THE DETERMINANTS OF CREDIT DEFAULT SWAP SPREADS IN EMERGING MARKET ECONOMIES

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ABSTRACT

Emerging markets have become a destination for international portfolio flows as a result of global financial integration. This has allowed exogenous factors like sentiment and developed country monetary policy to affect developing countries capital markets and macroeconomic fundamentals. This study analyses the impact of investor sentiment alongside US monetary policy, country specific risks, inflation and domestic stock returns on the BRICS credit default spreads. To investigate this relationship, the study uses panel data and a fixed effects model.

The results of the panel regressions suggest that all variables had an impact on the variation of BRICS credit default spreads however the crisis may have distorted the relationship among the variables. Sovereign ratings had an inverse relationship depicting a rise in ratings decreasing the credit default premium. This was in line with *a priori* expectations. Domestic company earnings also had an inverse relationship with BRCIS credit default premia, the magnitude of which is dependent on the value of the index. This is to say the higher the index, the more significant the effect on the BRICS default premium. US monetary policy was significant and in line with expectations of a linear relationship between emerging market credit default spreads when controlling for the crisis. In the crisis period however, results depicted an inverse relationship going against *a priori* expectations. The inflation variable was found to have a greater impact on CDS spreads during the crisis period, while the VIX index had a linear relationship with the default premia albeit the impact was not highly significant. The study concludes that the financial crisis was an important event that affected the relationship of these variables with BRICS country default spreads and had read through to market participant's behaviour at the time.

DECLARATION

I declare, except where explicitly stated otherwise and acknowledged, that this work is wholly my own and has not been submitted to any other University, Technikon or College for degree purposes.

SIGNED:

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LIST OF ABBREVIATIONS

UMP – Unorthodox Monetary Policy

CRA – Credit Rating Agency

GSG – Global Savings Glut

REH – Rational Expectations Hypothesis

QE – Quantitative Easing

EMH – Efficient Market Hypothesis

AMH – Adaptive Markets Hypothesis

EM – Emerging Markets

BRICS – Brazil, Russia, India, China, South Africa

US – United States

CDS – Credit Default Swap

VIX – Volatility Index

PCA – Principal Component Analysis

FDI – Foreign Direct Investment

WTO – World Trade Organisation

FOMC – Federal Open Market Committee

CBOE – Chicago Board for Options Exchange

TARP – Troubled Asset Relief Program

OMO – Open Market Operations

EMBI – Emerging Market Bond Index

SRO – Self Regulatory organisation

NFA – New Financial Architecture

SARB – South African Reserve Bank

GFC – Global Financial Crisis

EM – Emerging Markets

GDP – Gross Domestic Product

NIE – New Institutional Economics

CHAPTER 1

INTRODUCTION

1.1 CONTEXT

For most of the twentieth century hegemony over global governance and influence has been largely maintained by the developed western nations. Developing countries had very limited access to platforms that would allow them to influence matters of global significance. However emerging market economies have been in the spotlight as a result of staggering growth prospects and the immediate opportunities for investment. Consequently emerging market countries have been advocating for fairer and more equal opportunities on platforms such as the World Trade Organisation (WTO). This is as a result of growing discontent with the global financial and economic systems that are believed to be largely beneficial to the West. This resulted in the institutional consolidation of the five leading emerging market countries namely Brazil, Russia, India, China and South Africa (BRICS).

The BRICS nations are said to account for 40 percent of the global population (Sergunin, 2015). Moreover BRICS share of world trade has increased significantly from a mere 3.6 percent in 1990 to over 15 percent of global trade by 2010 (Purugganan, 2014). BRICS countries also share similar problems such as the need to modernize, stabilise currencies and achieve economic growth that will reduce the high number of people living in poverty (Sergunin, 2015). According to the orthodox account of modernisation and development, in order for emerging market countries to achieve high growth and eradicate poverty, emerging market economies needed to undergo capital account liberalisation (Rodrik and Subramanian, 2008). This would allow for foreign inward investment in the form of foreign direct investment (FDI) as developing nations are deemed to be constrained by savings.

Reforms that target capital account liberalization by emerging market countries were to be instituted with the assistance of international monetary institutions. Accordingly, the liberalization of developing country financial markets has been followed by large capital inflows from global institutional investors (Schmuckler, 2003). However, the capital flows have been argued to be largely short term flows. These hot money flows have added to emerging market volatility amplifying business cycle fluctuations (Rodrik and Subramanian, 2008).

Global financial integration has not only provided an abundance of capital willing to invest in emerging markets but has increased vulnerability for the BRICS countries to events taking place in international capital markets. Therefore BRICS members with limited capacity to intervene in their domestic capital markets, in times of financial turmoil experience shocks that destabilise domestic macroeconomic conditions. Such events take place through trade and financial linkages with the rest of the world. This has the ability to create volatility and turbulence in the member country's domestic capital markets. According to Moody's (2015) prolonged periods of emerging market risk aversion cause financial market turbulence for EM countries, especially those with high current account deficits and significant external financing needs. Moody's (2015) further states that the long awaited US monetary tightening cycle is expected to raise capital costs and deplete the availability of funding for EM countries, thereby creating more turbulence for sovereign yields and credit risk for emerging nations. According to Baek *et al* (2005) market assessed country risk is not only determined by economic fundamentals but also non country specific factors such as the markets attitude towards risk.

The South African Reserve Bank (SARB) Financial Stability Report (2015) concurs, providing evidence that global sovereign credit default swap spreads for the regions of Europe, Middle East, Africa, Asia and the Americas increased around the Federal Open Market Committee (FOMC) meeting of September 2015.

Furthermore, emerging countries like South Africa, Turkey, Brazil, Russia and Venezuela saw the sharpest volatility in five year credit default swap spreads as a result of uncertainty caused by the US interest rate normalization decision (SARB,

2015a; SARB, 2015b). Apart from the effects of US monetary policy there are other factors that affect emerging market countries creditworthiness. Idiosyncratic factors such as debt to GDP, external debt burden, a country's fiscal position, the composition of the balance of payments and economic growth affects developing nation's credit risk profile. Sovereign credit ratings, provided by credit rating agencies, encapsulate these factors in their rating determination (Elkhoury, 2009).

Credit rating agencies (CRA) are vehicles used by financial markets to provide an indication of the financial instrument issuers' ability to honour their obligations. These quasi-regulatory institutions have established a niche in the global financial architecture as specialised intermediaries of information. Credit rating agencies make use of both public and non-public information and by applying various techniques both quantitative and qualitative, establish the risk of default by an issuer (Maas, 2011). The ratings given by these institutions are therefore used to determine capital charges on debt obligation (Elkhoury, 2009). These institutions have been accused of causing procyclicality in emerging markets, increasing emerging market volatility.

Global investor sentiment equally plays an integral role in explaining the variation in emerging market debt spreads and thereby the change in risk profiles of emerging countries (Remolona, Scatigna and Wu, 2007). Yafeh (2002) asserts that emerging market sovereign bond yields move in tandem and are driven by global events rather than country fundamentals.

With the current global economic environment being characterised by low interest rates, high liquidity as a result of quantitative easing and a savings glut, the withdrawal of such liquidity is likely to have a significant impact on the BRICS countries ability to finance and subsequently service debt.

With all the aforementioned factors that may have a significant impact on the BRICS financial and economic stability, a study that investigates the relationship of these factors with BRICS country credit risk was warranted. As all material developments in markets affect investor sentiment, *a priori* expectations are that investor sentiment is a significant variable that can explain some of the variance in emerging market credit risk albeit markets will discriminate between countries. US monetary policy events, especially surprises in policy, should also be

significant as the policy affects global liquidity and feeds into risk sentiment towards emerging markets. Changes in idiosyncratic variables encapsulated in credit ratings should be significant due to mandates that dictate the type and quality of financial securities into which fund management institutions can invest their funds. Sudden changes in the domestic environment may not be immediately captured by credit ratings. However the effects of the changes will feed into sentiment towards the particular country and markets will react accordingly. Long term structural changes will be reflected in credit ratings. Moreover one would expect a circular relationship between company earnings and the economic environment, with the former being a leading indicator of economic conditions.

1.2 OBJECTIVES OF THE STUDY

The aim of this research paper is to examine the relationship between the BRICS countries credit default swap spreads and distortions in the global environment, specific country factors as shown by country sovereign credit ratings, changes or biases in global investor sentiment and domestic company earnings. The sub-goals therefore are:

- To determine the nature of the relationship of these factors with the BRICS countries credit default swap spreads.
- Determine the significance of the impact of these variables in the variation of the BRICS countries default premia.

1.3 DATA AND METHODOLOGY

Credit default swap spreads provide a more accurate adjustment to a country's risk premium as perceived by market participants. The methodology that will be employed in this paper closely resembles that of Alper (2006).

Alper uses balanced panel data and a fixed effects model to test for the influence of surprises in US monetary policy on emerging market bond spreads. He conducts his investigation using 17 emerging market bond spreads from the emerging market bond index (EMBI+). To control for country level fundamentals and market sentiment respectively, Alper (2006) uses credit ratings and the S&P 500 volatility index (VIX) as proxies. The investigation conducted in this

dissertation is restricted to four of the five BRICS countries. There appears to be insufficient data on Indian credit default swap spreads to include the member country. This article will examine the nature of the relationship between global sentiment as represented by the VIX, sovereign credit rating, the US Federal funds rate, domestic company returns, inflation and BRICS countries default spreads. Sovereign credit rating and the US Federal funds rate will be used to control for country specific factors and US monetary policy effects respectively, while company earnings will be used to control for domestic economic activity. Bloomberg as a data repository is used to obtain month end values for 5 year credit default swaps for the BRICS countries for the period 2003 – 2015. BRICS historical securities exchange index data was also obtained from Bloomberg. Data on the ratings of the BRICS countries was taken from Moody's website. The volatility index (VIX) data and inflation data was obtained from Bloomberg and the US Federal funds rate was obtained from Thomson Reuters DataStream.

1.4 OUTLINE OF THE STUDY

The organisation of the study is as follows: Chapter two provides a literature review of the theory underpinning the New Financial Architecture. Traditional finance theory such as rational expectations theory and EMH are also discussed. Chapter three provides a review of behavioural finance, US monetary policy and the current excess liquidity environment. Chapter four provides an overview of data and the methodology used in this study. Chapter five reports on the empirical findings and lastly Chapter six provides a summary and areas of further research.

CHAPTER 2

A THEORETICAL AND EMPIRICAL INVESTIGATION INTO CREDIT RATING AGENCIES AND MARKET EFFICIENCY

2.1 INTRODUCTION

This chapter provides a review of the theoretical underpinnings of the New Financial Architecture (NFA) and credit rating agencies. The chapter also provides empirical literature on credit rating agencies and theories concerning market efficiency. The orthodox account asserts that markets for the most part are efficient with the ability to self-equilibrate. This conjecture follows mostly from the foundations of classical economics and its assumptions on market equilibrium.

However even the orthodox literature acknowledges some market failures due to asymmetries largely as a result of informational inefficiency. Credit rating agencies were established with the view of ameliorating problems associated with informational efficiency. However rating agencies have been accused of implicitly exacerbating the problem. Thus economists have differed in accepting the orthodox narrative, as an adequate economic paradigm to explain real world phenomena.

This chapter will therefore provide a review of theories on investor expectation and market efficiency, alongside a review of regulatory systems established for market stability. The chapter will provide an assessment on their impact on emerging markets. The chapter is divided as follows Section 2.2 discusses the theoretical underpinnings of the New Financial Architecture (NFA) and credit rating agencies. Section 2.3 will provide a review of empirical literature on credit rating agencies and the efficient market hypothesis and lastly Section 2.4 will conclude.

2.2 LITERATURE REVIEW

2.2.1 THEORETICAL UNDERPINNING OF THE NEW FINANCIAL ARCHITECTURE

The NFA is based on the idea of market efficiency. Underpinning the idea of efficient markets are the rational expectations theory (REH) and the efficient market hypothesis (EMH). There have been a number of discussions on the behaviour of market participants. Most notably, academics have been concerned with the use of information by market agents and the subsequent effect on asset pricing. This concern has been used to explain in many instances how expectations are formed and how the use of information facilitates market equilibria. There are three approaches to expectations that were formulated by economists. Expectation are said to be exogenous, adaptive and rational.

Firstly exogenous expectation is the assertion that expectations are formed by events outside the particular economic system (Howells and Bain, 2008). This is when significant market moving events take place outside domestic capital markets which affects the performance of the domestic market. The result of these external events is seen on the impact that these events have, on the views of domestic economic participants for the foreseeable future of local assets. The second approach states that expectations are adaptive or backward looking. In this instance people extrapolate from past trends and make inferences for future price determinations (Lovell, 1986; Howells and Bain, 2008). Lastly expectations are deemed to be formed by market agents in order to construct a model of the economy. These expectations are called rational expectations. The rational expectations hypothesis (REH) can be formally defined as the act by market agents, in their self-interest, of making a decision with the use of all available information (Howells and Bain, 2008: 285).

Literature on rational expectations is largely accredited to Muth (1961) and its later application in macroeconomics to Lucas *et al* (1973). Muth (1961) observed two conclusions from studies concerning expectations namely, the average of the expectations for an industry are more accurate than models and, reported expectations underestimate the extent of changes that actually take place. The argument provided for is that industry participant expectations tend to be more

accurate than forecasted models by market commentators. Moreover, reported expectations tend to be more conservative that actual outcomes. Muth attributes this to the rigidity of economic models that do not allow for changes in the behaviour of economic actors as time and the conditions of the underlying economic environment change.

Syll (2012) views the REH as only applicable to stable and stationary processes as opposed to real world events. He views rational expectations as an extension of neoclassical macroeconomic theory and the cornerstone of the efficient market hypothesis (Syll, 2012: 2). The expectations theory, he states differs from the view held by Keynes of a future that is largely uncertain and unknowable (Syll, 2012:3). Syll (2012) further rejects claims that on average people or agents share similar expectations but argues that expectations differ as do information sets hence Keynes' advocacy for macroeconomic coordination. Pech and Milan (2009) state that Keynes' argued that in situations of uncertainty economic participants use conventions or heuristics to guide their actions, supported by a weighting or degree of confidence in those conventions. This argument seems to precede behavioural finance and its assertions.

Diamond and Verrecchia (1981) investigate the assumptions of the REH by analysing the informational content of prices in financial markets. They contend with the assumption that the rational expectations equilibrium price reveals all information to all the traders. Diamond and Verrecchia (1981) describe the rational competitive expectations equilibrium as the point where the market clears and the beliefs of traders' about the distribution of all observable variables is fulfilled (Diamond and Veracchia, 1981: 6). They assert traders learn nothing from prices. Thus, because traders observe their own information and the price, the equilibrium price cannot contain all available information.

However they find that in the presence of noise within markets, there appears to be information diversity rather than asymmetry. Therefore market participants are motivated to act on their private information, contributing to market informational efficiency. The result is prices being partially revealing as noise allows for the aggregation of information and through noise traders or technical analysts, assist in the price discovery mechanism.

Bryant (1983), in accordance with Syll (2012), agrees that rational expectations go against Keynes assumption of the behaviour of economic agents. Like Syll (2012) he states that there is nothing rational about the REH as Keynes proposed that economic agents assign weights to the probabilities of certain events taking place as a result of their beliefs. Blanchard and Watson (1982) appear to agree with the assertions put forth by Diamond and Verrecchia (1981) arguing that the rationality of both behaviour and expectations of economic agents do not imply that the price of an asset resembles its fundamental value (Blanchard and Watson, 1982: 3).

However they go on to say there can be rational deviations from an assets fundamental value. This is to say that if asset prices do not necessarily reflect past and current information, it is not evidence of irrationality in markets. Chari and Jaganathan (1987) also add to the notion of rational deviations by investigating bank runs. They assert that when economic agents observe large queues at banks, even without adverse information, would be rational to infer a failure and therefore precipitate a bank run (Chari and Jaganathan, 1987: 14).

With the 2008 global financial crisis (GFC) the rational expectations hypothesis received criticism on its theoretical soundness and its inability to predict the financial collapse. According to Dwyer *et* al (1993) the popular proposition of economic agents that gather and use information efficiently appeared to be inconsistent with the evidence collected prior to the global financial crisis. Levine (2012) a proponent of rational expectations argues the need for an uncertainty principle in economics like other scientific disciplines, as there are limits to the ability of economists to simultaneously be aware of facts. He argues the rational expectations hypothesis to not be a principle of perfect foresight.

Levine therefore describes rational expectations as a belief in forecasts that is self-fulfilling (Levine, 2012: 1). He however acquiesces to the limits of such a theory. Levine's proposal had been acknowledged by Keynes many years ago.

Having discussed the behaviour of economic agents as proposed by the rational expectations hypothesis a mixed picture is provided. Scholars appear to be divided on the theoretical soundness of the rational expectations theory and its relevance thereof. The ability of such an economic model to simulate an event as

it would unwind in reality is at the epicentre of much discourse in many economic theory assumptions, as markets are continually hit by crises. Hence the arguments by scholars such as Spiegler and Milberg (2013) and Blinder (2014) to re-evaluate the merits of the current theoretical foundations of mainstream economics.

2.2.2 REVIEW OF THE EFFICIENT MARKET HYPOTHESIS (EMH)

The efficient market hypothesis (EMH) is a theory on the informational efficiency of financial markets. Its core tenets are that investors form expectations rationally and markets aggregate information efficiently therefore equilibrium prices contain all aspects of available information (Busetti, 2009).

The EMH is categorised according to three forms namely weak form, semi-strong form and strong form (Fama, 1970). Weak form claims that all past information has been priced into asset values. Thus in the context of financial markets a trader using technical analysis may not be able to capture excess returns. However use of some fundamental analysis may provide a trader with excess returns (Fama, 1970; Goodspeed, 2013). Semi-strong form is when all publicly available information is fully reflected in asset prices. Therefore both technical and fundamental analysis would be of no use in trying to capture excess returns (Fama, 1970; Goodspeed, 2013). Lastly the strong form states that all information available both public and private is fully reflected in asset prices, consequently even inside information cannot be used to capture any excess return (Fama, 1970; Goodspeed, 2013).

There are also three categories of efficiency suggested by EMH namely, operational efficiency, informational efficiency and allocational efficiency. Operational efficiency is where trading is carried out quickly, reliably and at minimum cost. Allocational efficiency is described as where resources or funds go towards their most productive use and lastly informational efficiency is where prices reflect all available information (Howells and Bain, 2008:572). The essence of EMH is price efficiency.

Asset prices have not entirely behaved in random patterns as alluded to by the theory. Securities do provide discernible patterns when analysed over time. As a

result of the psychology of market participants, financial asset prices have a tendency to move in a trend. For example a downward trend in the price of BRICS countries debt instruments can be observed as credit ratings improved overtime. Similarly default spreads have been observed to show a tightening during such a period.

With the crux of the efficient market hypothesis being price efficiency the assumptions of EMH include frictionless markets and costless information. Furthermore the assumptions of EMH hold that security returns follow a random walk model and security prices are unpredictable by virtue of the unpredictability of news flow. However if the assumptions of EMH were to hold this would result in the Grossman-Stiglitz paradox.

Bailey (2005) describes the Grossman-Stiglitz paradox as the assertion that if information was freely available and common to all investors, then investors would acquire information to the point where marginal costs equal the marginal benefits. This would be due to the inferences investors could make from the price of an asset as it contains all available information. Thus because the acquisition of information is costly, prices cannot perfectly reflect all available information as those who spent resources in the acquisition of the information would not receive any compensation (Bailey, 2005: 72). The implications of the paradox therefore are; a state of strong form efficiency is a rarity and markets should be aware of information asymmetries.

The efficient market hypothesis follows from a previous theory on asset pricing known as the martingale theory. According to Bailey (2005) the martingale theory is one of the oldest and most known theories on asset pricing. The theory can be summarised using the following expression:

$$\mathrm{E}[P_{j,}t_{+1}|\Omega_{\mathrm{t}}] \geq Pj_t \qquad (1)$$

This states that the expected price of asset j in the next time period $t+1$ will be determined by an information set omega (Ω) in the current time period. The information set omega includes past price trends of asset j and other information such as company earnings etc. (Fama, 1970; Bailey, 2005: 79). The use of information in determining current and future price trends of assets in financial

markets has been a concept mulled over up to its current state where it is used to explain market efficiency. However whether these theories, which predominantly subscribe to neoclassical economics, can sufficiently explain how markets conduct themselves is an on-going debate among academic scholars.

Variants of theories explaining market efficiency have been investigated as a result of the perceived flaws in the efficient market hypothesis. One of those variants is the adaptive markets hypothesis (AMH). The AMH considers varying degrees of market efficiency. According to Urquhart and Hudson (2013) the adaptive market hypothesis provides for three practical implications in finance namely: (i) it allows for risk premia to vary over time as a result of the stock market environment and the demographics of the investors in the market; (ii) allows for arbitrage opportunities to exist in the market, therefore active liquid markets imply the existence of profit opportunities, however these opportunities are exploited and so disappear. The corollary is that new opportunities are continuously being created and lastly investment strategies are (un)successful as a result of the environment of the particular market (Urquhart and Hudson, 2013: 1-2).

2.2.3 REVIEW OF CREDIT RATING AGENCIES (CRA)

Credit rating agencies are a product of the 20th century and have been functioning since 1909. Moody's Investor Services has been rating since 1909 and an amalgam of agencies that formed Standard & Poor's (S&P) have been rating since 1922 (Cantor and Packer, 1996).

These two agencies were the dominant agencies before the ascendance of Fitch Ratings. Both Moody's and S&P used to grade any tradable financial instrument irrespective of whether the issuer requested such rating in the US, but have since moved to a user pays principle (Maas, 2011; Smith and Fryer, 2012). The user-pay principle meant clients would pay for an assessment. This has created an industry wrought by conflicts of interest and perverse incentives. The apparent faults within the credit rating industry are amplified by the fact that globally three rating agencies command the largest portion of market share thus creating a troika oligopoly (Maas, 2011).

The main premise of credit rating agencies is to compress large quantities of public and non-public information with the aim of disseminating it for the benefit of the investing community. The information provides detail of the creditworthiness of the issuer. The emphasis on informational issues preceded the New Institutional Economics (NIE) approach discussed herein. As information was crucial to market conduct, CRAs in their design were supposed to contribute to solving the principal-agent problem caused by asymmetric information and in the process ameliorating risks concerned with adverse selection and moral hazard. By making such information public CRAs also were to assist with reducing redundancy and the cost thereof to lenders (Smith and Fryer, 2012).

Credit ratings were viewed as forward looking indicators of the relative risk of an issuer's ability to service debt obligations but subsequently empirical studies found rating agencies to be lagging indicators and therefore not introducing much new information to the markets (Amadou, 2002; Mora, 2005). The rise to prominence of CRAs can be attributed to two events. Firstly there was a shift in policy regimes from Keynes and Minsky's disposition of endogenous instability in financial markets to the neoclassical belief of efficient financial markets. Keynes and Minsky believed in the regulation of markets by government as they deemed markets to be inherently unstable. Classical economic beliefs are that government intervention inhibits markets that are already efficient and can manage to self-equilibrate.

Secondly there was the emergence of the Efficient Market Hypothesis (EMH), which postulates markets have informational efficiency and that market prices are optimally set by rational utility maximizing agents (Crotty, 2011). The presupposition given by EMH affirms the beliefs given by classical economics. This new shift provided an impetus to a new globally integrated and deregulated form of neoliberal capitalism. This would be known as the New Financial Architecture (NFA).

The NFA refers to the integration of modern day financial markets with light government regulation (Crotty, 2008). Most of the radical deregulation took place during the era of the Great Moderation in the late 1980s, continuing until the global financial crisis. The repealing of the Glass-Steagall Act that regulated the

separation of commercial and investment banking activities proved to be a catalyst (Crotty, 2009; Stiglitz, 2009). This created grounds for the NFA based on lax regulation of commercial banks, investment banks and the other financial institutions to permeate. In tandem with neoclassical financial economics there was great financialisation of world economies. The NFA at its core is the belief that unregulated financial markets are efficient (Crotty, 2008). Thus Crotty (2008) and Stiglitz (2009) denounce the NFA as based on weak theoretical foundations due to its reliance on the assumption of neoclassical theory concerning capital markets ability to price securities and sufficiently allocate risk to those capable of managing it. The results of the NFA can be seen by the increase in speculative capital movement by financial firms directed at risky but high return assets. None the less the advocates of the NFA and of financialisation of economies, especially developing ones, continue to argue that there is a relationship between a deregulated global financial structure and economic development.

Moreover with the institutionalisation of CRAs, regulatory changes to banks' capital requirements according to the Basel accords (Basel I), required banks to hold capital against risk weighted assets. CRAs determined the risk weights on these assets. This had been further solidified under the Basel II accord. Basel II regulatory requirements calculated risk according to two prescribed methods. The Standardized Approach (SA) and the Internal Ratings Based Approach (IRBA) (Elkhoury, 2009). The standardized approach provides for the measurement of risk using external credit assessment institutions namely CRAs (Elkhoury, 2009). Basel III and IV have done very little to mitigate the use of CRA's.

Credit rating agencies have expanded into emerging markets moving from their home terrain of mainly the United States of America (USA). Since 1994 credit rating agencies have been rating developing countries. The agencies have however been accused of procyclicality, contributing to the boom and bust of the business cycle in developing countries. Despite this, credit ratings remain a key determinant of sovereign bond pricing. This is as a result of institutional investor's close monitoring of issued credit ratings due to investment restrictions. Big institutional investors like collective investment schemes (CIS) i.e. pension funds etc are obliged by mandates that govern in which financial securities to invest in, to use credit ratings as a definitive guide for a security's quality

assurance. Furthermore credit ratings of the banking institutions in developing countries are highly correlated to sovereign ratings. This has the potential to affect the integrity of developing country's financial systems.

The conduct of CRAs has been called to question post the financial crisis. According to Chandrasekhar (2013) and Smith and Fryer (2012) the conflicts of interests, as a result of the user-pay principle, have altered the rating agencies' ability to act as reliable intermediaries of information. King and Sinclair (2003) argue that rating agencies are serving to privatise policy-making thereby encroaching on the responsibility of government. This is due to the fact that governments in developing countries feel compelled to implement policies that would reduce their country's sovereign risk forsaking policies for sustained economic growth (Giselle, 2004). According to Smith and Fryer (2012) this compulsion felt by developing country governments to improve sovereign ratings can lead to overly tight macroeconomic policy. Within the BRICS countries both Brazil and Russia have seen rating downgrades below investment grade as a result of policy issues and growth concerns.

South Africa has since also received warnings from credit rating agencies to maintain fiscal prudence, policy certainty and create a business friendly environment in order to keep an investment grade rating (BDlive, 2016). Rating agencies are regarded to have quasi veto over government policy due to the influence they possess on private investors and they therefore impede developmental policies being pursued by developing nations in favour of more capital friendly policies (Giselle, 2004). As a result, the combination of credit rating agencies and global capital, can effectively 'discipline' the state by voting through rating endorsements and/or investor appetite and in a way force government to adopt certain policies in line with market expectation (Giselle, 2004). King and Sinclair further say that efforts to incorporate the outputs of rating agencies into plans towards decreasing global financial volatility are flawed (King and Sinclair, 2003: 346). Events such as the 2008 global financial crisis (GFC) vindicate the likes of Crotty, King and Sinclair in their persistence against highly liberated markets and over reliance on private mechanisms to provide market stability without the intervention of governments.

2.3 EMPIRICAL LITERATURE

2.3.1 CREDIT RATING AGENCIES

Rating agencies have a major impact on developing countries. Armed with only an opinion, rating agencies can influence capital flows into developing countries and the momentum of the flow in either direction. These agencies have managed to commercialise risk by performing the duties of risk profiling.

They have since perpetuated the concept of the emerging market premium on developing nations. This not only raises the cost of finance for emerging markets but the emerging market tag induces volatility within those markets. Investors are happy to provide capital inflows during the early stages of euphoria while in search of high yields. However they violently withdraw capital at the slightest indication of bad news setting in motion events that can cause financial distress in these economies.

The sovereign ratings also create an upper bound limit for corporate entities domiciled within developing countries known as the sovereign ceiling (Smith and Fryer, 2012). Such an action potentially inhibits companies in developing countries from raising finance at adequate capital costs regardless of sound financial standing.

There is a substantial amount of empirical literature making use of predictive models to ascertain the effect of credit ratings on financial instruments in issue. Much of the literature looks at the factors that are considered when determining ratings. For example Cantor and Packer (1996) found that per capita GDP, inflation, levels of external debt and default history etc. were significant determinants of sovereign ratings. Ferri, Lui and Stiglitz (1999) and Mora (2006) also echoed the significance of macroeconomic fundamentals such as deficits, growth and national debt. Other scholarly authors such as Reinhart (2001) tested the performance of ratings in comparison to economic fundamentals as predictors of impending financial crisis and concluded ratings to be the worst predictors of crisis over economic indicators. Thus the conclusion made by many is that ratings are in effect lagging indicators as opposed to forward indicators of an issuer's default.

Since the Asian crises there has been a resurgence of literature into emerging markets and the impact of credit ratings thereof. Amadou (2002) used panel regressions of a simple univariate model on ratings to analyse the statistical differences between actual bond spreads and rating changes and concluded a notch increase in credit ratings decreased bond yields for emerging markets by 14% on average. Jamaramillo and Tejada (2011), who also use a panel framework to test the hypothesis whether ratings matter in emerging markets, found that investment grade status does in fact lower bond spreads.

This is considered a sign of approval by the markets. Thus there has been an observed inverse relationship between ratings and bond yield spreads. However rating agencies are known for exacerbating the swings in the business cycle and therefore add to procyclicality.

Kaminsky and Schmukler (2002), using panel regressions and event studies, concluded that credit ratings contribute to contagion especially in emerging markets as changes in another emerging market can trigger spill over effects to other emerging markets. Also in times of crisis changes in ratings or outlook have a stronger effect on domestic markets as perceived credit risk increases. Lastly fragile economies as measured by the credit rating agencies are more vulnerable to events in developed countries for example a change in US interest rates.

In a study done by Mora (2006) it was concluded that ratings rather exhibit stickiness and only adjust when there is a sufficiently large deviation from predicted future ratings by market participants, as opposed to assigned ratings by the agencies. Thus one can conclude that ratings in effect follow market sentiment, once again suggesting that ratings are lagging indicators. Literature on developing countries and the apparent faults within the credit rating industry highlight the decline in rating quality as these agencies attempt to increase their market share by providing favourable ratings to clients (Becker and Milbourne, 2011).

2.3.2 THE EFFICIENT MARKET HYPOTHESIS

Empirical literature on the EMH is inundated with tests of the weak form. There has been varying conclusions in support of EMH while others question whether

the models used are misspecified and thereby inadvertently support the assumptions of the EMH. There has also been dissenting voices that discredit the efficient market hypothesis and its theoretical foundations.

Efficient markets under the EMH are assumed to follow a random walk model which renders asset returns unpredictable. However the phenomena of mean reversion in markets would seem to suggest that asset prices follow trends. The astute investor can therefore follow such trends and make profits through mere observation of past prices and making future inferences.

According to Brown (2011) there has been an accumulation of evidence from Fama himself from his seminal papers suggesting EMH fails empirically to describe how markets work in reality (Brown, 2011: 2). Brown (2011) conducts a similar event study to Fama (1970) using stock splits to investigate the implications concerning informational efficiency asserted by EMH and whether event studies lend themselves to biases when testing for evidence of EMH. Brown (2011) concludes that the results show a mixed bag as a result of *ex post* conditioning which results in anomalies. He however concedes that EMH cannot foresee bubbles and collapses.

Lee *et al* (2010) conduct a study to demonstrate whether different levels of economic and capital market development will show the same evidence of the efficient markets hypothesis. Using panel stationarity tests with and without structural break, Lee *et al* (2010) conclude that in developed countries the efficient market hypothesis does not hold. Lee *et al* also conclude that similarly security prices in developing countries do not exhibit the behavioural patterns assumed by the efficient market hypothesis.

Urquhart and Hudson (2013) use tests of linear dependence and non-linear dependence to establish degrees of market efficiency. They make use of data from the US, UK and Japanese stock indices. By dividing the data into five half a decade subsamples they test for the following stated goals: efficient markets, markets moving towards efficiency, markets switching from efficiency to inefficiency, adaptive markets and efficient markets. They achieve their goals by monitoring any autocorrelation between security returns. Urquhart and Hudson (2010) conclude that the Dow Jones Industrial Average (DJIA) in both linear and

non-linear tests has gone through periods of predictable and trended returns and unpredictable returns supporting the proposition of an adaptive markets hypothesis. Furthermore Urquhart and Hudson (2010) show that the Financial Times 30 (FT30) provides mixed results with the linear tests for dependence such as the tests for autocorrelation supporting the AMH. Similarly tests on the TOPIX suggest that the market is adaptive.

Brenner (1979) also employs stock splits to test for the sensitivity of empirical studies to capital markets (Brenner, 1979: 917). Using a number of different models such as the one factor Sharpe-Linter model of generating returns and the Cumulative Average Residuals (CAR) model to test for market efficiency, Brenner concludes that he cannot achieve a clear result and possibly the market models used could be misspecified. He remarks that maybe results validating the EMH may be conditional on the market model employed (Brenner, 1979: 928).

Munir *et al* (2012) investigate the behaviour of Southeast Asian stock indices namely Indonesia, Malaysia, Philippines, Thailand and Singapore. Using a threshold autoregressive method Munir *et al* (2012) conclude that returns on the Malaysian and Thailand stock are not predictable and are characterised by a random walk. This would be in agreement with EMH principles. However they find with the stock markets of the Philippines and Singapore there is evidence of mean reversion rejecting the principles of EMH. They finally conclude that developing countries do not possess well established financial systems. Furthermore developing countries suffer more frequently from political and economic instability hence their stock markets cannot be expected to be efficient continuously.

2.4 CONCLUSION

From the review of literature above one can observe the evolution in theoretical foundations that are used to explain how markets function and the behaviour of market participants. The rational expectations hypothesis tries to explain the behaviour of market participants with the use of the assumption that these participants use all available information to inform beliefs. This theory however has had little success in predicting crises as a result of its emphasis on individual beliefs. The theory seems to also fail to explain the processes investors go through

when making decisions. Some scholars view rational expectations as an extension of neoclassical economic theory with close relations to the efficient market hypothesis.

Moreover, theories trying to explain market informational efficiency have been evolving from theories like the martingale theory to the efficient market hypothesis. Much like the rational expectations hypothesis, EMH has had very little success in predicting financial downturns or explaining investor actions. Evidence in support of the EMH concludes with a mixed bag of results. Variants of the EMH are emerging as the schools of thought evolve with prevailing market conditions.

With a globally deregulated financial system there is pervasive use of credit rating agencies. These agencies established themselves a niche as information intermediaries. Their purpose was to create market stability with a more reliable flow of information. It has since been argued that they in fact increased procyclicality in markets and have exacerbated the effects of the business cycle. Markets in their very nature are dynamic and evolve with the times and economic environment in which they exist. Naturally the theoretical frameworks that underpin how the markets function will have to continuously evolve to reflect the non-static nature of markets.

CHAPTER 3

A THEORETICAL AND EMPIRICAL INVESTIGATION INTO BEHAVIOURAL FINANCE AND GLOBAL FINANCIAL MARKETS CONDITIONS.

3.1 INTRODUCTION

This chapter will provide a theoretical and empirical review of behavioural finance and the conditions prevailing within global financial markets, namely the global savings glut and accommodative monetary policy such as quantitative easing. Behavioural finance provides an alternative theoretical framework to assess the anomalies with regards to asset pricing as a result of the behaviour of economic actors. This is particularly important for emerging market assets which include assets from the BRICS countries.

Recently there has been a divergence between fundamentals and capital market performance. For instance in the context of the South African economy a dichotomy exists where weak macroeconomic fundamentals prevail however the capital markets appear to be outperforming domestic GDP growth. The analysis on behavioural finance as a paradigm will provide an insight into the impact of the psychology of market actors within financial markets and the subsequent effects on security pricing. This is done by analysing how market participants gather information and use it in the decision making process.

The inexplicable divergence in emerging market asset prices can also be attributable to the advent of a loose global monetary policy environment that has given rise to excess liquidity within global financial markets. This liquidity has created distortions in security prices in major financial centres globally. The extremely accommodating monetary policy has been as a result of the global financial crisis.

The crisis left most developed economies reeling from the crash of the housing bubble, depressing global growth and output. The chapter is organized as follows Section 3.2.1 discusses behavioural finance theory. Section 3.2.2 provides a

theoretical background to global liquidity. Section 3.3 provides an empirical analysis of global liquidity caused by accommodative US monetary policy and section 3.4 concludes.

3.2 LITERATURE REVIEW

3.2.1 REVIEW OF BEHAVIOURAL FINANCE THEORY

Financial economic theory is largely based on the concept of the economic man also known as *homo economicus*. This is the belief in rational economic actors and utility maximizing agents (Brabazon, 2000: 2; Botha *et al*, 2008: 94). These agents have the uncanny ability to make unbiased forecasts concerning the future, as has been discussed in the previous chapter. However this view of economic agents has not been able to consistently explain the decisions and actions taken by economic agents in markets. Market participant behaviour determines whether asset prices are largely representative of fair value or are distorted. Continuous volatility in risk sentiment can cause great fluctuations in asset prices. Hence the establishment of behavioural finance theory as a paradigm which proposes an alternative argument towards understanding the behaviour of market participants.

Behavioural finance supplements existing theory on the decision making process of market participants. Botha *et* al (2008) assert that investors are limited by three boundaries in their decision making abilities. These boundaries are; the investor's cognition which is the way people organise information and the resultant way of thinking that may be prone to errors, the investor's emotion which is the way they feel when they receive information and the investor's social environment which relates to the pressures the investor finds himself in (Howells and Bain, 2008: 98).

According to Ritter (2003) behavioural finance is premised on two foundations namely limits to arbitrage and cognitive psychology. Howells and Bain (2008) describe the foundations of behavioural finance as practical limits to arbitrage and investor sentiment (Howells and Bain, 2008: 585). Barberis (2011) categorizes behavioural finance theory according to investor beliefs and preferences.

The first foundation of behavioural finance is with regards to limits to arbitrage. Arbitrage can be defined as a discrepancy in an asset's price in two different markets, which allows for riskless profits as an economic actor can buy (long) the

asset in the market where it is cheap and sell (short) it in the market where it is priced higher. According to Barberis and Thaler (2003) persistent mispricing in markets is evidence of limits to arbitrage therefore if arbitrage was not limited the mispricing would disappear. Financial markets are littered with examples of arbitrageurs who perceived an opportunity and in their attempt to exploit these opportunities made losses to the point of capitulation.

The most famous example is that of Long Term Capital Management (LTCM) who saw an opportunity in the shares of Royal Dutch Shell trading out of parity in their respective domicile markets namely the UK, Netherlands and USA. When Royal Dutch and Shell merged, Royal Dutch owned 60% of the merged entity and Shell the remaining 40%. Both Royal Dutch and Shell maintained separate listings in their respective markets. Albeit LTCM maintained the correct view of the separately listed shares, market sentiment that drove the divergence continued. Eventually in 1998 LTCM capitulated and only in 2001 did prices of Royal Dutch and Shell trade at parity (Barberis and Thaler, 2003; Ritter, 2003; Lo, 2005).

The second foundation is cognitive psychology. Cognitive psychology suggests that the decision making process is subject to certain biases. Behavioural finance scholars categorises these biases into two components namely heuristic decision processes and prospect theory. Accordingly, the heuristic decision process includes the following biases; representativeness, availability, overconfidence and anchoring

Representativeness is described as the tendency for investors to make decisions based on stereotypes and extracting patterns that are non-existent in the data (Brabazon, 2000; Ritter, 2003; Sewell, 2007). This condition is sometimes referred to as the use of heuristics or rules of thumb. The most common biases as a result of heuristics are the law of small numbers and the base rate neglect effect. The law of small numbers refers to the tendency by investors to draw conclusions from limited data sets.

While the base rate-neglect effect is when investors place too much emphasis on similarities between market events and neglect unrelated variables that could impact the outcome of their investment decision (Botha *et al*, 2008). For example it is commonly stated that in times of turmoil gold as a store of value is a safe

investment therefore people would hold gold stocks neglecting to look at variables like company management, quality of assets, cost and capital structure etc. that would affect the value of a gold firm rather than the value of physical gold. These biases have major implications for emerging market assets, for instance these biases may lead to herd behaviour regarding EM assets as a result of limited data. Such behaviour could lead to bubble or contagion effects for emerging market assets. Instances of such behaviour taking place in markets includes the strong performances exhibited by commodity exporting countries that is correlated to a strong performance of the Chinese economy and the inverse when Chinese GDP growth falters. In such instances the fundamentals of the commodity exporting country are neglected for improved prospects associated to trade linkages. Hirshleifer and Teoh (2003) describe the phenomena of herding to be when individuals are in informational cascades. This they describe as observational learning by individuals whereby they observe the actions of others, their payoffs and these observations become so informative that the individual's actions are not representative of their own private signals (Hirshleifer and Teoh, 2003: 4-5).

The availability bias refers to the reliance by investors to use the most available information in their decision making process regardless of the accuracy of the information (Brabazon, 2000; Barberis and Thaler, 2003; Sewell, 2007). According to Botha *et al* (2008) there are four categories of availability bias namely retrievability, categorisation, narrow range of experience and resonance. Retrievability is investors regard as credible, information that is easily retrievable. Categorisation is the classification of information by its users in order to easily recall it. Narrow range experience refers to investors having little reference to retrieve information in order to make an objective decision and therefore they choose investments in sectors or markets they are most familiar with.

Lastly resonance is when investors buy investments that suit their personality (Botha *et* al, 2008: 104). These biases show that investors place huge weighting on sentiment in their decision making process thereby creating market movements not bound by rationality.

The overconfidence bias is the confidence investors have in their own ability and confidence in the information they hold (Brabazon, 2000: Ritter, 2003: Barberis

and Thaler, 2003). In most literature it is stated that this condition is dominant in entrepreneurs and males as opposed to their female counterparts. According to Botha *et al* (2008) overconfidence can manifest in two ways; by creating a knowledge illusion and creating a control illusion (Botha, 2008:112).

Lastly the anchoring bias is described by Brabazon (2000) and Sewell (2007) as the fixing of expectations due to recent observations. This has the effect of leading investors to believe that a security will continue to trade at a defined range in line with historical trends. Anchoring could result in a divergence in asset prices as past trends are extrapolated into the future. For example the expectations for the Chinese economy may appear to have been anchored around high growth rates in excess of seven percent annually albeit these rates are off a high base. Therefore when Chinese growth went below these levels, a stock market rout took place prompting Chinese authorities to implement radical policies to stem capital outflows such as the devaluation of the renminbi, preventing short selling and having state owned financial companies pick up the slack to buoy the capital markets.

Defining behavioural finance theory from the perspective of Barberis (2011), behavioural finance is also based on two foundations namely investor beliefs and investor preferences. From the belief side three main theories exist according to Barberis. These include investors' disagreement about future prospects and possible short sale constraints. Secondly investors extrapolate past trends too far into the future and lastly investor overconfidence. The belief based theory shares similar concerns as those mentioned previously by Ritter (2003). The other cornerstone on which Barberis asserts behavioural finance theory is based on is investor preferences.

The preference based model asserts that after investors experience gains they become less risk averse as a result of wealth gains. This is known as the house money effect (Barberis, 2011: 4). The reduced risk aversion leads to more enthusiastic buying of financial securities leading to overvalued securities. The other argument of the preference based model is that investors have an affinity to lottery-like payoffs where the investors place high weighting on low probabilities (Barberis, 2011: 4). The gamble can cause distortions in financial asset prices.

Traditional finance theories maintain investors have unbounded rationality and maximise expected utility. Expected utility theory was proposed by the likes of Bernoulli and von Neumann and Morgenstein. Using complex mathematical derivations these scholars were able to explain decision making under uncertainty (Barberis and Thaler, 2003: 1067). Behavioural finance provides a critique of expected utility theory and offers an alternate explanation in assessing decisions under uncertainty. According to Prast (2004) the theory of expected utility maximisation does not hold in practice thus prospect theory's ability to explain investor behaviour better.

Hede (2012), Barberis and Thaler (2003) state that prospect theory is a mathematically formulated alternative to the expected utility theory. With prospect theory values are assigned to gains and losses rather than final asset values (Prast, 2004; Hede, 2012). According to Prast (2004) the decision making process consists of two stages namely editing and evaluation. In the editing stage people frame their prospects in terms of gains and losses relative to a given benchmark. Moreover probabilities are replaced by decision weights (Barberis and Thaler, 2003:1068; Prast, 2004; Hede, 2012:13). This takes place in the evaluation stage where only prospects with the highest values are chosen with the assistance of heuristics.

Further contrast to utility theory is seen on the value function used to describe individual investor behaviour. Expected utility theory gives a concave function that depicts investor behaviour as risk averse, with decreasing marginal utility from continued gains in wealth and greater declines in utility as wealth falls.

Prospect theory, by contrast, has a downward sloping value function for wealth gains beyond a reference point and an upward sloping function beneath the reference point (Hede, 2012: 14). The reference point is the desired amount of wealth. While prospect theory agrees with utility theory above the reference point, below the reference point investor behaviour appears to be risk loving. Thus investors are risk seekers below their desired levels of wealth.

3.2.2 REVIEW OF THE GLOBAL LIQUIDITY GLUT AND QUANTITATIVE EASING

The surge in global liquidity in recent years is said to be predicated on unconventional monetary policy (UMP) and the global savings glut (GSG). As a result of the global financial crisis, central banks around the world and particularly the United States had to deploy unorthodox monetary policy to counteract the effects of the crisis. Countries like the US, Japan and the Euro area reduced domestic interest rates to near zero levels and injected stimulus into their economies in an attempt to create a demand shock through the credit channel (Klyuev, 2009). The use of unconventional policies originated in the US, the centre of the financial crisis. In 2008 the Federal Reserve Bank announced an ambitious programme to stave off a banking sector collapse and maintain stability in the US financial system by instituting the Troubled Asset Relief Program (TARP). The programme constituted the buying of 'toxic assets' to the tune of $700 billion (Taylor, 2011). This programme, aimed at controlling the macro economy through conventional policy (interest rates) and unconventional policy (TARP), would later be known as quantitative easing (QE).

The outcomes of QE were a surplus of low cost funding in global capital markets which resulted in great vulnerability to global financial markets. Economic actors engaged in 'carry' trading as opportunities to leverage and gain high yields from emerging market assets arose. As a result of the crisis central banks in the larger more developed markets created large amounts of liquidity. With yields in developed markets at record lows speculators directed flows to emerging markets.

These capital flows created vulnerabilities in EM countries as they can be virulently withdrawn as a result of changes in sentiment due to investor perception. This was evidenced by the currency crises that ensued in emerging markets in the 90's and more recently the effects of US Federal Reserve chairman pronouncements on the reduction of quantitative easing known as tapering. The volatility experience by the markets as a result of possible US interest rate normalisation and tapering became known as the taper tantrum (Taylor, 2011).

Another factor that is said to have caused excess liquidity that inadvertently found itself chasing yields in emerging market assets is the global savings glut. This

hypothesis was proposed by the then Federal Reserve chairman Ben Bernanke. Bernanke hypothesised that as a result of prior financial crises emerging market countries adopted new ways to handle international capital flows (Bernanke, 2005). This he states attributed to a growing current account deficit in the United States which corresponded with a growing surplus with the world (Bertocco, 2014).

This accumulation by developing countries of reserves which comprise of dollar and/or US government securities, depressed yields in the United States prior to the policy of quantitative easing taking place. This is said to have affected the decision to save by US citizens.

According to Bertocco (2014), Bernanke states this happened through two channels, (i) the increases in US citizen wealth as a result of foreign flows that boosted technology stocks decreased the citizens' propensity to save as wealth increased (ii) the bursting of the technology bubble in the early 2000's halted investments in the US and with liquidity remaining in place depressed yields in the US therefore decreasing the propensity to save by US citizens.

Apart from developing nations accumulating savings Bernanke (2005) asserts that oil producing nations were also able to accumulate savings on the back of the sharp increases in the oil prices. Furthermore developed nations like Japan and Germany had also accumulated large tranches of savings due to a largely aging population.

All these factors affected both global liquidity and real interest rates in the United States as a result of a growing global imbalance in capital flows (Bracke and Fidora, 2008; Bertocco, 2014). Bracke and Fidora (2008) dispute the hypothesis provided by Bernanke and explore an alternate explanation that could have caused global liquidity. This includes; the monetary approach which portrays global liquidity as a result of low interest rates which initiated the hunt for yield and declines in risk aversion and the non-monetary approach which portrays global liquidity as a result of real factors such as desired savings and investment decisions, concurring with Bernanke.

Summers (2014) assert that the imbalance seen is a result of a concept known as secular stagnation. This would then attribute the imbalance as a fault of what transpired in the US economy. Secular stagnation is based on two foundations namely the slowdown in population growth and technological progress (Summers, 2014). Therefore with an increasingly ageing population there is an increasing propensity towards saving. However with slower technological progress there is a decreasing propensity to invest into capital projects. Thus the excess savings depress real interest rates and the reluctance to invest results in companies with cash flux balance sheets. Despite having different conditions, elements of secular stagnation are visible in the South African economy. Demographically there is a large percentage of the population that is considered as youth thus the country is in a more favourable position. However corporate SA has maintained balance sheets with cash hoards and is showing reluctance in investing locally. This may be as a result of structural and policy issues that have created uncertainty locally. Growth in South Africa has been anaemic as a result post the financial crisis.

The world continues to await direction from the Federal Reserve Bank on US interest rate normalisation. Volatility in emerging markets has since been on the rise. This level of volatility is reminiscent of the time the Federal Reserve announced the tapering of its toxic asset purchase program. According to Sahay *et al* (2014) announcements by the Fed were strongly correlated with movements in prices of assets and capital flows to emerging markets, especially during the initial introduction of unconventional monetary policy and the discussions on tapering.

However they point out that good macroeconomic fundamental were important factors considered by the markets when reacting.

3.3 EMPIRICAL LITERATURE

3.3.1 US MONETARY POLICY

Emerging market countries are highly susceptible to events concerning the US economy. This is both in terms of monetary policy decisions or guiding announcements by US monetary authorities. This has made emerging market countries that are perceived to be less resilient to portfolio outflows, due to dependency on them, to experience volatility that has the potential to destabilise economic conditions domestically. According to Foley-Fisher and Guimaraes (2013) changes in US monetary policy affect emerging countries default risk by raising the opportunity cost for investors who then require a higher risk premium. This is as a result of developed markets being viewed as safer than the riskier emerging markets. Using a method of identification through heteroskedasticity Foley-Fisher and Guimareas (2013) conclude that a one basis point increase in 10 year US treasuries increases the Emerging Market Bond Index plus premium (EMBI+) by the same amount thus indicating the rising risk of default for EM countries. Therefore the 'flight to safety' effect appears to have a significant impact on emerging market risk premia.

Hausman and Wongswan (2006) concur with Foley-Fisher and Guimareas. Hausman and Wongswan (2006) conducted an event study to assess whether FOMC announcements affect global asset prices (both developed and developing countries). They conclude that both monetary announcements and guidance from Fed statements affects global asset prices albeit the effects differ between asset classes. This they attribute to two probable reasons; (i) financial linkages - US investors owning financial assets outside of their home country and (ii) trade linkages with the United States. Indications are that US monetary authority announcements can trigger the flight to safety effect among US based investors thereby creating the need for a premium on emerging markets.

Uribe and Yue (2006) investigate the drivers of emerging market country spreads and conclude that US interest rate shocks account for 20% of the movement in activity in emerging countries from a business cycle perspective. This they say is transmitted to domestic variables via the effect on country spreads.

Kamin and von Kleist (1999) hypothesise that increases in industrial country interest rates should have the effect of increasing EM countries debt burden for global issuances and thereby affecting the countries credit worthiness. This would filter to the risk appetite of global investors. However their results seem to suggest that variations in industrial country (US) interest rates appear to not have exerted much significant influence in EM country bond spreads and subsequently the credit risk of EM countries.

Andritzky *et al* (2005) finds that global debt markets respond strongly to changes in credit ratings and changes in US interest rates with regards to emerging markets due to the costs of funding. Thus emerging market debt spreads portray some form of volatility as a result. Yafeh *et al* (2002) conclude that there appears to be co-movement in the spreads of emerging market bonds mostly as a result of influences by global events. This seems to suggest that with greater financial integration the probability of contagion among emerging market countries has increased.

Arora and Cerisola (2001) argue that contagion is the result of investors who face liquidity constraints in one emerging market and therefore the investor withdraws liquidity from another more liquid market. Many other scholars echo similar sentiments concerning the effect of US monetary policy on emerging market financial instruments. These include Alper (2006), Eichengreen and Mody (1998) and Panyanukul (2009). According to Panyanukul (2009) not only do developments in the US markets affect asset pricing in other countries but liquidity risk and liquidity levels can account for a 100 basis point difference in yields in bond spreads between countries with differing liquidity risk profiles. Stahel (2003) concurs by asserting that shocks to aggregate liquidity may command a positive risk premium in assets.

3.4 CONCLUSION

The evidence gathered from the literature study above provides insights to possible factors that are currently affecting markets and could contribute to a new financial crisis among emerging market countries. Emerging markets usually bear the brunt of the effects of crisis emanating from developed markets. From the literature we can see how the psychology of investors affects the decision making

process of investors. A bias appears to be in place for emerging markets that requires additional risk premiums to be adjusted for due to the perception of investors domiciled in developed markets.

Most importantly the literature shows that investors do not contain unbounded rationality and can base their decision on factors that do not maximise their utility. Investors can forgo their own private signals and observe the signals of others and ultimately conclude an action not in accordance with their desired outcome. This poses a risk to emerging markets as investor decisions can lead to contagion effects and become a destabilising factor in developing economies. This can be attested to by the 1997/98 Russian and Asian crisis that resulted in contagion among emerging markets. The corollary is that developed markets have become a proxy for safe assets in times of turmoil. Therefore US monetary policy is an important factor in emerging market asset pricing.

As a result of the crisis emanating from the US, the policy undertaken by the country's monetary authority has resulted in excess liquidity in capital markets that is continuously searching for yield. These portfolio flows which have found their way into emerging market assets pose a risk to emerging market economies as have been evidenced by the volatility surrounding the Federal Reserve announcements on a number of occasions. These announcements were concerning the ending of the bond purchasing program that gave stimulus to the markets. Also the recent announcements' to normalize US interest rates and embark on a hiking cycle have resulted in much volatility in emerging markets. Market participants trying anticipate the Fed interest rate hike and in the process rebalancing their portfolios by moving out of perceived riskier EM assets into safe haven assets, are creating concerns for emerging market monetary authorities.

The withdrawal of these portfolio flows poses a threat to emerging market currencies and ultimately increases developing countries credit risk as weaker currencies will result in more expensive debt to be serviced. With the prevailing global macroeconomic slow down, idiosyncratic risks in emerging markets will add more pressure on these economies creating fertile grounds for an emerging market crisis.

CHAPTER 4

METHODOLOGY AND ANALYTICAL FRAMEWORK

4.1 INTRODUCTION

This chapter provides an overview of the statistical and econometric models that are to be used in order to achieve the objectives as set out in Chapter One. The study will empirically assess the relationship between BRICS countries credit default swap spreads and investor sentiment, sovereign ratings, stock returns, inflation and developed country monetary policy. India is omitted from the study due to the absence of data on credit default swaps (Neuenkirch *et al*, 2010). The chapter is organised as follows; section 4.2 outlines the period of the study, the type of data used and the sources of the data. Section 4.3 discusses the variables used. Section 4.4 sets out the tests used in order to determine whether the variables in the model are stationary. Section 4.5 provides the specification of the model used.

4.2 PERIOD OF STUDY, TYPE AND DATA SOURCES

The data used to conduct this study is a panel dataset comprising monthly time series data spanning from January 2003 to the month of July 2015 for four cross sectional groups. The data is for the BRICS countries. Data for the dependent variable, namely credit default swap spreads, was obtained as month-end values from Bloomberg. The explanatory variables, which include the volatility index (VIX) used as a proxy for global investor sentiment, inflation and BRICS countries stock returns were also obtained from Bloomberg, country credit ratings were obtained from Moody's Investor Services and the US Federal funds rate data was obtained from Thomson Reuters Datastream. Interactive dummy variables are used to observe the effects of the crisis on the explanatory variables.

4.3 DEFINITION OF VARIABLES

4.3.1 CREDIT DEFAULT SWAP SPREADS

The CDS data used comprises of US dollar denominated contracts with a 5 year maturity. Credit Default Swaps are financial contracts that offer insurance for losses suffered by the buyer as a result of a credit event (Neuenkirch *et al*, 2011; Faure, 2014). The subject of insurance is outstanding sovereign debt. According to Neuenkirch *et al* (2011) emerging market countries are at least ten times more vulnerable to defaulting than their developed counterparts. Therefore credit risk remains an important factor in pricing sovereign debt for emerging market borrowers. Accordingly, sovereign credit default swaps provide a reliable indication of the credit risk premium demanded by investors.

The basis of credit default swaps is to insure against the risk of bankruptcy of the reference entity and the resultant inability to pay thereafter. Ancillary risks accounted for in the instrument include when the entity's debt has to be restructured, the entity is obliged to default or when the entity repudiates its obligation to pay (Neuenkirch *et al*, 2011). Standard contracts have two legs namely; a buyer purchases protection and compensates the protection seller. The protection purchaser pays periodic payments to the protection seller who in turns settles with the protection buyer when a credit event occurs such as a credit rating downgrade, bankruptcy, default etc (Neuenkirch, 2011; Faure, 2014). Thus increases in default swap spreads may reflect a rise in the probability of a 'technical' default along with some transition risk such as a sovereign rating downgrade rather than actual principal losses on outstanding debt (Neuenkirch *et al*, 2011).

According to Longstaff *et al* (2007) default spreads are also affected by international events, particularly events in the US markets, therefore US monetary policy communications and action have a large economic influence on emerging market spreads as do credit ratings.

4.3.2 VOLATILITY INDEX (VIX)

The volatility index (VIX) as compiled by the Chicago Board Options Exchange is a gauge of the risk appetite of international investors or the price of risk (Alper, 2006; Ozatayo, 2007; Csonto and Ivaschenko, 2013). It is a measure popularly used to gauge the implied volatility of equity options on the S&P 500. The VIX is sometimes referred to as the fear index, therefore when markets experience some anxiety due to a significant event; there has been a traditional spike in the index's volatility. This anxiety in the markets is generally as a result of market moving announcements on stocks or by institutions in charge of economic policy in the largely developed markets i.e. US monetary authority.

4.3.3 CREDIT RATINGS

Alper (2006) defines variables dealing with country specific fundamentals as 'pull' factors as they are endogenous factors. Idiosyncratic factors are deemed 'pull' factors due to borrowers competing on the soundness of these variables to attract capital (Alper, 2006). Alper uses credit ratings as a proxy for idiosyncratic risk to assess their impact on the EMBI+ premium. Credit ratings, as discussed earlier, are credit reports compiled by credit rating agencies. Rating agencies observe a number of variables that allow them to determine whether a sovereign states fiscal position, macroeconomic environment and external balances do not impair its ability to service debt obligations. These reports therefore state the credit worthiness of a country and largely influence whether large institutional investors, given their mandates, are at liberty to invest in debt instruments issued by a particular country. Empirical studies have generally found that better ratings are associated with improved sovereign yields. The studies depict an inverse relationship between ratings and sovereign bond yields (Cantor and Packer, 1996; Amadou, 2002; Jaramillo and Tejada, 2011).

Table 4.1 sets out the rating scale used by Moody's. A rating below Baa3 is deemed to be sub-investment grade. This shows that the issuer has a high probability of default and their issued instrument is therefore deemed to be speculative.

A rating above Baa3 shows that the financial instrument is of adequate quality to be invested in with lesser risk assigned to the probability of default. The highest rating attainable is Aaa while the lowest is a B3.

Table 4.1: Credit rating index based on Moody's rating scale

Moody's Rating	**Assigned score**	**Logistic transformation**	
Aaa	16	2.773	INVESTMENT GRADE
Aa1	15	2.015	
Aa2	14	1.540	
Aa3	13	1.179	
A1	12	0.875	
A2	11	0.606	
A3	10	0.357	
Baa1	9	0.118	
Baa2	8	-0.118	
Baa3	7	-0.357	
Ba1	6	-0.606	NON INVESTMENT GRADE
Ba2	5	-0.875	
Ba3	4	-1.179	
B1	3	-1.540	
B2	2	-2.015	
B3	1	-2.773	

Source: Moody's Investor Services

4.3.4 US FEDERAL FUNDS RATE

In many studies the US interest rate is used as a proxy for both global liquidity and US monetary policy effects (Alper, 2006; Hausman and Wongswan, 2006; Ozatayo *et al*, 2010). Some studies use the 10 year US treasury rate as a proxy for US monetary policy and liquidity (Neuenkirch *et al*, 2011; Csonto and Ivaschenko, 2013). Alper (2006) describes the Federal funds rate as a 'push' factor along with investor sentiment to portray the exogeneity of these variables. Alper (2006) asserts that global liquidity conditions are deemed 'push' factors because low returns in developed financial markets pushes liquidity to high yielding emerging markets. For the purpose of this study the US Federal funds rate is used.

4.3.5 STOCK RETURNS

To assess firm specific factors and control for market perception on emerging market returns, historical stock exchange returns in US dollars, of the four BRICS countries are used. The indices used are the countries main indices from the local bourses which include the JSE Top 40, the Brazilian Bovespa main index, the Chinese Shanghai Composite index and the Russian Micex. Investment returns have a profound effect on the flows directed at any financial instrument. Company earnings are also an indication of market conditions in the market in which the company is domicile and operates in. Therefore controlling for perceived market returns for these regional powerhouses will assist in ascertaining whether the actions taken by market participants, largely driven by valuations and sentiment towards the risks, have an impact on sovereign credit default swaps spreads.

4.3.6 INFLATION

Inflation is added as it affects the returns on fixed income securities. The real returns on fixed income securities, as dictated by the Fisher equation, are a function of nominal interest rates adjusted for inflation. Thus investors into this category of asset class seek returns that will sustain the purchasing power of their investable funds. Inflation also has a significant bearing on the macroeconomic environment of a country. Its effects are seen through the transmission mechanism where they eventually affect the monetary policy decision of policymakers. Whether the move in inflation is affected by cost-push factors (i.e. these factors tend to be exogenous for example global events that cause currency depreciation which then leads to higher factory gate prices for imported goods and higher prices for consumers) or are demand driven (endogenous factors), investors will adjust the required rate of return to account for the movement in inflation expectations. Inflation data for each member country is used.

4.3.7 DUMMY VIARIABLE

The exact timing of the global financial crisis is a matter of debate. According to Brunnermeier (2008) the liquidity crisis that filtered through to the stock markets took shape in February 2007 with a sharp rise in subprime mortgage defaults. As the deterioration of mortgage backed securities continued, United Bank of Scotland (UBS) and Bear Sterns saw their internal hedge fund businesses capitulate as a result of losses associated with mortgage related products. During this time Moody's initiated the downgrades to subprime mortgage deals. By June 2007 Moody's, S&P and Fitch all announced further downgrades of subprime products which unnerved financial markets. For the purpose of this study the crisis is therefore assumed to have begun at the end of the second quarter of 2007 in July. To control for the crisis, equation 4.5 is adjusted. Dummy variables are inserted to control for the impact of the 2007/8 global financial crisis. A dummy variable is binary assuming two values namely 0, in this case for the pre-crisis period (prior July 2007) and 1 for the post crisis period. To test for the impact of the crisis on the dependent variable interactive dummy variables are used.

4.3.8 COMPUTATIONAL ADJUSTMENTS

As can be seen from Table 4.1 credit ratings are not a numeric score. To overcome this problem the credit ratings must be converted to a more numeric measure. Reinhart (2002) converts ratings to a scale of natural numbers ranging from 1-16. This conversion does not consider changes in outlook from positive, neutral and negative, of the ratings but considers actual changes in ratings. Alper (2006) uses a similar translation and constructs an index spanning 1-58 numbers.

This is due to his treatment of changes in outlook as an intermediate step between changes in ratings. In this article the method used is similar to the method implement by Reinhart (2002) and Smith and Fryer (2012) and does not account for changes in outlook. We subject the index to a logit-type transformation to account for possible nonlinearities in the rating scale. The transformation is done as follows:

$$L_t = ln\left(\frac{I_t}{17-I_t}\right) \qquad (4.1)$$

Where I_t denotes the assigned index value from Moody's Investors Services ratings.

4.4 TESTS FOR STATIONARITY

In order to estimate the model, properties of the panel dataset constructed must be explored. For variables that do not differ cross sectionally like the US federal funds rate and the volatility index, univariate unit root tests are used. Traditional unit root tests used are the Augmented Dickey-Fuller (ADF) test and the Kwiatowski-Phillips-Schmidt-Shin (KPSS) test. Unit root testing is conducted in order to explore whether the model used produces a spurious regression (Hill *et al*, 2012).

The ADF test is estimated as follows (Gujarati, 2006):

$$\Delta y_t = \propto + \gamma y_t + \sum_{s=1}^{m} a_s \, \Delta y_{t-s} + v_t \qquad (4.2)$$

The hypothesis (null) tested here is that the series is non-stationary (i.e. $H_0: \gamma = 0$, has unit root) against the alternative hypothesis the series is stationary (i.e. $H_A: \gamma < 0$). Therefore if the null hypothesis should be rejected the conclusion is that the series is stationary.

The KPSS test complements tests for non-stationarity like the ADF test. The test is a Lagrange Multiplier test of the hypothesis that a random walk has zero variance. The KPSS is a more powerful test for stationarity and therefore will be used to confirm the results obtained from the ADF test. The null hypothesis tested is H_0: $\sigma_v^2 = 0$, the series is stationary against the alternative hypothesis H_A : $\sigma_v^2 > 0$, series non stationary. The KPSS is estimated as follow (Hill *et al*, 2012):

$$KPSS = \frac{1}{T^2} \frac{\Sigma_{t=1}^{T} S_t^2}{\hat{\sigma}_{\infty}^2} \qquad (4.3)$$

Where T is the sample size, $\hat{\sigma}_{\infty}^2 = \frac{1}{T} var(S_t)$ is a HAC estimator of the variance of $\hat{e}$ and $S_t = \sum_{s=1}^{t} \hat{e}_s$ is a partial sum process.

For variables that do differ cross sectionally, a panel unit root test which has more power than a univariate unit root test is conducted. The variables tested are the credit ratings, credit default swap spreads, inflation and stock returns. For this test

we use the Phillips-Perron test and the Im-Peseran-Shin test. Therefore we estimate the Im-Peseran-Shin test as follows (Hill *et al*, 2012):

$$y_{it} = \rho_i \, y_{i,t-j} + \sum_{j=1}^{Pi} \varphi_{ij} \, \Delta y_{i,t-j} + z'_{it} \, y + \varepsilon_{it} \qquad (4.4)$$

The null hypothesis states that each series in the panel has unit root (i.e. H_0: $\rho_i = 1$) and the alternative is that at least one of the individual series in the panel is stationary (i.e. H_0: $\rho_i < 1$). Unlike other unit root tests, Phillips and Perron use non-parametric statistical methods to solve for the problem of possible serial correction in the error terms. The Phillips and Perron test is used to complement the Im-Peseran-Shin test.

4.5 MODEL SPECIFICATION

4.5.1 PANEL REGRESSION

There are plenty of benefits for using panel data. An important benefit is the ability of the data to control for individual heterogeneity (Baltagi, 2001).This study draws on studies conducted to assess the effect of Federal Reserve announcements on emerging market debt instruments (Arora and Cerisola, 2001; Yafeh, 2002; Andritzky *et* al, 2005; Alper, 2006; Ozatayo *et al*, 2007). Therefore in order to test the determinants of emerging market credit default swap spread variation the following model is estimated:

$$CDS_{it} = \alpha_i + \gamma_1 F_t + \gamma_2 VIX_t + \gamma_3 CR_{it} + \gamma_4 SR_{it} + \gamma_5 INF_{it} + \varepsilon_{it} \qquad (4.5)$$

Where *i*= denotes the BRICS member country and *t* is the period (2003-2015). The first explanatory variable is the federal funds rate. The second variable depicts the volatility index, the third explanatory variable shows the credit ratings, the fourth variable depicts stock returns and lastly the fifth variable represents inflation.

4.6 CONCLUSION

This chapter outlined the methodology that will be used to obtain the objectives outlined in Chapter One. The chapter explained the variables used and the reasons thereof. Section 4.2 gave an overview of the period of the study, where the data was sourced and the type of data that will be used. Section 4.3 discussed the variables that will be utilised in the investigation. Section 4.4 elucidated on the tests used to determine the order of integration of the variables. Section 4.5 discussed the model specification. The next chapter will provide details of the findings.

CHAPTER 5

EMPIRICAL ANALYSIS

5.1 INTRODUCTION

Following the methodology and analytical framework discussed in Chapter Four, this chapter now explores the empirical findings. Chapter Five presents the regression results which include the results for the tests for stationarity and the panel regression. The results will assist in determining the significance of the impact of investor sentiment, sovereign credit ratings, US monetary policy, inflation and stock returns on BRICS country credit default swap spreads. The chapter is organised as follows. Section 5.2 provides a descriptive analysis of the visualization of the data. Section 5.3 presents the results of the ADF and KPSS test and the Im Pesaran Shin panel unit root test. Section 5.4 presents the results of the panel regression. Lastly Section 5.5 concludes.

5.2 DESCRIPTION OF DATA VISUALS

Before running tests on the data it is important to depict the data visually in order to check for any discernible patterns. Figure 5.1a shows credit default swap spreads for the four BRICS countries in basis points (bps). As can be seen from Figure 5.1a South African credit default swap spreads had been falling from 2003 until 2007. There is an observed rise in South African credit default swap spreads during 2007 as the crisis took form. During the periods 2008-2009 there is an observed peak in spreads, thus spreads widened at the height of the financial crisis. Towards 2010 a moderate decline in spreads can be seen and occasional bouts of volatility throughout the years till 2015. However, it is notable that spreads appear to remain anchored at a higher level after 2008. A similar pattern is observed for China and Russia, except that the peak in the Russian case is exaggerated. Russia's credit default swap spreads also depict a much sharper rise in spreads during 2014 as Russia received credit downgrades.

In the case of Brazilian credit default spreads, one can see a marked decline from lofty levels prior the 2008 crisis this is a result of improved ratings. Despite credit default swap spreads widening over the period of 2008/9, Brazil was granted investment grade status by S&P and Fitch in 2008 and by Moody's 2009. Thus the observation of improved credit default spreads post the financial crisis. China was the earliest of the BRICS to be granted investment grade status and its ratings have been improving gradually. With that being said there was a widening in the default premium at the time of the crisis as can be seen in Fig 5.1a.

Figure 5.1c depicts the performance of the BRICS countries' main indices. In all the BRICS nations, one observes a bullish period of rising markets from 2003, peaking in 2008 where markets crashed indiscriminately. All bourses recover from the lows of 2008 post the crisis, with the Chinese market and South African market continuing to rise thereafter. Both the Brazilian and Russian market recover for a short period of time before entering a downward trend. This trend could be predicated on the sovereign downgrades on the countries post 2011.

Figure 5.1d depicts the historical trajectory of inflation of the BRICS member countries. As can be seen from the figure, South African inflation declined from the peaks of 1999 (not included in the sample period) when South Africa announced its intent to move towards an inflation targeting regime. Inflation targeting was formally introduced in the year 2000. Post 2003, inflation in South Africa rose and peaked at the height of the global financial crisis. A possible explanation is that inflation may have been led by cost-push factors. This is to say market participants withdrew portfolio investments from South Africa, leading to a depreciation in the South African currency that resulted in higher inflation. Post the crisis from 2010 onwards, South African inflation came within the range of the South African Reserve Bank (SARB) of 3% - 6%.

The pattern of inflation in China bears a similar resemblance however it starts from a low base. Inflation in China peaks during the crisis and deflates significantly before peaking again in the periods 2010/12. It then appears to normalize from 2013 onwards. In Brazil inflation moderated from 2003 until 2007 where one can observe an uptick in the trajectory. Inflation appears to have been ticking higher post 2013. Attributable factors have been discussed above

concerning sovereign ratings. The implication of deteriorating ratings could have prompted investors to withdraw invested funds, affecting the currency and driving inflation higher from a supply side channel. The deterioration in credit ratings would have been led by, among other things, lowered economic growth prospects and political instability that resulted in an impeachment of the then president Dilma Rouseff in late 2016.

In Russia, the inflation trajectory appears to follow a downward trend. In 2008/9 there is an observed spike in inflation. The trend continues downward until it troughs in 2012 where inflation begins to rise. Similar to Brazil, sovereign ratings may have been an influence in the inflation trajectory along with geopolitical events concerning the state of Russia that resulted in developed nations imposing sanctions on the country.

Figure 5.1e gives a visual observation of the volatility index. Risk aversion appears to decline in the years 2003 until 2007. However, as the global financial crisis ensues a spike in implied volatility as measured by the volatility index can be seen. A downward trend in risk aversion post 2010 with another spike in the periods 2011/12 is observed. Volatility then picks up again in 2015. The behaviour observed from the VIX closely resembles what transpires on the default spreads for the member countries.

As for the US Fed funds rate Figure 5.1f shows an increase in the rate between the periods 2004-2007. There is a precipitous fall in the US interest rates from 2007 onwards highlighting the change in monetary policy stance to being accommodative as a result of the crisis. Since 2009 onwards rates have remained near the zero level at 0.25 percent.

For most of the third and fourth quarter of 2015 markets were on edge awaiting the Fed to raise interest rates. In December of 2015 the FOMC decided on a 25 bps increase and again in December 2016. This highlights the Feds decision to start a trajectory of interest rate normalisation and an upward interest rate cycle going forward.

5.3 TESTS FOR STATIONARITY

As discussed in the previous chapter testing the order of integration of the variables is important so as not to produce results that are misleading. In this study the ADF test and the KPSS test were used to test the order of integration among variables that do not differ cross sectionally, namely the volatility index and the US Federal funds rate.

For the VIX, tests were conducted with an intercept in level terms and first difference. Section A of the appendix provides the results obtained. Results from the ADF test show that the VIX data is stationary in level terms. Therefore it is integrated in level terms (I(0)). The ADF test was also used to test the US Fed funds target rate data with an intercept. The US Fed funds rate was found to be integrated of the first order (I(1)).

The Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test was then used to verify the order of integration. The results are shown in Section A of the appendix. Both the volatility index and US Fed funds target rate were found to be stationary in level terms and are therefore integrated in level terms (I(0)). For the variables that differed across sections the Im-Peseran-Shin test and Phillip Perron test was used. The variables tested were the country sovereign ratings, credit default swap spreads, inflation and stock returns. Results are shown in Section B. The variables were tested with an intercept. Country credit ratings proved stationary once having been differenced using the Im Peseran–Shin test, meaning sovereign ratings are integrated of the first order (I(1)). However sovereign ratings were stationary in level terms as per the Phillips Perron test. Credit default swap spreads were stationary in level terms with both tests. Stock returns were integrated of the first order (I(1)). The inflation variable proved to stationary in level terms according to the Im Peseran-Shin test and Phillips Perron.

5.4 REGRESSION RESULTS

5.4.1 PANEL REGRESSION

Table 5.1: Panel regression results: fixed effects model

Dependent Variable: CDS spreads		
	Model 1	Model 2
Explanatory variable		
Constant	109.5019*	-92.61144*
VIX	4.698384*	12.56768*
US FED rate	-31.91063*	10.63636*
Country rating	-132.2527*	-269.1393*
Stock Returns	-0.010079*	-0.020260*
Inflation	14.39096*	4.465613***
Crisis dummy		216.8716*
Crisis dummy* Country Rating		119.6582*
Crisis dummy*US FED rate		-47.33144*
Crisis dummy* VIX		-8.594725*
Crisis dummy*stock returns		0.011997*
Crisis dummy*inflation		9.870212*
Observations	604	604
Adjusted R^2	0.739805	0.780030
F-Statistic	215.3112*	153.7343*
D-W	0.214774	0.283635
SIC	11.86833	11.75386

* significant at 1% level, ** significant at 5% level. ***significant at 10% level

To determine whether the abovementioned variables have a significant effect on BRICS country credit default swap spreads, a balanced fixed effects panel regression model was forecasted. The fixed effects model allows for heterogeneity or individuality among the countries by allowing each country to have its own

intercept. The use of the term fixed effect is due to the fact that intercepts may differ across countries but may not differ over time.

Table 5.1 gives the regression results for model one as follows. The coefficient of the volatility index is significant at the one percent level and is positive. Therefore a point increase in the volatility index will result in an approximate 5 basis point increase in default spreads *ceteris paribus*. Thus the default spreads widen as there is a rise in volatility indicating an increase in risk aversion.

The US Fed funds rate is also significant at the one percent level, however the coefficient is negative depicting a one percentage point rise in the Fed funds target rate to result in an approximate 32 basis point decline in default spreads *ceteris paribus*. The result is interesting and seems to suggest that a tightening of liquidity reduces default spreads for emerging markets. One would expect a positive relationship between default spreads and US interest rates, whereby a rise in US interest rates pushes up emerging market credit default swap spreads as a result of ballooning risk premia associated with a rise in foreign denominated debt repayments. This would be as a result of the repatriation of portfolio flows to safe haven markets like the US. The result appears counter-intuitive and will be discussed further when looking at model two.

Looking at the coefficient for country ratings, it is negative and significantly affects credit default swap spreads. Thus a one notch upgrade will result in a 132 basis point decline in credit default swap spreads. This result is similar to studies that tested the impact of a rise in sovereign ratings to sovereign bond yield spreads. This suggests that idiosyncratic factors, as represented by sovereign ratings, have a great impact on BRICS country's credit default premium.

Stock returns appear to behave in accordance to *a priori* expectations where a rally in stocks would result in a decline in credit default swap spreads. Results point to an inverse relationship between stock returns and credit default premia. Upon observation, it would appear that the higher the index the more significantly lower the credit default premia *ceteris paribus*.

Lastly the inflation variable appears to be significant at the one percent. Keeping all other variables constant a percentage point rise in inflation increases credit default swap spreads by 14 basis points.

To make sure the regression is not spurious we observe the F-statistic which shows the overall goodness of fit of the model. The F-stat is significant at the one percent level. Therefore we may conclude the model is fitted well.

The regression is run again with the addition of a crisis dummy variable (Model 2). The crisis dummy is used to determine whether the global financial crisis increased spreads, and affected the relationship between the independent variables and credit default spreads. Firstly, the dummy is significant at the one percent level and suggests that defaults spreads rose by 216 basis points as a result of the global financial crisis. This is consistent with the evidence presented in Figure 5.1, which suggests a marked increase in CDS spreads at the height of the crisis for all BRICS countries.

Secondly, the results of the interactive dummies suggest that the relationship between spreads and the dependent variables may have been changed by the crisis.

Model 2 results are as follows; keeping all the other variables constant, a point increase in the volatility index in the period before the financial crisis resulted in an approximate 13 basis point rise in default spreads. Thus risk sentiment had an effect on credit default swap spreads. The effect after the crisis appears to have a lower impact; keeping all other variables constant a point increase in the VIX resulted in an approximate 4 basis point rise in credit default spreads. The result suggests that the crisis period induced the lowering of risk aversion, resulting in lower risk premiums sought by investors from riskier assets. An explanation may come in the form of extremely accommodative monetary policy in developed markets (both lower interest rates and high liquidity) which sought yields in developing markets.

Looking at the US interest rate variable prior the crisis, the variable is positive and significant at the one percent level. Therefore a percentage point rise in US interest rates increases emerging market CDS spreads by approximately 11 bps.

This result points to *a priori* expectations of a linear relationship between the tightening of liquidity and emerging market risk premium. Looking at the interactive US interest rate dummy, it is significant at the one percent level. Therefore post the crisis, keeping all other variables constant, a one percentage point increase in US interest rates resulted in a 37 basis point decline in default spreads. The outcome purports an inverse relationship. We therefore surmise that the result highlights the nature of the US interest rate variable. Despite there being an expectation of a linear relationship between US interest rates and emerging market credit default spreads, the interest rate variable is a policy instrument. By its design, it is an instrument used to 'lean against the wind' in times of macroeconomic instability. The effects of this variable would also explain the behaviour of market participants after the events of the crisis, where global risk sentiment appears to have a more muted effect on emerging market credit default spreads. Lower interest rates and stimulus in the form of quantitative easing may have altered the behaviour of market participants who may have become risk loving in order to recoup losses made at the height of the crisis.

Idiosyncratic factors as depicted by sovereign ratings show a marked difference in impact after having controlled for the crisis. Whereas prior to the crisis a notch increase in sovereign ratings would result in a decline in default spreads of 269 basis points. After controlling for the financial crisis a notch rise in sovereign ratings would decrease default spreads by 149 basis points. This would seem to show that improvements in country specific factors were compensated less by the markets after the crisis or perhaps already priced in. This would allude to an initial decline in the risk behaviour of market actors who were willing to invest at a whim.

Looking at the inflation variable, prior to the crisis a percentage point increase in inflation would result in a 4.5 basis increase in CDS spreads keeping all other variables constant. However, post the crisis a percentage point increase in inflation resulted in a 14.33 basis point increase in CDS spreads. Model 2 suggests that the crisis lead to an exaggeration of the impact of inflation on CDS spreads.

Lastly, the effect of stock returns on credit default premia after controlling for the crisis continues to show an inverse relationship between rising equity markets and credit default premia within the BRICS. However, the magnitude of the decline in credit default premia reduces for each member country as a result of the crisis.

5.5 CONCLUSION

The chapter presented evidence on the investigation that investor sentiment, proxied by the VIX, sovereign ratings, stock returns, inflation and US monetary policy affected BRICS countries credit default swap spreads. The results suggest the impact differed once having controlled for the financial crisis.

The chapter initially presented a descriptive analysis of the data before any tests were run. The descriptive analysis of the data visuals allows us to discern patterns within the data by using visual observation. The chapter then presented results on the integration of the variables that would be used in the regression results. The ADF test shows that the volatility index and US federal funds rate are stationary in level terms and first difference respectively. While the KPSS tests for stationarity showed that the volatility index and US federal funds rate are stationary in level terms respectively. Using a panel unit root test, namely the Im Peseran Shin test, credit default swap spreads and inflation were stationary in level terms, while both stock returns and credit ratings were stationary in first differences respectively.

The regression results obtained provided interesting outcomes. The global financial crisis appears to have pushed up spreads. This is in line with *a priori* expectations. This is suggestive of the fact that there was negative sentiment towards emerging market countries during the period of the crisis. The events of the crisis appear to have also weakened the relationship of the independent variables with the dependent variable. This impact can be seen in the weakened effect of country specific factors on credit default swap spreads. The US interest rate seems to have a negative effect, driven by how the policy instrument is used to defend against economic instability. Thus this phenomenon can only be explained by the following rationale, with the crisis ensuing and negative sentiment permeating among emerging markets, interest rates were used by developing countries to defend their economies. Also there was use of

unconventional monetary policy such as the injection of stimulus into financial institutions and the capital markets to preserve financial system stability. This scenario created opportunities to engage in 'carry trading'. This affected global investor sentiment as the hunt for yield in risky assets grew on the back of perceived risk to reward ratios. Therefore the crisis points to a significant turning point in the markets and the behaviour of market participants in terms of risk and how it was perceived.

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CHAPTER 6

SUMMARY, CONCLUSION AND AREAS FOR FURTHER RESEARCH

6.1 SUMMARY AND CONCLUSION

This study had set out to investigate the determinants of BRICS countries credit default swap spreads. The study was motivated by the need to supplement existing literature that had sought to determine factors affecting emerging market sovereign bond yields. The price of sovereign bonds is usually viewed by the market as a gauge of a country's risk. Therefore the larger the risk premium required by investors above the risk free rate (US treasuries), the more negative the outlook for that particular country, as deemed by the capital markets. Following from the abovementioned literature, we sought to determine which variables from a selected number of factors significantly affected emerging countries credit risk profile.

In Chapter Two of the study, theories that were the foundation of the NFA were discussed. These theories were used to describe markets, their participants and the assumption of market efficiency. The chapter looked at credit rating agencies as a mechanism of creating market stability. The discussion provided views from theoretical and empirical literature. The observation made from the literature that was analysed is that rating agencies are not leading indicators of the probability of default by a sovereign state. In fact credit ratings follow market sentiment when market expectations differ highly with the ratings given. Furthermore, credit ratings have been shown to increase procyclicality in the business cycle of emerging countries.

Since the credit ratings issued by rating agencies are still used by market participants to gauge country risk, ratings for the BRICS countries were used in determining their relationship with BRICS countries credit default swap spreads. Chapter Five provided the results for this analysis. CDS spreads were determined to have an inverse relationship with sovereign ratings congruent with other studies looking at bond yield spreads and sovereign ratings. Sovereign ratings were also seen to have the most significant impact on the variation of the BRICS default

premium. Before controlling for the global financial crisis, country specific factors as encapsulated in the sovereign ratings decreased credit default spreads by 269 basis points. When controlling for the crisis the impact of a notch upgrade in the sovereign ratings decreased credit default swap spreads by 149 basis points. Therefore, this points to risk sentiment rewarding emerging markets less for improved macroeconomic fundamentals during the crisis period

In assessing market participants and their behaviour, Chapter Two then discussed the views given as per classical economic foundations. The chapter discussed the rational expectations theory. This theory asserts that market participants make decisions using all available information. It is this behaviour of economic agents that allows markets to be efficient and self-equilibrate. There were many dissenting scholars that provided criticism of the assertions of classical economics and therefore rational expectation theory.

Closely linked to classical economics and rational expectations is the efficient market hypothesis. The efficient market hypothesis is based on informational efficiency and therefore asserts that economic actors form expectations rationally and markets aggregate information. This results in asset prices in markets containing all aspects of available information.

EMH proved to be less reliable in maintaining the hypotheses proposed by the theory on its different forms when having to explain market behaviour in reality. Hence the advent of the adaptive markets hypothesis. The adaptive markets hypothesis considers varying states of market efficiency unlike the EMH. The AMH considers the changes in risk premia over time as a result of the changes in the market environment and demographic of market participants. The AMH also considers that in active and liquid markets, opportunities for arbitrage will continuously exist and lastly that investment strategies will be as a result of financial market conditions.

Chapter Three provided a discussion on market participant's behaviour from the perspective of behavioural finance. In contrast to traditional finance theories on economic agent behaviour, behavioural finance asserts that market participants are limited by their cognition which is their way of thinking, associated emotions and the environment the economic agent is exposed to. This relates to the pressures an

economic agent is subjected to. As a result of these limitations behavioural finance explains how the decision making process is vulnerable to biases. The chapter established behavioural finance to be premised on two foundations, namely, practical limits to arbitrage and investor sentiment. The chapter then elucidated on the alternative framework behavioural finance provides to expected utility theory. The alternative proposal by behavioural finance for decisions under uncertainty was established to be known as prospect theory.

Lastly the chapter discussed the global savings glut hypothesis as proposed by the former chairman of the Federal Reserve Bank, Ben Bernanke. Bernanke presided over the Fed during the height of the crisis and instituted highly accommodative monetary policy along with financial stimulus. This policy was later known as quantitative easing. Quantitative easing created a global liquidity glut that affected capital markets. The excess liquidity and low returns associated with developed countries created imbalances in portfolio flows towards high yielding emerging market assets. Therefore the abundance of liquidity increased the risk appetite of global institutional investors who were looking for profitable gains in emerging markets. To test the hypothesis presented by the literature in Chapter Three the study used the volatility index as a proxy for investor sentiment and US interest rates as a proxy for global liquidity and international monetary policy. Regression forecasts were made controlling for the crisis and without controlling for the financial crisis.

From the results it would appear that the US interest rate had an inverse relationship with emerging market credit default swap spreads. However, controlling for the crisis there appears to be a clear distinction in the impact where prior to the crisis a rise in US interest rates increased emerging market default premiums. Post the crisis, one observes the negative relationship once again. This was explained in Chapter Five to be as a result of the interest rate being a policy instrument that is used as a defence mechanism in deteriorating economic conditions.

The results, when testing the impact of investor sentiment on emerging market credit default swap spreads showed that increases in volatility do create greater risk premium demands. However, when controlling for the crisis, risk premia

demanded seemed to have weakened. The explanation given in Chapter Five was that of increased liquidity affecting the risk perception of market actors. Policies like quantitative easing and the lowering of interest rates induced risk appetite for global investors who could borrow at historically low interest rates and obtain yields from riskier emerging market assets. Furthermore the stimulus provided by developed country monetary authorities led to increased speculative trade as investors tried to recoup losses incurred during the crisis. The results show that the GFC affected the relationship between the explanatory variables and the dependent variable. The results help in explaining the changes seen in perceived risk and the actions undertaken by market actors thereof.

BRICS countries stock returns were found to have an inverse relationship with credit default premia. It was observed that the higher the index the greater the impact on CDS spreads. Controlling for the crisis proved to weaken the impact of stock returns on CDS spreads in the period of the crisis. On the contrary, the inflation variable showed a marked difference in impact when controlling for the crisis. The impact of the inflation variable increases CDS spreads by 4.5 basis points for every percentage point rise in inflation *ceterist paribus* prior to the crisis. From the crisis period the effect of inflation on credit default premia increases to 14.33 bps for every percentage point increase in inflation keeping all other variables constant.

Chapter Four provided the methodology that would be used to obtain results in this investigation. A number of emerging market foreign denominated debt issuances are included in world indices and therefore many global financial institutions hold EM debt instruments. Hence investigating the determinants of emerging market risk premia was appropriate. Chapter Four discussed the tests that were to be used to determine the order of integration of the variables in the model and the model that would be employed to obtain results.

6.2 AREAS FOR FURTHER RESEARCH

Perceived risk by market participants is an important factor in the pricing of securities. Market volatility does not remain static for extended periods. An area of research that may improve future studies would include a change in the frequency of the data from monthly data to the use of daily data. This would

capture more accurately the effects of volatility in markets on the prices of financial assets. Furthermore a study that can include Indian CDS spreads, should a longer dated time series be available, would provide fairer comment on the determinants of the BRICS countries default premia.

It would also be of interest to have a study that uses another indicator for investor sentiment such as the put/call ratio. Rhoad (2012) describes the put call ratio as a measure of the number of put options traded vs the number of calls traded. The ratio is typically used to gauge the demand for bearish protection against a downturn in equities (Rhoad, 2012: 01). Thus the ratio can be used as a barometer for sentiment and risk appetite. On days the ratio is higher than 1.0, it would indicate that investors are buying more put options in order to cover their long positions in a perceived weak environment within markets. When the ratio is below 1.0 it would mean market participants are buying more call options in anticipation of stronger stock prices (Rhoad, 2012: 01).

Visualization of Data

Figure 5.1a

CDS spreads in basis points

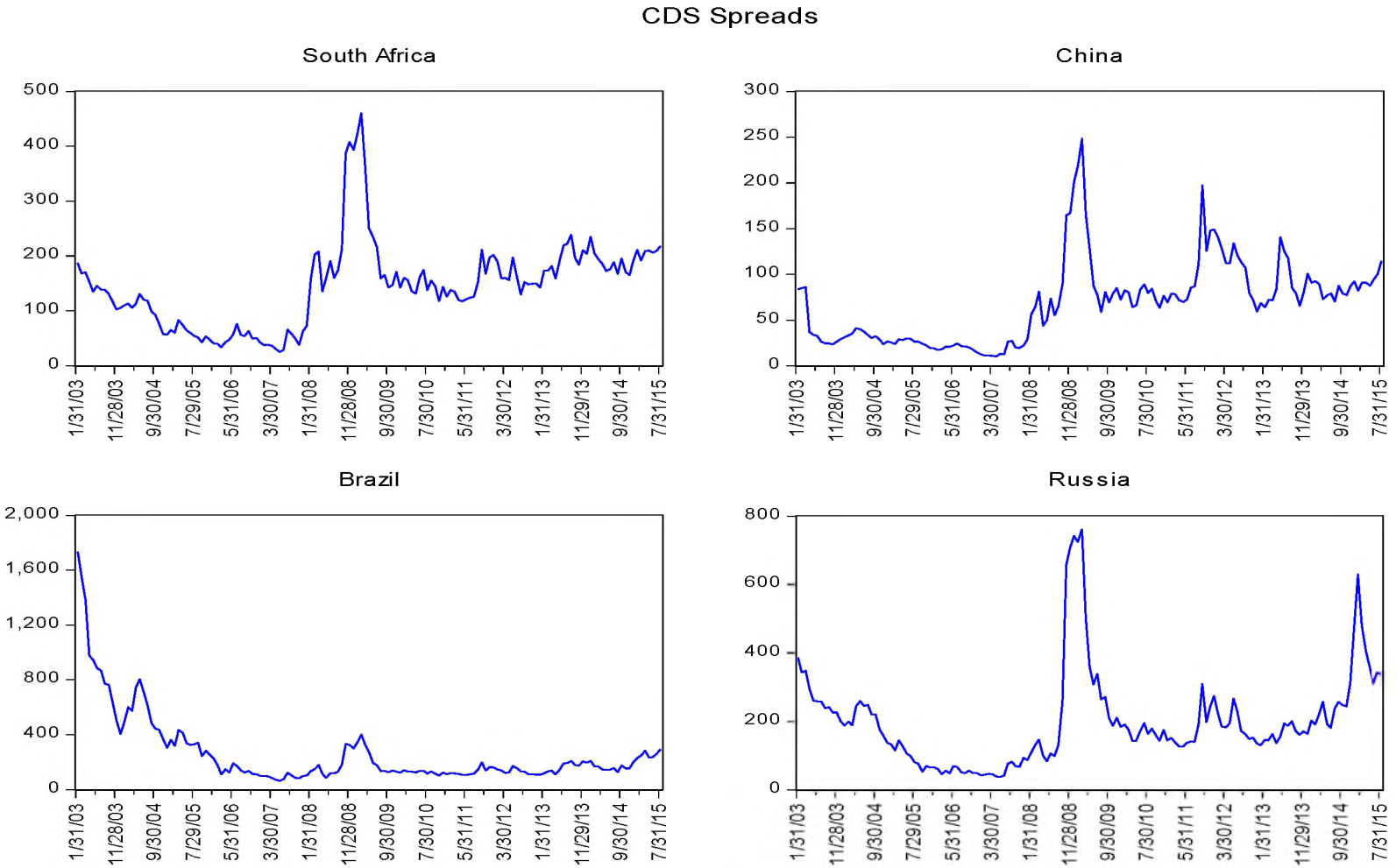


Figure 5.1b

Transformed credit ratings

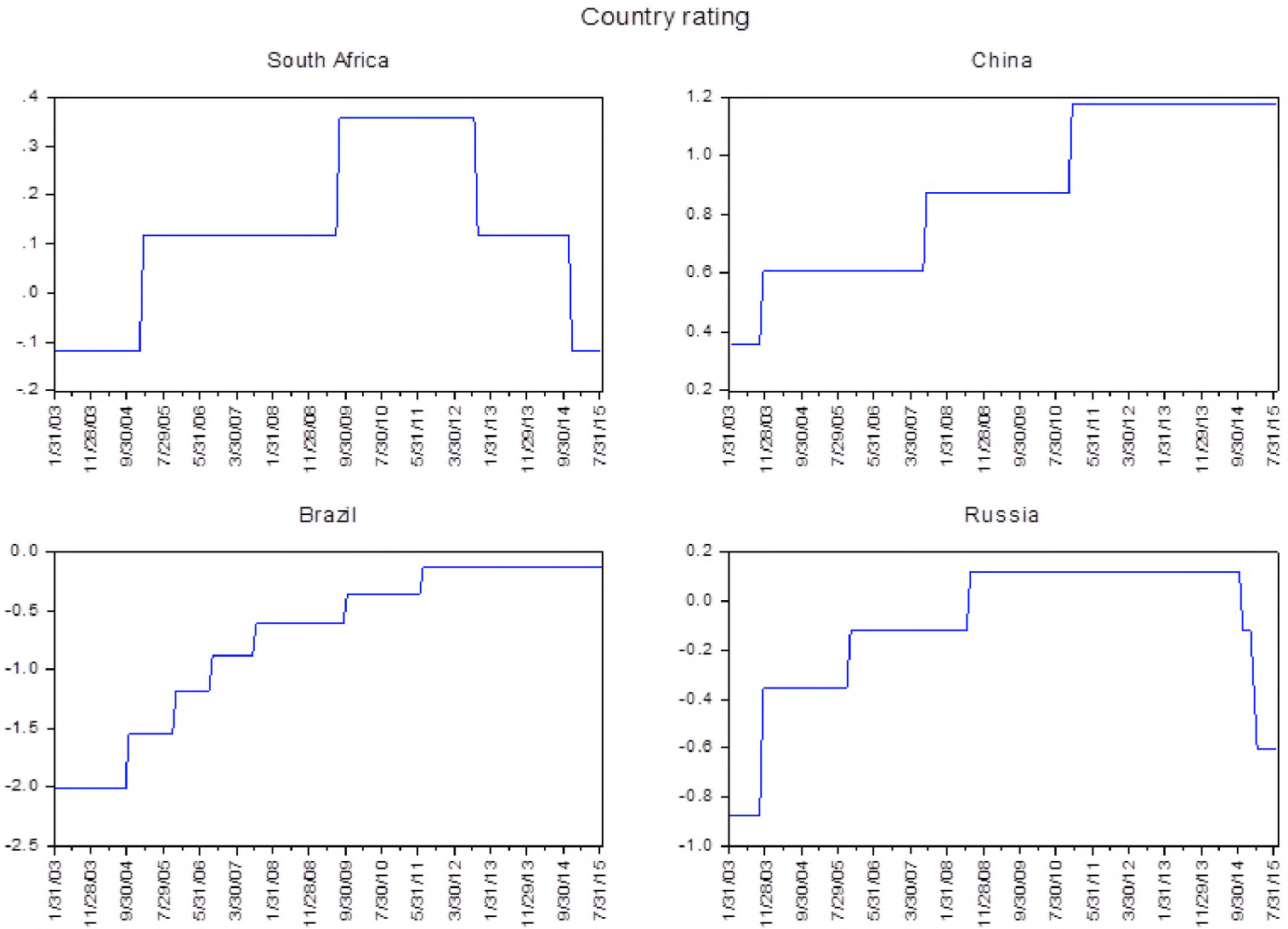


Figure 5.1c

Stock Returns

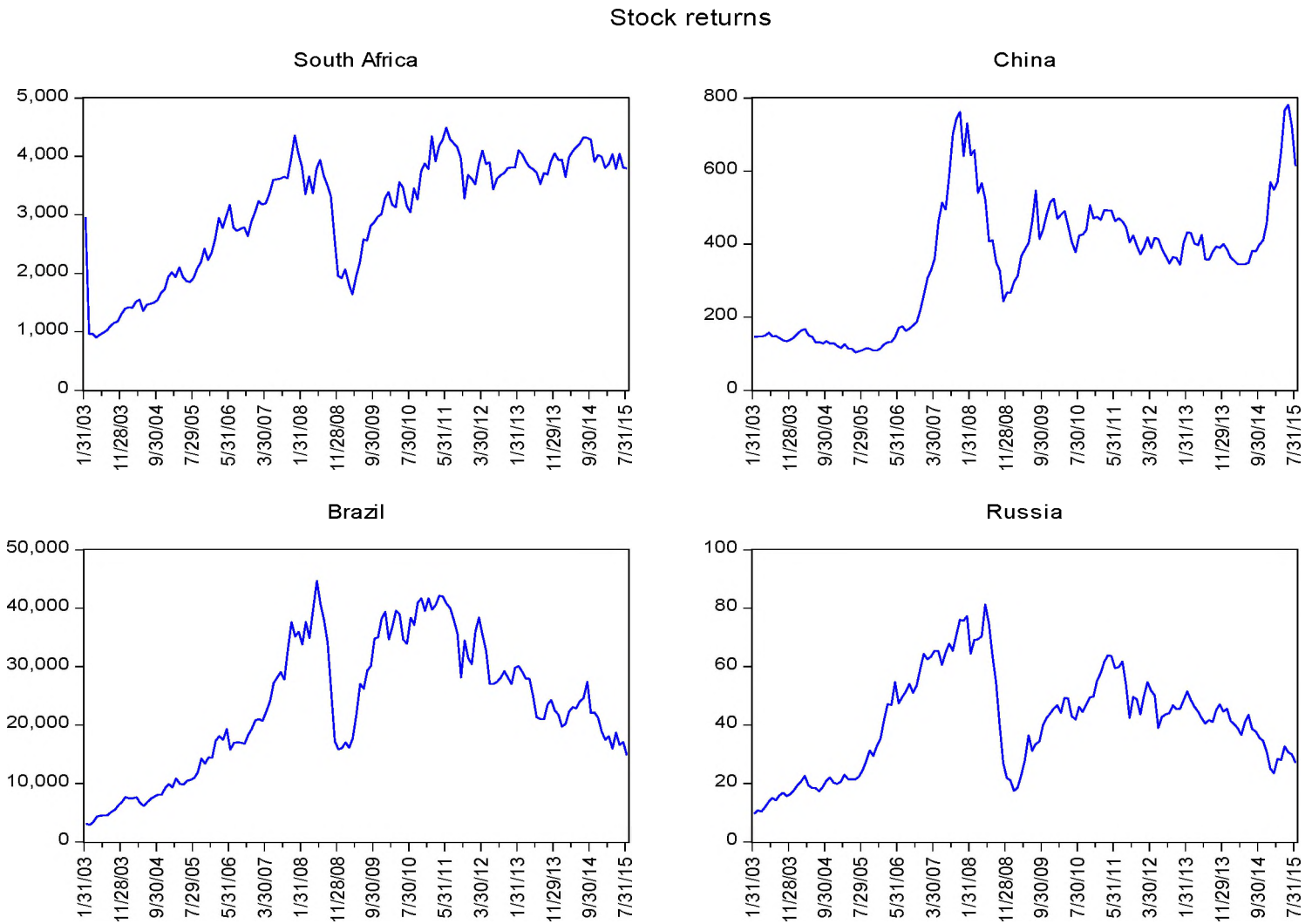


Figure 5.1d

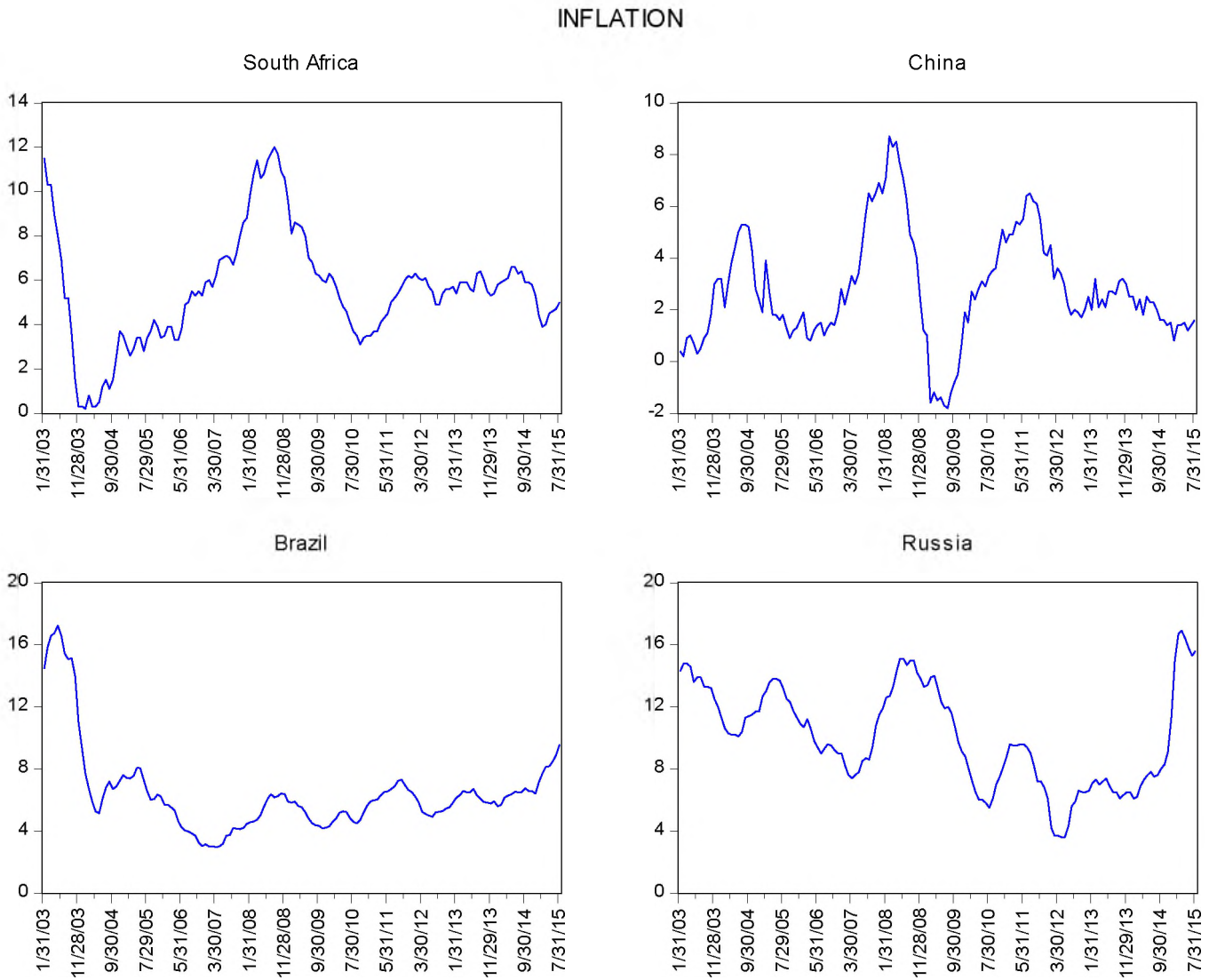
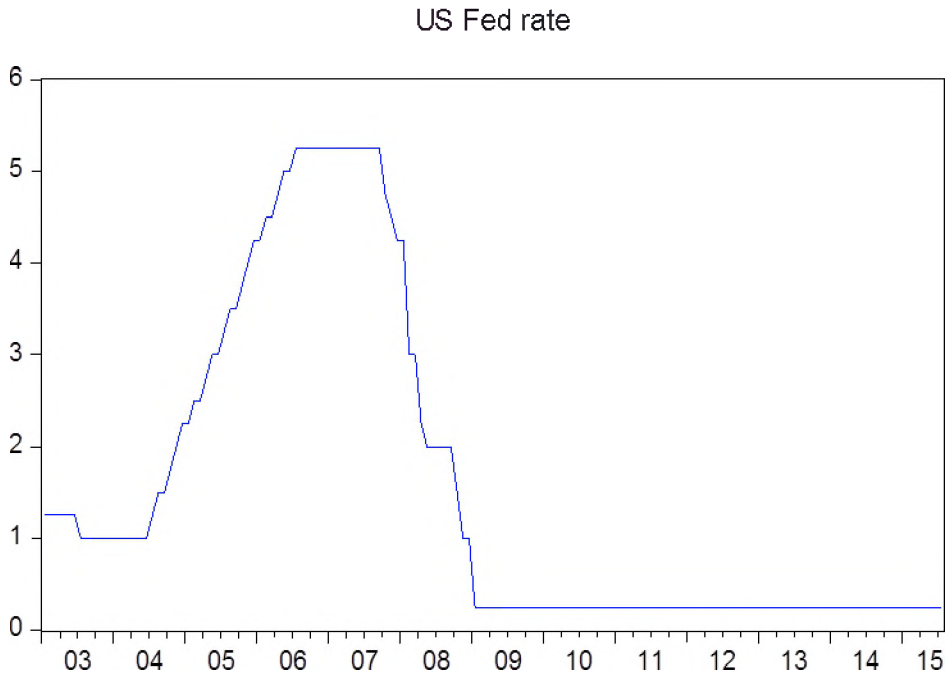
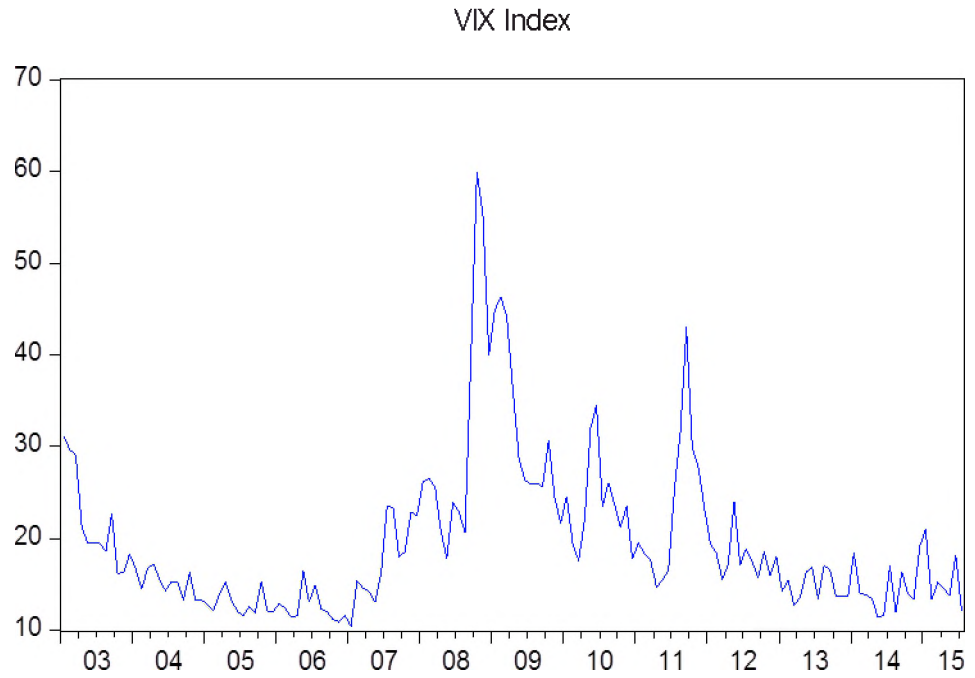

INFLATION
South Africa
China
Brazil
Russia
1/31/03
11/28/03
9/30/04
7/29/05
5/31/06
3/30/07
1/31/08
11/28/08
9/30/09
7/30/10
5/31/11
3/30/12
1/31/13
11/29/13
9/30/14
7/31/15

Figure 5.1 e

VIX & US Fed rate in nominal terms





APPENDIX

SECTION A: STATIONARITY TESTS				
2003M01 - 2015M07				
Variable	Test	Level of Integration	T-statistic	Prob
VIX	ADF	Level terms	-3.409734**	0.0121
US FED RATE	ADF	Level terms	-1.578127	0.4912
	ADF	1st Difference	-3.237117**	0.0198
			LM statistic	
VIX**	KPSS	Level terms	0.204627**	
US FED RATE*	KPSS	Level terms	0.644229**	

ADF: H_0: Variable has unit root / critical values: -2.58; -1.943; -1.615 (Significance levels: 1%***, 5%**, 10%*)

KPSS: H_0: Variable is stationary / critical values 0.7390; 0.4630; 0.3470* (Significance Levels: 1%***, 5%**, 10%*)

KPSS: H_0: Variable is stationary/critical values 0.216000; 0.146000; 0.119000** (Significance Levels: 1%***, 5%**, 10%*)

SECTION B: PANEL UNIT ROOT TESTS				
2003M01 - 2015M0				
Variable	Test	Level of Integration	W-Statistic	Prob
CDS spreads	IPS	Level Terms	-3.96074	0.0000***
CDS spreads	PP	Level Terms	66.3433	0.0000****
Country ratings	IPS	1st Difference	-6.14173	0.0000***
Country ratings	PP	Level terms	26.7329	0.0008***
Stock Returns	IPS	1st Difference	-7.70697	0.0000***
Stock Returns	PP	1st Difference	317.513	0.0000***
Inflation	IPS	Level Terms	4.88394	0.0000***
Inflation	PP	Level Terms	19.3792	0.0130**

Im Pesaran and Shin; H_0: Individual unit root process (unit root) 1%***, 5%**, 10%*

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