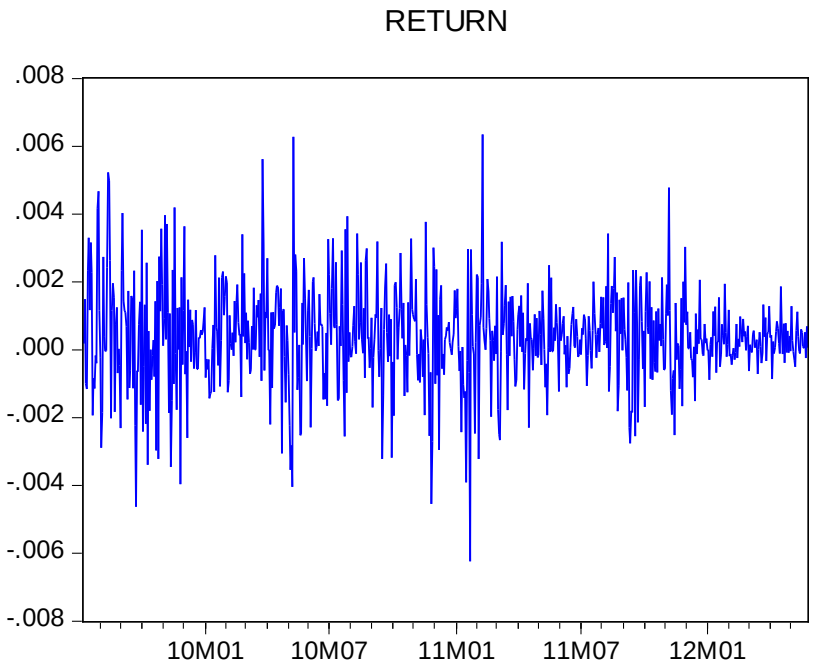
4.1.4 Data and its properties

Three data sets are chosen for this test. They are one government bond and one corporate bond and the All Bond Index (ALBI). This index is reading the close clean price. The investigation period for the government bonds is from July 2009 to May 2012. The daily price of each bond is observed and extracted from Bloomberg. There are 752 data points for the government bond. Government bond Z006 is chosen as it is the earliest government bond issued in South Africa. The one corporate bond chosen is ABSA. The investigation period is over two years started in July 2010. The reason why it is chosen is because it is the highest rating bond as well as the largest corporate. ALBI is the Bond Exchange Association of South Africa All Bond Index (Total Return Index). The ALBI is used as the benchmark for the Pure Fixed Interest Local

Portfolio. ALBI is extracted from I-NET. For this paper, we looked at ALBI for a period from 2004 January to 2012 October.

We will first examine whether the return of each is stationary. The following are graphs plotted against logarithm form of return for the whole investigation period for three bonds.

Figure 24: Unit Root test for Government Bond Z006



Source: Eview

The y-axis represents returns, x-axis represents days. From the graph the logarithm form of return r_t (defined in section 3.3) seems to be stationary for the given period. However, we will still use Unit Root test to confirm whether or not the underlying series is indeed a stationary process which is a pre-condition for being a random walk process.

Table 1: Unit Root test for Government Bond Z006

Null Hypothesis: RETURN has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=19)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-25.60736	0.0000
Test critical values:	1% level	-3.438842	
	5% level	-2.865178	
	10% level	-2.568763	

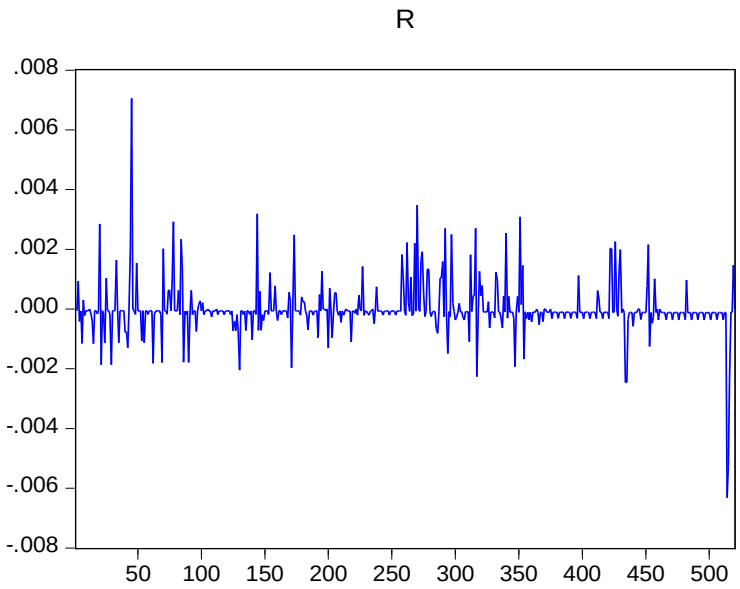
*MacKinnon (1996) one-sided p-values.

Source: Eview

The ADF statistic value is -25.60736 and the associated one-sided *p*-value (for a test with 752 observations) is less than 0.0001. In addition, EViews reports the critical values at the 1%, 5% and 10% levels. Notice here that the absolute value of t-statistic is significant so that we reject the null at conventional test sizes and conclude that there is no unit root and r_t is stationary, in other words, the investigated underlying data follows a random walk process.

The following shows the graphs and statistics of the two corporate bonds.

Figure 25: Unit Root test for corporate bond – ABSA



Source: Eview

Table 2: Unit Root test for Corporate bond – ABSA

Null Hypothesis: R has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=18)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-19.12296	0.0000
Test critical values:	1% level	-3.442746	
	5% level	-2.866900	
	10% level	-2.569686	

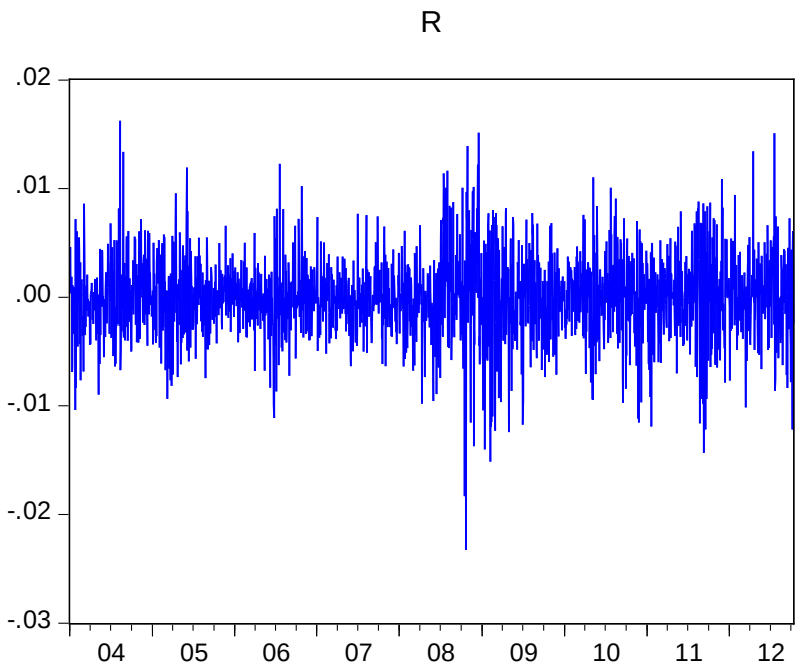
*MacKinnon (1996) one-sided p-values.

Source: Eview

ABSA bonds share similar characteristics as that of the government bond in terms of a stationary process. The ADF statistic value is -19.12296 and the associated one-sided *p*-value (for a test with 520 observations) is less than 0.0001. The absolute value of t-statistic is significant so that we reject the null

at conventional test sizes and conclude that there is no unit root and r_t is stationary

Figure 26: Unit Root test for All Bond Index (ALBI)



Source: Eview

Table 3: Unit Root test for All Bond Index (ALBI)

Null Hypothesis: R has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=26)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-42.25142	0.0000
Test critical values:	1% level	-3.433015	
	5% level	-2.862603	
	10% level	-2.567382	

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

Source: Eview

All Bond Index shows the similar characteristics of, as others, stationary

process. The ADF statistic value is -42.25142 and the associated one-sided *p*-value (for a test with 2300 observations) is less than 0.0001. The absolute value of t-statistic is significant so that we reject the null at conventional test sizes and conclude that there is no unit root and r_t is stationary

We have tested three data sets and concluded that the returns on these bonds are stationary processes. Now we can proceed to test whether or not these three data sets are in fact a random walk process and then conclude whether or not the bond market in South Africa is a weak-form efficient market.

The first model we will use to test the data is a simple regression model with time varying parameters, which is defined as follow:

$$r_t = \beta_{0t} + \beta_{1t} r_{t-1} + \mu_t$$
$$\beta_{0t} = \beta_{0t-1} + v_{0t} \ ; \qquad v_{0t} \sim N(0, \sigma_0^2)$$
$$\beta_{1t} = \beta_{1t-1} + v_{1t} \ ; \qquad v_{1t} \sim N(0, \sigma_1^2)$$

In the case of an efficient market the parameter β_{1t} needs to be as close to zero as possible. μ_t in this model is a random disturbance and distributed with zero mean and constant variance.

The following graphs show the movement of β_{1t} for three different data sets:

Figure 27: Simple regression with time varying parameters for Government bond Z006

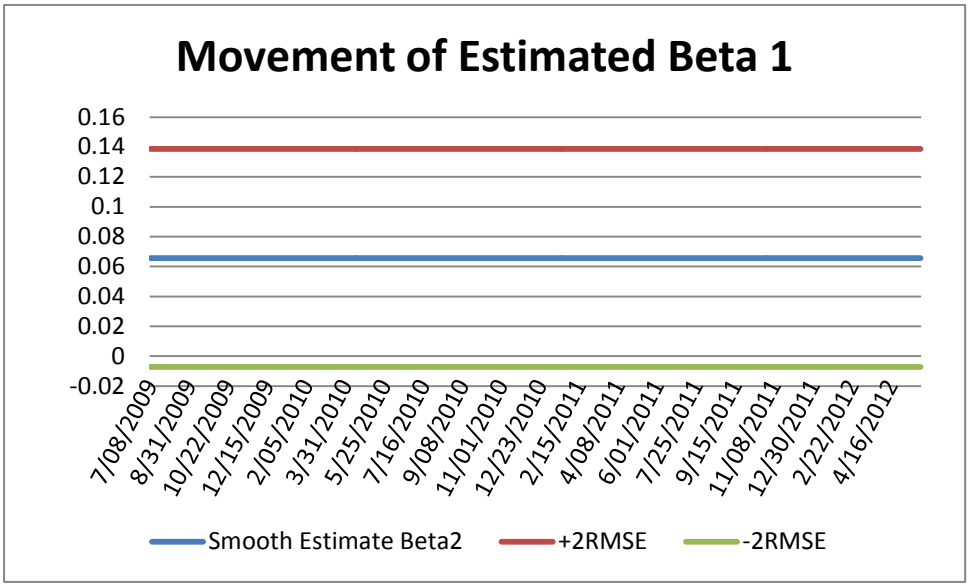


Figure 28: Simple regression with time varying parameters for Corporate bond – ABSA

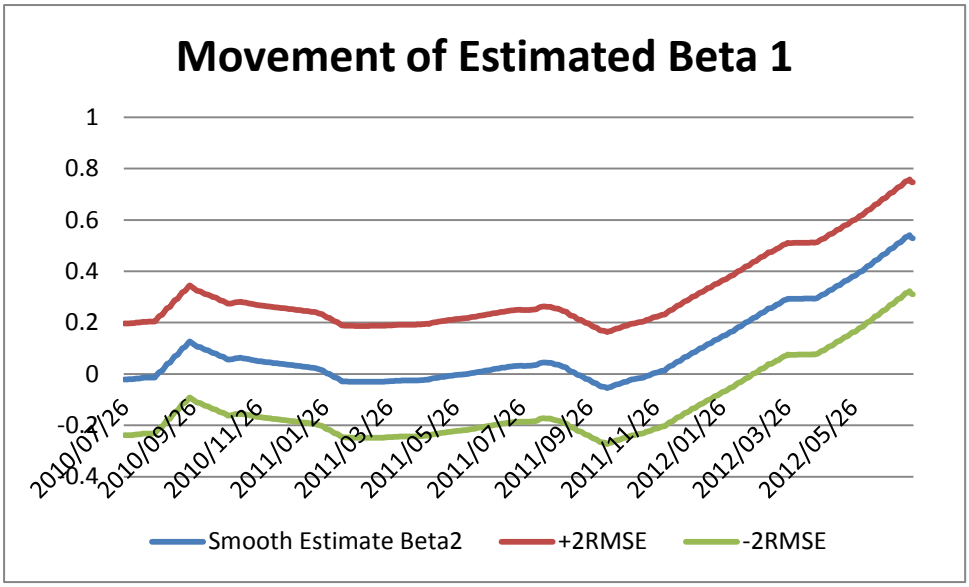
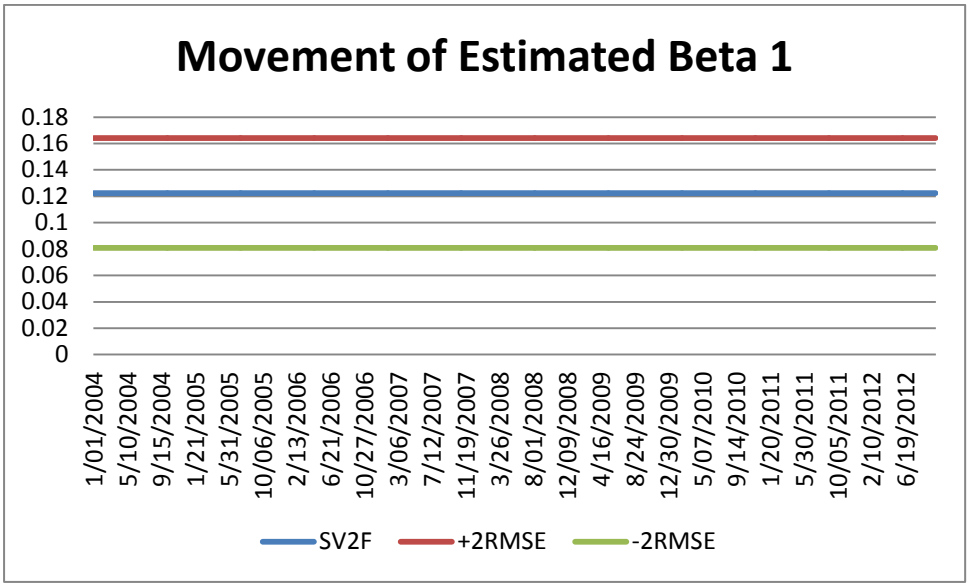


Figure 29: Simple regression with time varying parameters for All Bond Index (ALBI)



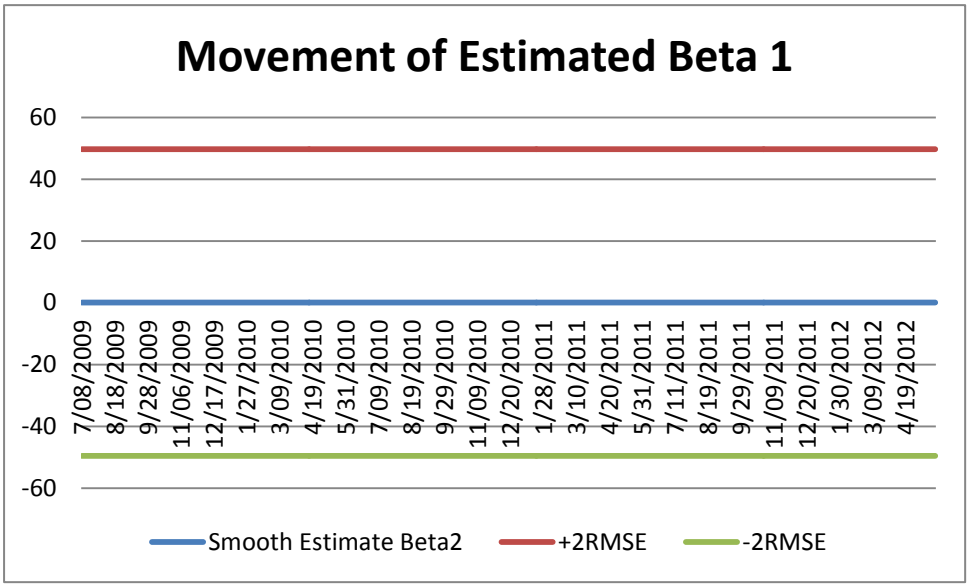
From the above graphs we can see estimated β_{1t} for each data set is around zero except for the ABSA bond which is moving away from zero, this could be interpreted as the ABSA bond became less efficient. However, this could be due to the size of sample data being very small, hence a few extraordinary movements might distort the results. From a statistical point of view, estimated β_{1t} s not significantly different from zero at a 0.95 confidence interval.

However, there is an issue associated with this model, it assumes the variance of the residual disturbance to be constant. This, however, is not the case in the real world, as much empirical evidence suggest that the variance of the return of the underlying stock changes systematically. From the equation (1) we can see that the variance of the return is the variance of the residual disturbance μ_t. If we recall the graph of daily returns of the bonds, we can see that the variance is not constant; to address this issue a time-varying variance should be considered, hence a GARCH term variance should be added into the model.

Equation (5), (6) and (7) have provided us an adjusted model based on the model we have just implemented. The adjusted model adds a GARCH variance term, $h_t = \alpha_0 + \alpha_1 \mu_{t-1}^2 + \gamma_1 h_{t-1}$, where h_t is the GARCH variance term, μ_t is residual part from equation (1). Instead μ_t being Normal distributed with constant variance, μ_t now is Normal distributed with zero mean and variance h_t.

The following graphs and statistics illustrate the movement of β_1 with 0.95 level of confidence interval for three bonds.

Figure 30: Simple regression with time varying parameters for All Bond Index (ALBI)



The result shows the value of the estimated β_{1t} with GARCH term and time varying parameters is 0.065667 and stays constant. The 0.95 confidence interval are 49.67735 and -49.546 respectively. The lower bound covers zero. This exhibits the characteristic of a weak-form efficient market. The following shows the statistics of the estimated β_1.

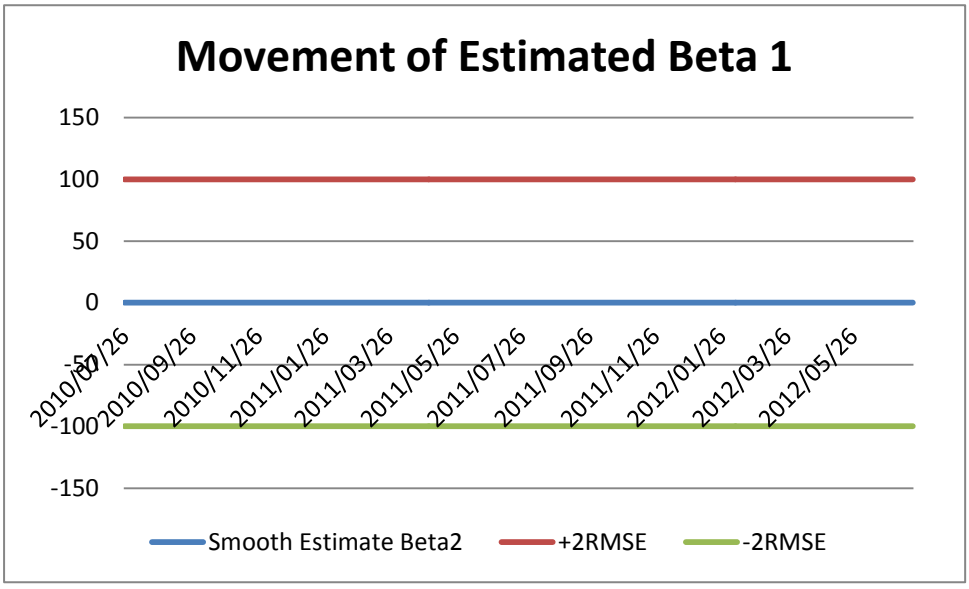
Table 4: Estimated β_1 for Government bond Z006

	Final State	Root MSE	z-Statistic	Prob.
β_0	0.000355	0.037716	0.009426	0.9925
β_1	0.065667	24.80584	0.002647	0.9979

Source: Eview

As we can see the p-value is 0.9979 and is greater than $\alpha\%$. This suggests that it is insignificant and we cannot reject null hypothesis, that is $\beta_1 = 0$; we can conclude that the previous return has little explanatory power for the current return.

Figure 31: Test of Evolving Efficiency for Corporate bond - ABSA



The result shows the value of the estimated β_{1t} with GARCH term and time varying parameters is 0.17006 and stays constant. The 0.95 confidence interval are 100.0401 and -99.7 respectively. The lower bound covers zero. This exhibits a characteristic of a weak-form efficient market. The following

shows the statistics of the estimated β_1.

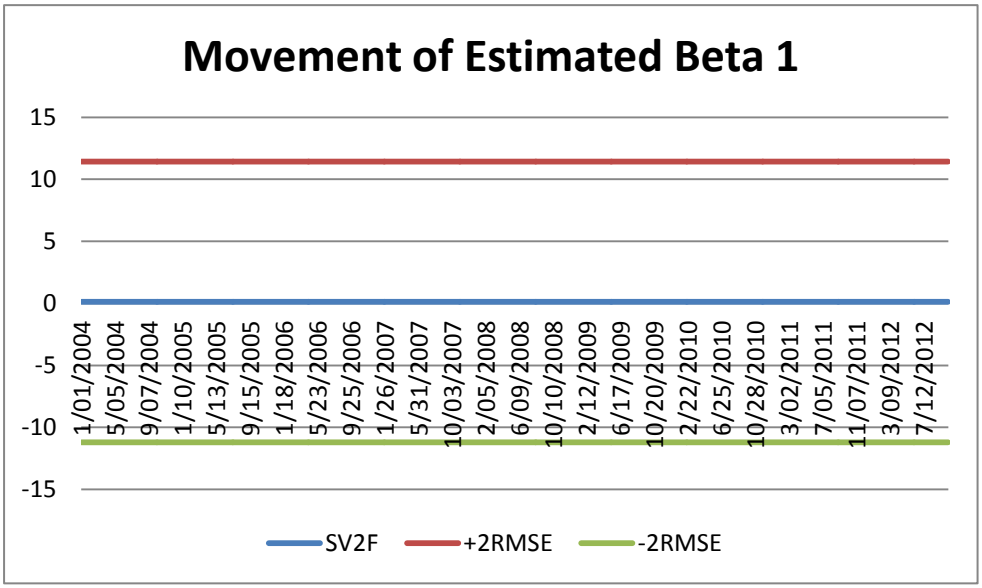
Table 5: Estimated β_1 for Corporate bond - ABSA

	Final State	Root MSE	z-Statistic	Prob.
β_0	-8.09E-06	0.04394	-0.00018	0.9999
β_1	0.17006	49.93502	0.003406	0.9973

Source: Eview

As we can see, the p-value is 0.9973 and greater than $\alpha\%$. This suggests that it is insignificant and we cannot reject null hypothesis, that is $\beta_1 = 0$; we can conclude that the previous return has essentially zero explanatory power for the current return.

Figure 32: Test of Evolving Efficiency for All Bond Index (ALBI)



The result shows the value of the estimated β_{1t} with GARCH term and time varying parameters is 0.122594 and stays constant. The 0.95 confidence

interval are 11.43961283 and -11.19442317 respectively. The lower bound covers zero. This exhibits a characteristic of a weak-form efficient market. The following shows the statistics of the estimated β_1.

Table 6: Estimated β_1 for All Bond Index (ALBI)

	Final State	Root MSE	z-Statistic	Prob.
β_0	5.24E-06	0.020902	0.000251	0.9998
β_1	0.122595	5.658509	0.021666	0.9827

Source: Eview

As we can see the p-value is 0.9827and greater than $\alpha\%$. This suggests that it is insignificant and we cannot reject null hypothesis, that is $\beta_1 = 0$; we can conclude that the previous return has essentially zero explanatory power for the current return.

The second model (RW3) does not only accounts for time varying parameters, as the first model considers, but also the variable variance. This has been achieved by including a GARCH term, whereas the first model only considers time varying parameter β_{1t} with constant variance assumption. That could explain the different shape of the graph for each model. The overall results state that the returns on the three bonds exhibit some characteristics of weak form efficient market throughout the investigation period.

4.2 Conclusion

Two models were used to test the weak form efficiency in this regard. If a market is weak form efficient, the market price will fully reflect information from the past. The first model uses a simple regression form of $r_t = \beta_{0t} + \beta_{1t} r_{t-1} + \mu_t$ (as defined in section 3.2.1) with time varying parameters. The second uses a GARCH approach with time varying parameters; a test of evolving efficiency is implemented. Both models are implemented on daily returns on three different bonds trading in the South African bond market.

The conclusion that can be drawn from these test results is that if β coefficients are significantly close to zero, this indicates that the underlying market can be considered to show some form of a weak-form efficiency. Nevertheless, a more reliable conclusion can be drawn if more data of the underlying market is tested as we only obtained limited data.

The difference between those two models is that the GARCH variance term is included in the second model. Adding this new GARCH term in the second model will take account for time-varying variances. Zalewska-Mitura and Hall (1999) argue that this approach is not relevant in the context of emerging markets, especially those newly created, as we expect markets to behave inefficiently in the early stages. If a market matures over a period of time, we would expect to observe that initial inefficiency fades away and the market becomes efficient, in other words, coefficients β's trend towards zero.

The result we obtained from the first model has suggested that the underlying market, where the three bonds are chosen from, is showing some form of a weak-form efficiency, however, since we did not consider the time varying variances in this model, whereas the second model includes the time varying

variance. The reason we included this is because in reality the variance of the return is not constant which empirical evidence show frequently.

Based on the results obtained from the second model we still conclude that the underlying market is a weak-form efficient. However this time we derived a flat line as graph of β_{1t}'s movement, which is a characteristic of the developed market in developed countries.

CHAPTER FIVE: SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of the findings

The role of the bond market has become more and more important in the financial market and for emerging markets, the development of the domestic bond market can not only provide the key channels to raise the capital and funds for governments and corporates, but also can be seen as a way to avoid crises. Since the world economy has been more and more driven by the emerging economies, so this study focused on the bond market in emerging markets.

The bond market itself is essentially simple; it provides a platform to bring the different market participants all together with different needs, the issuers who want to raise funds and with the long-term financing needs, the investors who have money and want to place the capital with some returns, the intermediaries who build the bridge between issuers and investors and also the market infrastructures which is the mechanism the market uses to execute and settle transactions.

There will also be the legal framework and regulatory body to oversee and supervise the entire system. Having a sound efficient bond market could not only attract more investors and enhance the country's economy, but also it could be the backbone of the country's financial system when there is a good maturity match between the country's short-term obligations and long term assets.

From Chapter 2, the bond market in South Africa was discussed and various characteristics were addressed. The East Asian and Latin American countries were also compared with South Africa and provided some guidelines. To be a theoretically efficient bond market, the bond market should have:

i. Liquidity, with high volume of bonds traded and secondary market turnover ratios, while keep the tight trading spreads.
ii. Diversified investor base, different type of market participants that play in the market.
iii. Sound regulatory and legal frameworks, transparency of disclosure and free of capital flows.
iv. Well coverage of Maturity Structure and reliable bond yield curve, maturity of domestic government bond should vary with short-, medium- and long-term and provide reliable benchmark yield curve and overall credit curve.

After a thorough study of the South African, East Asian and Latin American bond markets, it was found that the South African bond market, as a leading economy in African countries, is generally more effective than most East Asian countries except for Hong Kong China, Singapore, and some Latin American countries.

In Chapter 3, an empirical study was done by testing the efficiency market hypothesis (EMH). The concept of the efficient market hypothesis theory basically asserts that the financial markets are informational efficient, it means when the information of tradable assets arises, the news spreads very quickly without any delay and the price will fully reflect the information. Therefore, every piece of information will be incorporated into the tradable asset price

which makes it impossible for investors to generate excess returns above those the markets suggest. In this empirical study, the simple regression model with time varying parameters method and test of evolving efficiency (TEE) method were used to determine whether the South African bond market was weak-form efficient. Three data sets were chosen for this test. They were one government bond Z006, one ABSA zero coupon bond and the All Bond Index (ALBI). First of all, the test of unit root on the return must be done so that it was safe to use linear regression. Second was the application of the random walk theory to test whether bond market is weak-form efficient by using the two methods mentioned above, which means the slope of the random walk is significantly close to zero thus the past price pattern has little explanatory power to predict the future price movement. Both methods came up with the same results. So the conclusion can be drawn that the South African bond market is weak-form efficiency and investors cannot use technical analysis to beat the market.

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APPENDIX

A-1 Domestic debt securities by residence of issuer

Domestic debt securities
By sector and residence of issuer
In billions of US dollars

	Amounts outstanding				Changes in stock					
Sector and country	Dec 2009	Dec 2010	Sep 2011	Dec 2011	2010	2011	Q1 2011	Q2 2011	Q3 2011	Q4 2011
All issuers	**83,869.8**	**87,486.9**	**89,932.6**	**88,812.7**	**2,540.8**	**2,838.1**	**811.1**	**822.7**	**662.6**	**861.7**
Argentina	57.3	58.2	56.5	53.0	2.5	–2.1	1.6	1.7	–2.8	–2.6
Australia	845.1	965.1	973.3	1,023.4	9.1	59.8	17.8	5.7	23.5	12.8
Austria	364.7	362.4	298.0	335.4	23.1	–19.0	–15.7	–11.2	–44.1	52.0
Belgium	585.8	548.4	561.2	550.1	4.6	19.9	5.0	–2.5	4.6	12.8
Brazil	1,237.2	1,456.7	1,386.1	1,488.8	177.4	176.4	26.8	–46.3	66.7	129.3
Canada	1,324.6	1,485.4	1,507.2	1,547.7	97.6	94.8	28.0	28.6	24.2	14.0
China	2,565.4	3,031.4	3,232.1	3,344.8	376.4	156.3	–14.4	53.4	32.9	84.4
Czech Republic	80.3	77.4	88.8	81.1	–1.5	9.5	3.5	0.6	6.0	–0.6
Denmark	739.0	711.4	658.4	714.6	24.2	19.9	–98.5	–19.0	51.4	85.9
Finland	93.2	87.4	87.3	85.9	0.5	1.6	–7.5	3.6	3.1	2.4
France	3,146.0	3,131.4	3,384.0	3,307.6	215.1	295.7	88.5	81.1	58.4	67.7
Germany	2,801.8	2,606.7	2,647.6	2,534.2	6.8	10.0	31.4	–0.3	–18.1	–2.9
Greece	227.6	256.5	268.2	252.9	45.6	5.2	2.2	6.5	0.8	–4.3
Hong Kong SAR	99.9	122.1	128.5	128.3	22.5	6.0	1.8	1.7	3.2	–0.7
India	603.1	708.5	648.9	596.1	78.2	..	..	..	..	..
Indonesia	97.7	102.3	103.7	100.5	–0.0	–1.1	6.4	–3.4	–3.8	–0.4
Ireland	317.8	304.3	312.2	292.1	10.1	–2.9	21.5	7.5	–24.5	–7.4
Italy	3,191.0	2,997.0	3,077.7	3,077.7	37.7	184.9	31.0	34.5	–14.4	133.8
Japan	11,521.5	13,733.9	15,138.5	14,952.5	649.3	542.9	70.0	239.9	206.6	26.4
Malaysia	202.6	285.7	314.9	303.7	58.2	28.1	22.3	9.3	9.3	–12.7
Mexico	364.9	427.6	448.0	444.0	41.1	75.4	18.3	24.2	18.4	14.5
Netherlands	1,006.4	975.1	1,002.3	955.5	41.1	12.4	7.9	19.2	–9.6	–5.2
Norway	239.2	244.7	240.0	239.5	8.4	–0.1	–1.6	–7.8	3.5	5.7
Poland	183.7	202.0	203.5	193.1	25.3	21.5	17.6	6.2	–1.4	–0.9
Portugal	230.8	261.1	295.1	282.3	46.2	33.0	–2.6	37.1	–1.1	–0.4
Singapore	113.0	127.6	125.2	127.5	4.3	–3.3	0.2	2.9	–8.8	2.3
South Africa	155.0	208.4	192.1	195.7	32.3	29.5	10.7	7.2	6.5	5.1
South Korea	1,066.1	1,111.0	1,123.3	1,149.0	16.5	56.9	24.9	21.3	10.7	..
Spain	1,560.8	1,450.9	1,472.3	1,448.7	2.3	44.6	32.1	–8.2	–18.7	39.5
Sweden	423.2	404.2	416.0	422.0	–41.4	29.9	6.4	4.9	10.5	8.1
Switzerland	259.5	291.0	300.5	302.9	5.6	13.0	–6.6	7.2	–3.1	15.5
Thailand	166.4	209.3	213.6	208.9	24.0	10.3	4.4	–0.0	7.1	–1.1
Turkey	210.2	227.2	202.0	200.5	24.6	17.9	6.4	5.3	3.6	2.6
United Kingdom	1,548.8	1,648.9	1,745.5	1,743.8	150.4	120.3	–3.0	34.7	75.0	13.6
United States	25,602.9	25,828.3	26,183.5	26,333.1	225.4	504.8	242.5	56.5	56.2	149.6
Governments	**34,881.0**	**38,600.3**	**41,987.3**	**42,087.4**	**3,888.9**	**2,622.6**	**484.3**	**880.2**	**887.8**	**870.2**
Argentina	46.7	48.7	47.6	44.4	3.6	–1.3	1.9	1.7	–2.6	–2.3
Australia	230.7	344.6	382.6	418.5	75.0	75.0	21.1	9.8	23.0	21.1
Austria	132.6	135.1	133.4	138.7	11.1	8.0	1.4	3.4	–8.1	11.3
Belgium	297.6	288.3	295.9	295.9	12.5	17.8	–5.3	1.7	8.6	12.8
Brazil	803.7	949.0	858.7	957.1	119.1	96.8	4.7	–64.5	40.5	116.1
Canada	929.3	1,045.8	1,061.9	1,094.1	72.0	71.3	16.6	24.5	16.7	13.5
China	1,459.8	1,622.8	1,477.0	1,508.8	114.0	–189.1	–137.9	–35.1	–35.1	19.0
Czech Republic	55.9	51.9	59.0	53.8	–3.3	5.7	3.5	0.1	2.5	–0.4
Denmark	107.6	116.9	142.6	137.4	16.9	25.3	0.4	6.7	17.6	0.6
Finland	28.3	33.0	28.3	30.0	6.4	–2.0	–8.5	2.2	1.3	3.0
France	1,693.3	1,661.7	1,799.5	1,741.7	89.8	143.1	64.7	74.5	–14.1	18.0
Germany	1,547.6	1,724.5	1,812.7	1,752.2	290.6	90.9	–15.2	69.4	20.8	15.9
Greece	181.1	159.1	158.7	150.5	–8.4	–3.6	–4.2	3.9	–1.6	–1.6
Hong Kong SAR	69.8	87.3	89.7	88.4	17.7	1.0	0.0	–0.1	2.7	–1.6
India	530.5	608.3	557.1	511.8	54.1	..	..	..	..	..
Indonesia	87.8	90.7	91.5	88.7	–1.3	–1.5	6.1	–3.4	–3.8	–0.4
Ireland	54.0	65.4	60.1	57.6	15.1	–6.2	–4.0	–2.3	0.0	0.0
Italy	1,972.8	1,933.5	2,011.9	1,950.3	103.4	83.6	36.9	43.1	–19.9	23.3
Japan	9,654.2	11,632.3	12,966.7	12,787.6	657.8	577.8	138.2	209.9	227.0	2.7
Malaysia	103.2	141.4	155.7	150.8	25.6	14.3	13.8	5.5	0.6	–5.6
Mexico	206.4	242.0	270.4	268.8	23.3	62.8	16.1	20.1	17.0	9.6
Netherlands	381.1	385.7	411.5	387.7	31.8	16.0	6.4	19.5	–3.0	–6.9
Norway	96.6	100.6	87.7	83.9	5.2	–15.7	–3.9	–9.9	–0.3	–1.6
Poland	176.6	193.6	191.7	180.5	23.7	15.4	16.8	4.3	–3.3	–2.4
Portugal	98.8	114.8	119.6	108.7	22.6	–1.2	–16.9	30.5	–8.6	–6.2
Singapore	88.1	102.8	104.2	106.5	6.4	0.5	0.8	4.2	–6.9	2.3
South Africa	90.2	128.3	120.8	124.9	25.2	23.1	6.4	6.5	5.2	5.0
South Korea	425.6	475.1	487.3	498.4	37.6	31.5	20.8	7.3	3.4	..
Spain	603.5	629.4	691.4	687.4	68.7	82.9	36.4	17.5	3.2	25.9
Sweden	148.3	134.7	125.1	128.1	–20.4	–3.4	–5.5	3.1	–4.6	3.6
Switzerland	113.1	125.5	124.3	122.5	1.1	–3.0	–2.0	–5.3	0.8	3.5
Thailand	127.7	167.2	170.1	165.8	24.6	7.1	2.0	–0.1	6.7	–1.5
Turkey	209.8	225.4	195.1	193.1	23.0	11.1	4.5	2.2	2.5	2.0
United Kingdom	1,188.9	1,326.2	1,433.0	1,485.5	174.4	181.9	–3.5	30.3	89.2	66.0
United States	10,183.1	11,839.4	12,560.5	12,862.9	1,656.4	1,023.5	252.5	190.6	268.0	312.4

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A-2 International bonds and notes by residence of issuer

International bonds and notes - all issuers

By residence of issuer

In billions of US dollars

	Amounts outstanding			Announced issues		Net issues				
Countries	Dec 2010	Dec 2011	Mar 2012	Q4 2011	Q1 2012	2010	2011	Q3 2011	Q4 2011	Q1 2012
All countries	**28,783.9**	**27,679.7**	**28,813.7**	**1,098.6**	**1,848.0**	**1,601.0**	**1,227.4**	**157.2**	**283.7**	**580.8**
Developed countries	**23,240.5**	**23,733.8**	**24,602.2**	**829.5**	**1,488.5**	**1,241.1**	**889.9**	**83.8**	**212.7**	**326.4**
Australia	540.1	546.4	569.9	16.1	39.8	37.2	10.1	1.6	–2.5	18.1
Austria	350.4	337.3	336.7	7.7	8.8	–6.8	–5.2	0.4	–5.2	–10.3
Belgium	302.4	301.5	313.7	1.4	20.3	19.3	8.8	–7.3	–0.9	2.8
Canada	653.9	709.6	743.5	37.2	44.4	81.0	62.3	6.8	16.9	25.2
Cyprus	13.2	17.0	11.8	1.6	–	2.0	4.5	1.5	1.3	–5.5
Denmark	130.2	136.3	140.7	0.4	7.3	–5.9	8.8	3.7	–9.0	1.2
Finland	136.9	158.5	179.7	5.3	19.4	15.8	26.4	6.9	1.9	16.8
France	1,806.1	1,883.0	2,003.8	77.6	158.3	137.5	129.3	7.3	27.6	67.8
Germany	1,948.1	1,970.6	2,014.7	46.5	147.5	–3.1	76.2	11.7	10.4	–8.6
Greece	329.6	322.8	311.8	–	0.5	89.4	3.9	–8.0	–3.3	–20.7
Iceland	32.0	24.8	22.9	–	0.0	–8.4	–6.8	–2.1	–3.6	–2.2
Ireland	1,169.9	1,058.6	1,073.4	11.3	23.9	–22.0	–84.3	–24.1	–8.7	–15.6
Italy	1,134.2	1,134.9	1,135.4	35.4	34.1	41.8	36.7	2.5	8.0	–33.6
Japan	181.4	179.6	182.0	8.7	14.7	1.1	–5.8	–2.0	2.8	6.9
Luxembourg	421.5	419.2	436.8	10.9	22.7	–12.7	5.1	3.3	1.2	9.3
Netherlands	1,848.3	1,905.5	1,993.2	84.0	139.0	104.4	105.7	7.9	51.4	38.3
New Zealand	12.6	18.4	19.7	1.1	1.4	1.9	5.8	2.6	0.8	1.2
Norway	202.3	236.2	253.3	17.7	26.6	24.0	37.1	5.6	7.6	13.9
Portugal	182.8	169.4	167.2	2.1	0.4	15.3	–9.0	–2.3	–0.5	–7.4
Slovakia	11.7	14.2	16.0	–	1.7	4.2	3.1	–	–	1.3
Spain	1,434.9	1,488.9	1,560.8	56.4	72.8	69.3	103.3	18.2	30.7	25.2
Sweden	343.7	357.6	387.2	14.1	47.0	29.5	21.0	0.7	–2.7	21.4
Switzerland	28.5	35.8	38.7	1.8	4.7	1.6	7.6	0.9	1.3	1.8
United Kingdom	3,500.4	3,510.8	3,652.6	180.7	211.3	55.9	61.5	–28.8	4.6	56.9
United States	6,506.0	6,774.6	6,915.0	311.4	441.7	564.8	280.0	76.4	82.5	122.5
Offshore centres	**1,619.9**	**1,646.7**	**1,684.8**	**47.1**	**88.2**	**32.6**	**25.8**	**–2.8**	**16.3**	**47.1**
Aruba	6.7	6.4	6.1	–	–	–0.0	–0.5	–0.4	–	–
Bahamas	8.4	8.2	8.5	0.2	0.7	–0.7	–0.2	–0.4	0.1	0.3
Bermuda	79.9	85.9	87.1	0.3	4.2	11.4	5.9	–0.4	–0.6	0.9
Cayman Islands	1,136.6	1,128.6	1,150.3	25.2	43.8	7.3	–9.0	–5.1	9.0	21.7
Hong Kong SAR	58.2	83.3	94.4	10.3	14.1	13.4	24.9	5.1	6.8	11.0
Lebanon	24.7	29.3	28.7	2.9	1.0	1.1	4.6	1.2	2.6	–0.6
Netherlands Antilles	93.0	83.1	79.7	0.2	0.5	–10.5	–9.2	–3.8	–3.7	–4.3
Panama	10.6	12.1	11.9	0.4	0.4	–0.1	1.4	0.9	0.4	–0.2
Singapore	54.2	54.1	68.5	4.4	15.1	3.5	0.3	–2.1	–0.7	13.8
West Indies UK	34.6	39.7	40.2	1.3	3.5	6.7	5.0	0.9	–0.3	0.5
Developing countries	**1,142.4**	**1,278.3**	**1,333.1**	**62.4**	**97.7**	**137.2**	**145.4**	**16.3**	**40.9**	**47.3**
Africa & Middle East	**164.4**	**170.6**	**176.4**	**16.0**	**11.0**	**16.8**	**18.0**	**–1.6**	**14.2**	**4.0**
Israel	16.5	20.6	23.3	5.0	2.6	2.2	4.3	–	5.0	2.6
Qatar	25.7	29.4	28.3	5.0	–	3.9	3.7	–0.1	4.5	–1.1
South Africa	27.2	31.8	34.8	0.0	3.1	4.3	6.1	–0.2	–0.0	2.4
Tunisia	3.4	2.6	2.6	–	–	–0.4	–0.8	–0.2	–	–
United Arab Emirates	54.5	60.3	60.3	4.5	3.3	0.7	6.0	–0.1	3.3	–0.1
Asia & Pacific	**308.9**	**340.7**	**368.1**	**14.3**	**28.1**	**28.2**	**32.4**	**6.6**	**4.3**	**16.2**
China	24.1	28.3	28.6	0.9	2.7	–0.8	3.7	0.6	0.2	0.2
Chinese Taipei	6.9	8.9	9.3	0.0	0.8	1.2	2.0	0.4	–0.2	0.4
India	28.5	26.1	23.1	0.0	0.3	–2.2	–2.4	1.3	–1.5	–3.0
Indonesia	22.7	29.3	33.9	3.0	4.7	3.6	6.5	–	2.8	4.6
Malaysia	27.5	27.6	28.7	0.3	1.0	2.7	0.2	–0.0	–0.1	1.0
Philippines	39.0	40.9	43.4	0.1	3.1	2.7	1.9	–0.4	–0.8	2.5
South Korea	132.1	148.2	156.2	9.9	14.8	13.2	17.2	2.6	3.6	8.0
Thailand	8.1	8.8	8.8	–	–	–0.7	0.8	0.9	–	–
Europe	**273.6**	**298.9**	**314.8**	**8.8**	**33.4**	**30.8**	**27.4**	**0.3**	**1.0**	**13.6**
Croatia	7.6	8.8	8.9	–	–	0.5	1.3	1.1	–	–
Hungary	35.2	36.4	36.9	2.0	–	–1.1	1.9	0.2	–1.2	–0.3
Poland	57.4	61.7	65.3	2.2	3.4	6.7	5.7	0.7	2.2	2.4
Russia	65.7	68.6	68.6	1.4	14.8	4.8	3.2	–2.4	–1.1	–0.6
Turkey	48.5	54.2	58.5	2.1	5.1	6.5	5.7	–0.3	1.9	4.1
Latin America & Caribbean	**405.7**	**470.3**	**488.9**	**23.6**	**24.2**	**64.4**	**67.5**	**12.0**	**21.4**	**14.8**
Argentina	56.2	55.8	56.4	–	1.0	2.6	0.3	–0.6	–0.4	–0.1
Brazil	115.7	136.4	140.7	4.9	6.1	26.0	22.1	3.4	4.6	3.8
Chile	22.2	27.2	27.6	1.8	1.4	7.3	5.2	1.0	1.8	0.3
Colombia	22.3	26.9	28.0	1.2	2.3	0.3	4.5	2.0	0.5	1.1
Mexico	93.2	113.1	121.2	5.1	10.3	16.0	20.9	5.7	5.0	7.2
Peru	19.4	21.0	23.7	0.3	2.7	6.1	1.5	0.1	0.3	2.7
Uruguay	9.2	10.1	9.9	1.3	–	–0.0	0.8	–0.0	1.2	–0.2
Venezuela	48.1	59.2	59.2	7.8	–	5.2	11.2	0.9	7.8	–0.0
Int. organisations	**881.1**	**1,021.9**	**1,183.8**	**69.6**	**171.6**	**90.2**	**168.4**	**80.0**	**14.8**	**141.1**

BIS Quarterly Review, June 2012

A-3 Countries' total value of bond traded

Fixed-income -Total value of bond trading

(USD millions)

Exchange	2011 Total	2011 Domestic private sector	2011 Domestic public sector	2011 Foreign	2010 Total	2010 Domestic private sector	2010 Domestic public sector	2010 Foreign	% change 2011/2010 (in USD)	% change 2011/2010 (in local currency)
Americas										
BM&FBOVESPA	162.1	114.2	47.8	0.0	249.3	198.7	50.5	0.0	-35.0%	-38.3%
Buenos Aires SE	32 341.9	974.3	31 367.6	0.0	27 807.5	743.1	27 064.3	0.0	16.3%	22.9%
Colombia SE	912 731.1	176 832.7	734 897.2	1 001.1	1 135 766.9	243 095.8	891 227.7	1 443.5	-19.6%	-21.7%
Lima SE	610.5	558.8	45.4	6.2	635.3	604.1	7.1	24.2	-3.9%	-6.4%
Mexican Exchange	339.8	NA	NA	NA	139.5	NA	NA	NA	143.5%	140.3%
Santiago SE	232 180.8	93 739.7	138 441.1	0.0	177 439.7	64 229.5	113 210.1	0.0	30.9%	24.0%
TMX Group	6 324.2	0.0	6 324.2	0.0	5 654.8	0.0	5 654.8	0.0	11.8%	6.5%
Total region	1 184 690.3				1 347 692.9				-12.1%	
Asia - Pacific										
Australian Securities Exchange	975.9	NA	NA	NA	602.1	NA	NA	NA	62.1%	42.5%
Bombay SE	20 160.0	NA	19 245.1	NA	21 564.3	NA	NA	NA	-6.5%	-3.9%
Bursa Malaysia	200.6	200.6	0.0	0.0	562.7	562.7	0.0	0.0	-64.3%	-66.0%
Colombo SE	24.6	24.3	0.3	0.0	1.0	0.6	0.4	0.0	2251.8%	2204.6%
Gretai Securities Market	519 936.1	40 565.6	478 891.3	479.2	755 333.9	30 408.0	724 903.6	22.3	-31.2%	-35.5%
Hong Kong Exchanges	108.4	NA	NA	NA	0.2	0.0	0.2	0.0	-	-
Korea Exchange	746 021.9	5 782.6	740 239.3	0.0	504 225.9	4 300.5	499 925.4	0.0	48.0%	40.9%
National Stock Exchange India	123 074.6	15 024.6	108 050.1	0.0	125 887.8	15 821.6	110 066.3	0.0	-2.2%	0.5%
Osaka Securities Exchange	0.0	0.0	0.0	0.0	15.7	15.7	0.0	0.0	-	-
Shanghai SE	98 271.6	77 040.7	21 230.9	0.0	76 019.6	52 378.2	23 641.4	0.0	29.3%	23.3%
Shenzhen SE	11 572.9	11 417.5	155.4	0.0	13 838.7	12 779.3	1 059.4	0.0	-16.4%	-20.2%
Singapore Exchange	NA	NA	NA	NA	4 614.4	NA	NA	NA	-	-
Thailand SE	25.8	25.8	0.0	0.0	65.7	65.7	0.0	0.0	-60.8%	-62.2%
Tokyo SE Group	3 092.3	3 092.3	0.0	0.0	4 205.5	4 205.4	0.0	0.0	-26.5%	-33.0%
Total region	1 523 464.7				1 506 937.5				1.1%	
Europe - Africa - Middle East										
Amman SE	0.8	0.8	0.0	0.0	0.2	0.1	0.1	0.0	292.5%	292.9%
Athens Exchange	21.8	0.3	0.0	21.5	22.8	0.0	1.8	21.0	-4.4%	-9.8%
BME Spanish Exchanges	17 345 420.0	7 613 443.9	9 731 976.1	0.0	11 030 482.9	4 827 563.0	6 202 919.9	0.0	57.2%	48.4%
Budapest SE	1 449.6	34.6	1 415.0	0.0	1 113.2	58.5	1 054.7	0.0	30.2%	24.9%
Casablanca SE	1 066.6	891.2	42.9	132.4	1 106.9	995.0	26.7	85.2	-3.6%	-8.1%
Cyprus SE	37.1	36.4	0.7	0.0	38.0	31.6	6.5	0.0	-2.5%	-8.0%
Deutsche Börse	67 609.4	12 128.1	39 701.9	15 779.4	109 999.9	20 738.2	61 881.0	27 380.7	-38.5%	-42.0%
Egyptian Exchange	5 267.4	144.8	5 122.6	0.0	11 230.6	99.3	11 131.3	0.0	-53.1%	-50.6%
Irish SE	42 995.2	0.0	42 995.2	0.0	152 908.0	0.0	152 908.0	0.0	-71.9%	-73.5%
IMKB [1]	511 969.2	4 854.8	456 616.8	50 497.6	445 851.8	853.6	409 325.9	35 672.3	14.8%	27.9%
Johannesburg SE	2 883 407.6	71 674.1	2 811 484.9	248.5	2 312 957.2	61 487.3	2 251 455.4	14.6	24.7%	23.7%
Ljubljana SE	83.3	27.7	55.7	0.0	143.6	67.1	76.5	0.0	-42.0%	-45.2%
London SE Group	5 386 112.1	104 328.3	4 939 410.0	342 373.8	4 021 758.5	61 039.4	3 872 724.0	87 995.1	33.9%	26.4%
Luxembourg SE	201.9	0.0	28.7	173.2	72.6	0.0	0.0	72.6	178.2%	162.5%
Malta SE	660.2	48.0	612.3	0.0	631.5	60.7	570.8	0.0	4.5%	-1.3%
Mauritius SE	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
MICEX	298 091.4	175 387.5	121 387.6	1 316.3	232 173.5	146 130.5	85 375.0	668.0	28.4%	23.7%
NASDAQ OMX Nordic Exchange	2 700 084.7	1 569 523.3	1 094 104.6	36 456.9	2 619 509.8	1 576 979.5	1 040 736.2	1 794.0	3.1%	-2.7%
NYSE Euronext (Europe)	13 040.7	NA	2 584.9	10 455.8	27 172.5	NA	4 054.6	23 117.8	-52.0%	-54.7%
Oslo Børs	592 004.8	63 692.3	527 840.3	472.3	556 359.2	40 637.0	515 165.9	556.3	6.4%	-2.4%
RTS Stock Exchange	10.0	10.0	0.0	0.0	1.1	1.1	0.0	0.0	796.0%	763.2%
Saudi Stock Market - Tadawul	482.4	482.4	0.0	0.0	115.7	115.7	0.0	0.0	317.0%	317.0%
SIX Swiss Exchange	200 248.2	42 062.7	55 066.5	103 119.0	156 734.8	33 918.0	41 790.6	81 026.2	27.8%	8.5%
Tel Aviv SE	246 102.6	49 429.6	196 672.9	NA	202 559.2	46 025.0	156 534.3	NA	21.5%	16.6%
Warsaw SE	856.6	595.1	261.5	0.0	520.9	148.3	372.6	0.0	64.4%	61.1%
Wiener Börse	914.9	860.9	8.0	46.0	1 412.0	1 281.4	15.9	114.7	-35.2%	-38.8%
Total region	30 298 139.5				21 884 876.6				38.4%	
WFE total	***33 006 294.5***				***24 739 507.0***				33.4%	

[1] *IMKB: İstanbul Menkul Kıymetler Borsası*

Notes : Converted with year-average exchange rates

The sale & purchase of a share are counted as one transaction

A-4 Countries' Number of bonds listed

Fixed-Income -Number of bonds listed

Exchange	2011 Total	2011 Domestic private sector	2011 Domestic public sector	2011 Foreign	2010 Total	2010 Domestic private sector	2010 Domestic public sector	2010 Foreign
Americas								
BM&FBOVESPA	253	235	18	NA	287	263	24	0
Buenos Aires SE	1 390	1 092	298	0	1 286	979	307	0
Colombia SE	625	401	215	9	610	386	215	9
Lima SE	530	498	30	2	606	573	31	2
Mexican Exchange	569	NA	NA	NA	247	NA	NA	NA
TMX Group	206	0	206	0	196	0	196	0
Total region	3 573				3 232			
Asia - Pacific								
Bombay SE	2 065	2 065	0	0	1 626	1 626	0	0
Bursa Malaysia	33	33	0	0	36	36	0	0
Colombo SE	181	62	119	0	186	60	126	0
Gretai Securities Market	1 240	1 141	97	2	1 312	1 210	94	8
Hong Kong Exchanges	192	79	94	19	169	NA	NA	NA
Korea Exchange	9 797	5 282	4 513	2	9 528	4 940	4 586	2
National Stock Exchange India	5 128	1 909	3 218	1	4 380	1 365	3 014	1
Osaka Securities Exchange	303	3	300	0	301	5	296	0
Shanghai SE	630	417	213	0	472	273	199	0
Shenzhen SE	321	108	213	0	273	75	198	0
Singapore Exchange	1 134	NA	NA	NA	1 084	NA	NA	NA
Taiwan SE Corp.	96	0	96	0	94	0	94	0
Thailand SE	633	99	534	0	673	110	563	0
Tokyo SE Group	323	23	300	0	335	39	296	0
Total region	*22 076*				*20 469*			
Europe - Africa - Middle East								
Amman SE	148	2	146	0	122	2	120	0
Athens Exchange	67	2	59	6	49 R	2	44	3
BME Spanish Exchanges	4 914	4 419	466	29	4 240	3794	417	29
Budapest SE	158	135	23	0	107	85	22	0
Casablanca SE	48	42	5	1	45	41	3	1
Cyprus SE	63	20	43	0	58	17	41	0
Deutsche Börse	22 463	10 625	1 124	10 714	24 839	11 370	1 133	12 336
Egyptian Exchange	151	16	135	0	157	15	142	0
Irish SE	21 095	4 952	29	16 114	22 480	5 702	33	16 745
İMKB [1]	120	42	53	25	93 R	11	57	25
Johannesburg SE	1 172	971	154	47	1 062	864	168	30
Ljubljana SE	70	44	23	3	80	53	25	2
London SE Group	18 419	11 188	227	7 004	17 256	10 289	233	6 734
Luxembourg SE	29 243	0	2	29 241	29 566	0	2	29 564
Malta SE	113	45	68	0	103	43	60	0
Mauritius SE	2	1	1	0	1	0	1	0
MICEX	812	672	122	18	788	643	130	15
NASDAQ OMX Nordic Exchange	5 627	4 494	448	685	5 062	4 472	266	324
NYSE Euronext (Europe)	4 485	NA	456	4 029	3 957 R	NA	448	3 509
Oslo Børs	1 211	1 122	65	24	1 154	1 044	71	39
RTS Stock Exchange	0	0	0	0	62	53	9	0
Saudi Stock Market - Tadawul	8	8	0	0	7	7	0	0
SIX Swiss Exchange	1 498	447	110	941	1 425	397	103	925
Tel Aviv SE	718	685	33	0	698	665	33	0
Warsaw SE	246	202	38	6	137	94	40	3
Wiener Börse	3 635	3 028	164	443	3 657	3 000	163	494
Total region	*116 486*				*117 205*			
WFE total	*142 135*				*140 906*			

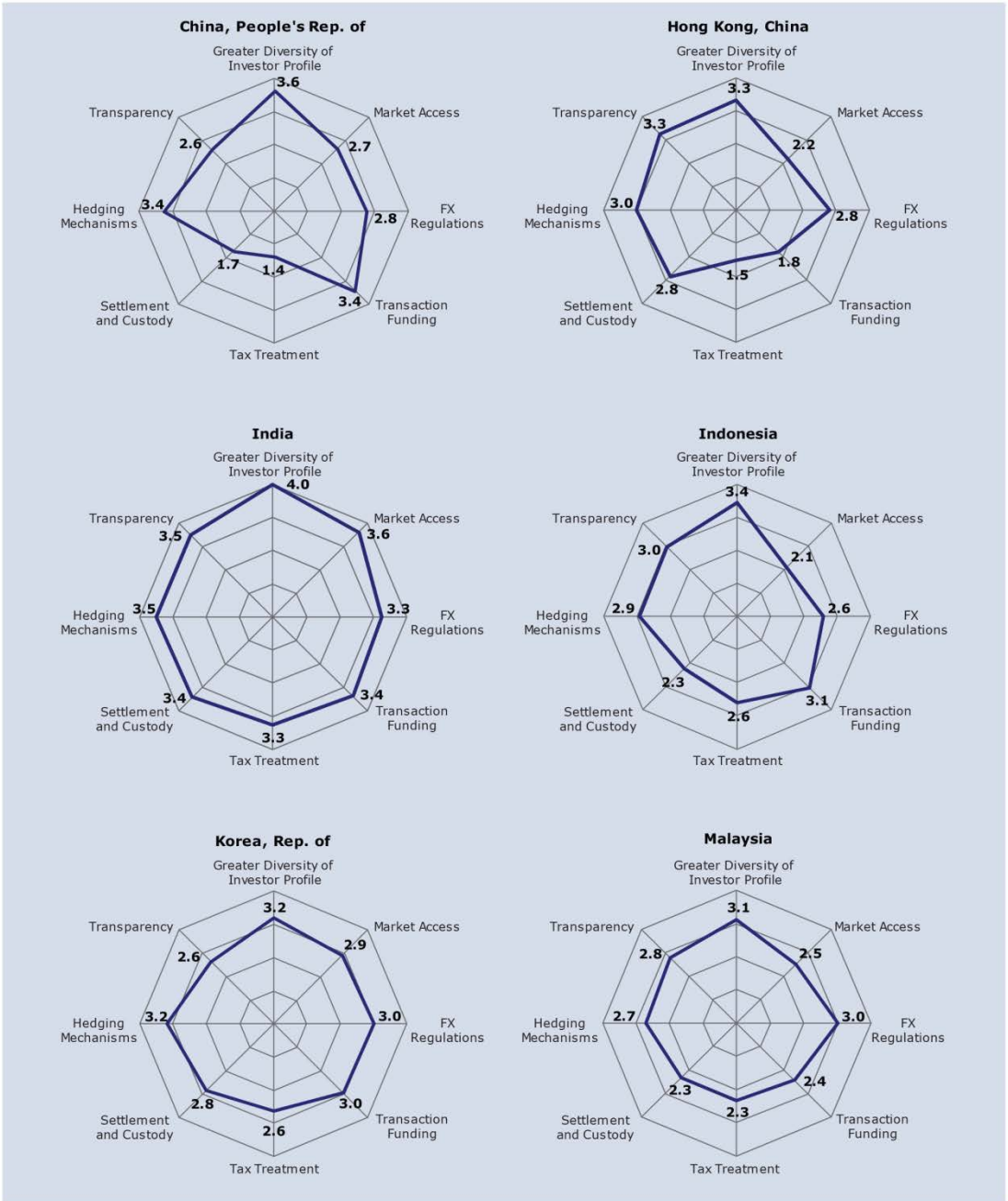
[1] *İMKB: İstanbul Menkul Kıymetler Borsası*
NA : Not Available
R : Revised

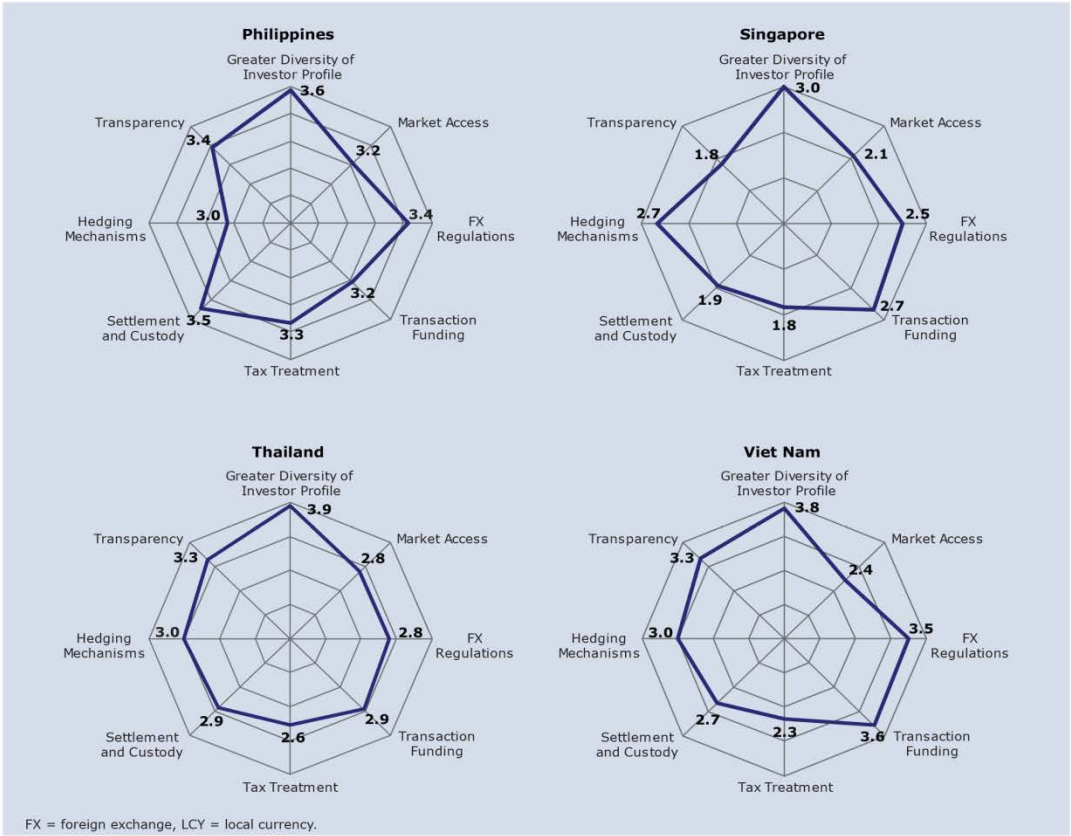
A-5 Countries' Number of bond issuers

Fixed-Income - Number of bond Issuers								
	2010				2009			
Exchange	Total	Domestic private sector	Domestic public sector	Foreign	Total	Domestic private sector	Domestic public sector	Foreign
Americas								
Bermuda SE	10	1	1	8	6	1	0	5
BM&FBOVESPA	163	156	7	0	174	167	7	0
Buenos Aires SE	159	130	28	1	146 R	118	27	1
Colombia SE	176	150	20	6	293	254	32	7
Lima SE	69	67	1	1	66	63	1	2
Mexican Exchange	240	NA	NA	NA	234	NA	NA	NA
Santiago SE	163	154	9	0	162	153	9	0
TSX Group	124	0	124	0	111	0	111	0
Asia - Pacific								
Bombay SE	NA	NA	NA	NA	153	NA	NA	NA
Bursa Malaysia	26	26	0	0	31 R	31	0	0
Colombo SE	13	12	1	0	11	10	1	0
Hong Kong Exchanges	59	38	6	15	59	38	6	15
Indonesia SE	105	104	1	0	86	85	1	0
Korea Exchange	737	666	70	1	847	778	68	1
National Stock Exchange India	188	124	63	1	168	105	62	1
Osaka Securities Exchange	6	5	1	0	7 R	6	1	0
Shanghai SE	318	281	37	0	225	189	36	0
Taiwan SE Corp.	3	0	3	0	3	0	3	0
Thailand SE	39	23	16	0	45	28	17	0
Tokyo SE Group	38	37	1	0	36	35	1	0
Europe - Africa - Middle East								
Amman SE	5	2	3	0	11 R	8	3	0
Athens Exchange	5	3	1	1	5 R	3	1	1
Budapest SE	10	9	1	0	9	8	1	0
Casablanca SE	24	21	2	1	18	16	1	1
Cyprus SE	9	8	1	0	9	8	1	0
Deutsche Börse	2,809	216	43	2,550	2,826 R	213	38	2,575
Egyptian Exchange	11	10	1	0	8	7	1	0
Irish SE	3,784	703	6	3,075	3,519	733	6	2,780
Istanbul SE	13	11	1	1	5	2	2	1
Johannesburg SE	127	107	15	5	107	88	13	6
Ljubljana SE	20	16	3	1	26	21	4	1
London SE Group	1,630	880	11	739	1,562	890	11	661
Luxembourg SE	2,524	0	1	2,523	2,632	0	1	2,631
Malta SE	27	26	1	0	26	25	1	0
Mauritius SE	1	0	1	0	1	0	1	0
MICEX	393	355	36	2	420 R	377	41	2
NASDAQ OMX Nordic Exchange	291	145	10	136	307	192	33	82
NYSE Euronext (Europe)	616	368	123	125	606	409	56	141
Oslo Børs	138	114	17	7	141	113	21	7
Saudi Stock Market - Tadawul	3	3	0	0	2	2	0	0
SIX Swiss Exchange	419	98	19	302	432	93	19	320
Tehran SE	0	0	0	0	1	1	0	0
Tel Aviv SE	337	319	1	17	334	315	1	18
Warsaw SE	41	29	11	1	8	4	3	1
Wiener Börse	264	152	15	97	269	158	11	100

NA : Not Available
R : Revised

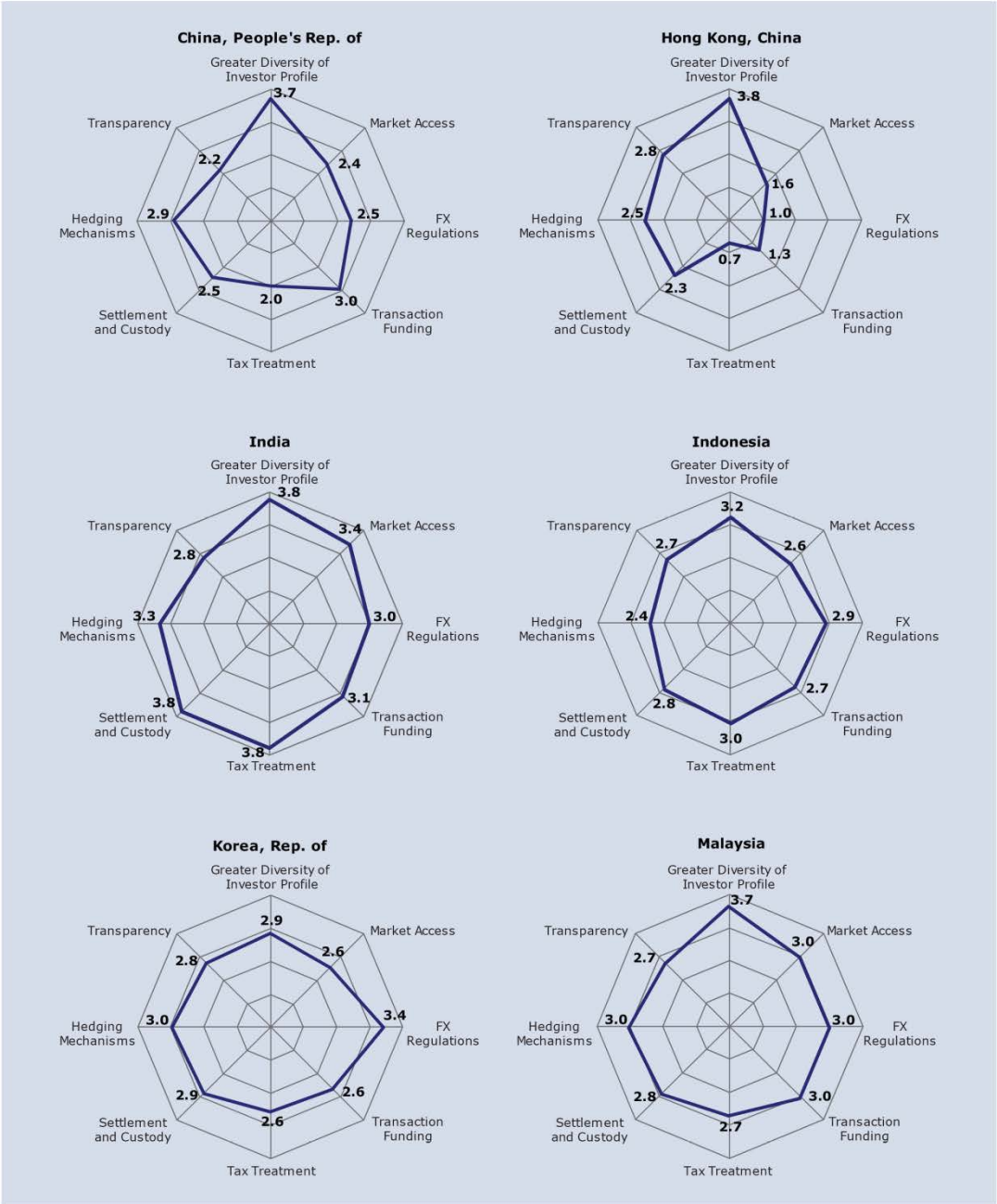
A-6 Structural Issues for Asian Individual Local Currency Government Bond Markets

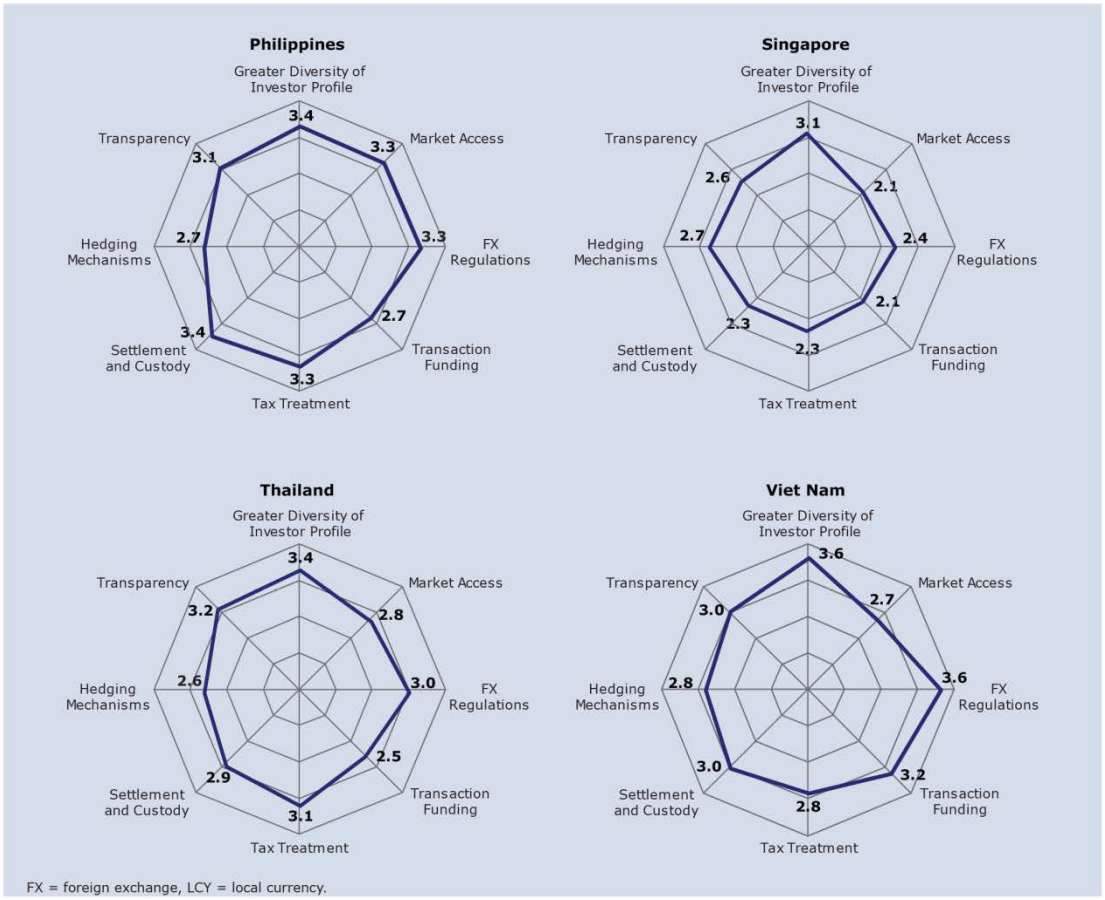




FX = foreign exchange, LCY = local currency.

A-7 Structural Issues for Asian Individual Local Currency Corporate Bond Markets





FX = foreign exchange, LCY = local currency.