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Determinants of credit ratings:
Evidence from Emerging Market Economies

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Research thesis submitted in partial fulfilment of the requirements for the degree

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THESIS DECLARATION

I, Tavuya Manungo, declare that the research work reported in this thesis is my own, except where otherwise indicated and acknowledged. It is submitted to fulfil the requirements for the Masters of Management in Finance and Investment degree at the University of Witwatersrand, Johannesburg. This has not, either in whole or in part, been submitted for a degree or diploma to any other university or institution for a similar qualification.

_____ _____

T.V.K Manungo Date

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Abstract

Sovereign credit ratings provide a summary of the economic conditions of a particular country, and are a representation of the ability and willingness of a country to make its debt payments as they fall due. These ratings provide an indication of the cost of borrowing in that country, so a country would like to obtain the highest possible credit rating. These ratings are provided by independent agencies who use their own systems to provide a rating and an outlook. Credit ratings are important as they provide information to investors on the potential investability and access to financial markets of that particular country. The problem found by some literature is the reliability of ratings in emerging markets as investors perceive these markets to be riskier in nature.

In this paper, the aim was to identify what the different factors that the two big agencies, Moody's and Standard and Poor's use when rating a country. This is done through using a multiple regression model on 5 emerging economies from different continents from 1994 to 2015, based on annual data. The first step was to find out what are the macro-economic variables that have strong correlations with the agencies, and the results show that external balances as a % of GDP and the GDP growth have low correlations with the ratings. The regression analysis also shows that Moody's takes the inflation rate into consideration when rating a country but Standard and Poor's does not.

The paper also wanted to identify the effects of ratings on markets, and this was done through the effect of ratings on the interest rate spreads. The results show that the rating differential, which was the ratings from Moody's subtracted from the ratings of Standard and Poor's, affect the interest rate spreads negatively, therefore a better rating should reduce the spread and have a positive effect on the financial markets.

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Chapter 1: Introduction and background

1.1 Introduction

A Credit Rating Agency (CRA), is an institution that designates ratings to a country and its ability to pay its debts.

Credit rating agencies have played a significant role in supplying information with respect to debt instruments and their creditworthiness. They are organisations that monitor whether a company or government is able to meet its/ their debts as they fall due. Their role is not only to assess and monitor but also to provide information to investors and other companies (Ryan, 2012).

Since the global financial crisis in 2008, a lot of focus and importance has been placed on the relevance of credit ratings (Ghosh, 2013).

This study focuses on a selected countries that fall into the emerging markets category, and aims to identify whether receiving a rating from a CRA will yield the same result in the market as receiving a similar rating from another agency. To that extent, this study aims to analyse and evaluate how different financial markets in the different economies respond to the different ratings that they are given by the agencies. This is done through comparing the different ratings that are assigned by the two large agencies, Moody's and Standard and Poor's and to examine whether the differences are significant in emerging economies.

1.2 Background and Context

According to Smith and Fryer (2012), credit rating agencies are organisations that make use of different statistical tools to attach ratings to companies, governments and debt instruments such as bonds, based on the chances of a default or non- repayment on certain obligations. Rating agencies can be seen as providers of information and this information is used by different lenders and users in the market place.

A Credit Rating Agency can be seen as undertaking a lot of functions but the main two purposes of their activities are:

i. To act as oversight by serving as a regulatory tool in the financial markets
ii. To provide support to investors in their market transactions by acting as an information centre (Weber & Baumann, 2012).

The above notion is supported by Kraussl (2003), who suggested that these agencies play a key role in the financial decisions taken by market participants with information about credit risk that is associated with the various investment decisions made.

Credit ratings are very meaningful and the agencies are greatly esteemed. These agencies play a huge role in the market and also on total market capitalisation. The agencies rate the quality of debt and companies. Not only do rating agencies make use of a government's financial statements in order to come up with a rating, but they also make extensive use of the level of management quality, the market value of the firm in order to produce some of the ratings listed in the above tables. The information that is used is both available publicly and also confidentially (Matthies, 2013).

Any rating agency that is below the investment grade is judged as being speculative or "junk". A "junk" bond is one where the chance of default is high as compared to an investment grade bond (Hill, 2007).

Table 1: Sovereign credit ratings

Number	Standard and Poor's rating	Moody's rating
1	AAA	Aaa
2	AA+	Aa1
3	AA	Aa2
4	AA-	Aa3
5	A+	A1
6	A	A2
7	A-	A3
8	BBB+	Baa1
9	BBB	Baa2
10	BBB-	Baa3
11	BB+	Ba1
12	BB	Ba2
13	BB-	Ba3
14	B+	B1
15	B	B2
16	B-	B3

Source: Standard and Poor's and Moody's

Table 1 above shows an extract of the sovereign ratings that are issued by the two agencies. As can be seen, Standard and Poor's uses positive and negative signs after their letters, whereas Moody's uses numbers from 1 to 3 after their letters.

Just having ratings is not enough. These ratings have been supported by both rating outlooks and credit watches, which provide an insight on what factors might lead to a rating change in the future (Kraussl, 2003).

Table 2: Sovereign Credit Ratings for countries

Country	**Standard and Poor's rating**	**Outlook**	**Moody's rating**	**Outlook**
Argentina	B^-	Stable	B3	Stable
Brazil	BB	Negative	Ba2	Negative
China	AA^-	Negative	Aa3	Negative
Egypt	B^-	Negative	B3	Stable
Greece	B^-	Stable	Caa3	Stable
Mexico	BBB^+	Stable	A3	Negative
South Africa	BBB	Negative	Baa2	Negative
India	BB^+	Positive	Baa3	Stable
Indonesia	BBB^-	Stable	Baa3	Positive

Source: Author with information from Trading Economics

Table 2 above, is an extract of some of the emerging economies and shows the different ratings attached by the different agencies. These different ratings given per country is what

will be analysed to see whether markets are affected differently by the different outlooks given.

Rating agencies can either downgrade a country in times of difficulty or they can upgrade in the good times. A change in either direction can communicate new information about a particular country, which is usually stronger in emerging markets where there are challenges of clarity. An upgrade or a downgrade will usually have spill over effects in countries that have similar economies (Kaminsky & Schmukler, 2002).

The effects of an upgrade (downgrade) on the sovereign debt above or (below) the investment grade will have a strong shock on the price levels as these different ratings will have an impact on investors all over (Kaminsky & Schmukler, 2002).

Governments try and get the best ratings possible so as to boost their access to international capital markets. These ratings are crucial as they play a key role in calculating or determining the cost of borrowing to that particular country (Iyengar, 2012).

1.3 Problem Statement

The 2008 global financial crisis affected even the most developed nations such as the United States, which received a downgrade of its sovereign credit rating. Rating agencies have continued to grow in importance since then and the two biggest agencies now act as oversight for various governments, therefore they hold the “power” in terms of either upgrading or downgrading an economy.

Moody’s investor services and Standard and Poor’s have been recognised by both market participants such as investors and policymakers as having a strong influence and impact on the cost of funding and the willingness of institutional investors to hold certain types of financial instruments including bonds (Kraussl, 2003).

Each rating agency uses or attaches its own weights when it comes to assessing a country’s economy and the chances that a nation could default on an obligation. Cantor

and Packer (1996) identified some factors that contribute to the willingness and ability to service a debt and these include Gross Domestic Product, the rate of inflation, balance of payments, the economic development, per capita income and the total external debt. Each agency may also use other factors when it comes to attaching a rating to a nation, for example the exchange rate may be applied by one agency and left out by another agency. Each agency uses a different notion when it comes to attaching a rating to a country, and these notions therefore indicate a different rating for a country.

Rating agencies are known to affect the markets after upgrades and downgrades. These rating agencies play a key role in both access to international capital markets and also in attaching ratings to companies, governments and debt instruments such as bonds. The use of different ratings agencies often results in a different response by the markets and the relevant stakeholders involved.

The two big agencies will each apply a different weighting to these factors in order to come up with a rating of countries. Developed and developing economies always seek to obtain a positive rating from these agencies. A problem exists as to whether there is a superior agency and whether Moody's is better at rating than Standard and Poor's or vice versa. This study aims to understand why these differences exist and why markets respond differently to them. The problem that arises when these rating agencies provide different ratings, is that the market and therefore the countries involved are therefore provided with different results which therefore gives conflicting results which can create confusion at times in the market.

1.4 Research questions

The research aims to answer the following questions:

1) What are the most important factors considered by the two agencies when it comes to attaching ratings and is there a rating differential?

2) Do these rating agencies follow the same trend when rating countries or firms?
3) Does the rating differential negatively or positively affect interest rate spreads?

1.5 Significance of the study

The study aims to explain why different rating agencies have different ratings for the same country, and what are the consequences of these different ratings are to the countries. The study also seeks to examine what factors are considered by the different rating agencies when it comes to attaching different ratings to a country, which therefore can create confusion for the users of this information.

1.6 Outline of the study

The research will be conducted and presented in the following manner:-

The first section will introduce the research topic which will include a brief background on credit rating agencies. The second section will be a detailed literature review which will begin with an introduction or background of credit rating agencies and will also focus on the emerging markets and their response to these ratings. The third section will capture the research methodology and will also include an analysis of the data and information of the study. Section four of the paper will be a presentation of the findings and an interpretation of the results. The last section will include a conclusion on the findings from the empirical analysis and will also offer recommendations.

Chapter 2: Literature Review

2.1 Brief history of rating agencies

In the early 1900's, there was a need for industries to raise more capital than they actually had, therefore rating agencies acted in an intermediary role by helping investors and businesses to come together and do a cost-benefit analysis of a particular venture (Hill, 2007). The name Moody's comes from a man called John Moody. His company was the first to publish bond ratings in 1909. At this time the company solely focused on railroad bonds (White, 2010). Poor's Publishing Company then followed soon after, by providing published ratings in 1916, and then Standard Statistics Company in 1922. Fitch then followed in 1924. They all had a similar model whereby the investor paid for the services to be rendered (Hill, 2007).

At first, bond ratings were sold to investors in manuals, as this was before the establishment of the U.S Securities and Exchange (White, 2010).

In 1941, Poor's and Standard combined to form one company called Standard and Poor's. In the year 2000, the market for other securities began to grow and issuers of these instruments had only these three companies to obtain their credit ratings. A favourable or a positive rating from these agencies was important as this was helpful in the facilitation of the sale of securities and other forms of debt (White, 2010).

To date, more than 100 countries are being rated in terms of their debt obligations and how well they service their debt, by these agencies.

2.2 Role and function of Rating Agencies

A variety of economic literature has been centred around the credit rating agencies and their effect on emerging markets. Kaminsky and Schmukler (2002), reiterated that that these agencies have a tendency to assign different ratings to the different type of financial instruments such as bonds and to the different borrowers which include governments and

firms. Agencies do not only provide ratings based on the scales which are summarised in the tables above, but also include an outlook which shows where a country or a firm is going and whether there is a possibility of a rating upgrade or downgrade in the future. These agencies provide either quantitative and qualitative information with regards to the creditworthiness of a sovereign or a company when it comes to their debt obligations. Due to a highly integrated and globalized world both in terms of physical and financial products, the use of credit ratings has increased, therefore placing more importance on rating agencies (Frost, 2007).

According to Smith and Fryer (2012), the use of credit ratings has been increasing especially since they play a key role in financial regulations and have also added value in emerging markets in order to provide guidance for their growth. Kraussl (2003), supports this as sovereign credit ratings have assisted a lot of governments in obtaining access to the international bond markets, which stresses their importance and the role these agencies play in financial markets. Macey (2006) and Fitzpatrick and Sagers (2009), both seem to downplay this by suggesting that there is little evidence that supports the need or use of rating agencies, and that they do not supply markets with any extra or useful information. The continued rise of rating agencies and overall credit/debt ratings in the world is contradiction to the idea that agencies are basically an unnecessary entity in the market place (Macey, 2006). A positive that can be drawn from these rating agencies is that they are sometimes viewed as being problem-solvers when it comes to the information asymmetry that exists between debt issuers/lenders and borrowers (Listokin & Taibleson, 2010). Akerlof (1970), suggested that this is done through the rating agencies acting as information intermediaries that are constantly providing information on the debtor's level of credit worthiness, which is the rating.

Rating agencies have not really had a lot of support from other writers, as they have been described as being the ones that are the causes of financial chaos. Ferri et al. (1999), claimed that rating agencies have a tendency to follow the economic life cycle, and will downgrade an economy in the bad times, but will upgrade one when there are positive prevailing financial conditions.

Kraussl (2003), also affirms the above notion and that credit ratings are a reflection of financial market outcomes and rather than the ratings themselves being the cause, therefore the issue of credit rating agencies having such power is also questioned. Because ratings are a reflection of publicly available information, the outlook and the watchlist signals can be seen as the source of private information by rating agencies (Alsakka & Gwilym, 2012).

These rating agencies not only provide ratings to countries and companies, but they also extend their services to providing information about the outlooks in the future and the rating watch lists (Bannier & Hirsch, 2010). Keenan et al., (1998), defines a rating outlook as how the rating will change in the future and is primarily a value judgement provided by the agency, whereas a rating watch list are usually of more concern as they are short term in nature, and are not only based on qualitative information, but also on quantitative information such as the financial conditions in that particular country. If a rating is placed on the watch list or under review, then that particular rating is usually different from the rating that is not under review, therefore the watch list is very important for those investors who want to see the creditworthiness in the short term. A rating outlook is a value judgement which shows the way a rating will be headed in the future and has four categories which are: positive, stable, negative and developing (Alsakka & Gwilym, 2012).

According to Bannier and Hirsh (2010), a watch list can be viewed as a means by which rating agencies can monitor countries and firms continuously and effectively, as investors will always require credit risk information.

Some tests were conducted by Bannier and Hirsh (2010), on the effects of a rating review or watch list and their study focused mainly on downgrades. Their tests were done in order to see whether markets react differently to a direct downgrade or an imminent rating downgrade or rating change. The results showed that for low-quality borrowers, a direct downgrade is more important than a review downgrade. For borrowers who have good ratings, the watch list or review is only used only when demanded by investors, therefore the reaction to a direct downgrade is usually similar to a review downgrade.

Rating agencies are organisations that are also in competition with each other. An advantage of having competition among rating agencies according to Cantor and Packer (1994), is that competition leads to the agencies wanting to give the best and most realistic rating as opposed to having one dominant player in the industry. A problem of bias among agencies may arise as each institution or country will try and get the best possible rating. Rating agencies are usually forced into this competition against one another for the right to attach ratings that companies and governments may be wishing for. There is therefore an incentive for these agencies to give issuers a good rating since these agencies are paid for these services (Johansson, 2010). However, Hunt (2009), argues that it is difficult for these agencies to provide bias reports as they all want to maintain their reputation in the markets.

Since investors and policymakers are affected by these ratings, Kraussl (2003) suggests that agencies such as Moody's have a great impact on both the ability and willingness to hold certain instruments and also on the cost of debt attributed to borrowing.

Credit ratings have been shown to have a compelling impact on the yield spread and debt instruments. A summary of the chances that a country or company will not pay its debts is known as sovereign risk. A country that has “junk” status or any other rating below investment grade, is the one that will not be able to borrow from international markets and will depend on funding from the government. A lot of low income countries have difficulty in accessing funding from these international markets, whereas for emerging economies, the access to the international markets is of paramount importance but usually dependant on circumstances and usually varies over time (Reinhart, 2002).

Ratings may include sovereign credit ratings. These are valuations and assessments of the possibility that the debtor will default on their obligations as they fall due. All governments aim to have positive credit ratings as this makes it easier to access international capital markets, as many investors always seek securities that have a good rating, or rather rated, than unsecured securities (Cantor & Packer, 1996). Although these sovereign ratings are crucial in terms of access to capital markets, they also play a key role in the ratings that are designated to borrowers of the same nationality.

These sovereign credit ratings can be divided into two categories which are economic risk and political risk. Economic risk is the risk of whether the government will repay its debt obligations as they fall due (Kraussl, 2003).

The other type of risk that usually affects emerging markets is that of political risk. In general, emerging markets usually have more political risk or instability than developed economies, which often results in higher levels of sovereign default by these economies (Cuadra & Sapriza, 2008). Kraussl (2003) also identifies political risk as the enthusiasm that a government has to repay its debts on time.

Therefore in conclusion, rating agencies are supposed to improve on market efficiency, and this is done through providing ratings that are free from bias, are not opaque and that are authentic (Bissoondoyal-Bheenick et al., 2006).

2.3 Determinants of Sovereign ratings

The ability and the willingness to pay back a debt obligation at the right time is assessed by interested parties through sovereign credit ratings. These interested parties, both governments and other market participants in financial markets such as investors (Afonso et al., 2011). It is therefore important that governments and other market participants know what the most important factors that agencies put an emphasis on are when giving a rating score (Montes et al., 2016). These ratings are not only important in terms of gaining access to the capital markets, but they are also important in aiding in the stability, efficiency and growth of a country's local and international markets (Bissoondoyal-Bheenick et al., 2006).

Standard and Poor's (2015) identifies that there are five crucial factors that are the foundation when it comes to their sovereign credit risk analysis and these are:

i. Monetary flexibility
ii. Debt burden
iii. Economic growth and structure
iv. International investment and external liquidity
v. Institutional and governance effectiveness and security risks

Moody's can also have the same factors that affect sovereign risk but the weights attached to each factor may be very different which will result in a different rating being given to a particular country (Cantor and Packer, 1996).

These ratings as identified by Afonso et al., (2011) are a very crucial factor in determining the interest rates that countries encounter and also on their cost of borrowing. From the above definition and implications, it is therefore important for all market participants and governments to understand the factors that determine a credit rating that is assigned by Moody's, Standard and Poor's or Fitch. So basically, a sovereign rating is a continuous evaluation and assessment on the chances that a country will not pay back its debt, in other words, the chances of default (Afonso et al., 2011).

Bissoondoyal-Bheenick (2005), gave a simple definition of a rating, by saying that a rating is a way of looking into the future and the chance of default. Credit ratings are not only assigned to sovereign or governments, but they also assigned to both public and private countries within those countries. These ratings do not necessarily have to be the same as the sovereign rating, but a sovereign rating is important as it acts as a benchmark for the ratings assigned to companies within a particular country (Bissoondoyal-Bheenick, 2005). Ratings are not only influenced by macro-economic factors, but also by the default history of the country whereby political factors may be very relevant (Mora, 2006).

An empirical analysis that was carried out by Afonso et al., (2011), decided to break down the determinants of sovereign ratings into short-term and long-term factors. The reason for them doing this was that they analysed and saw that countries' ratings do not change much over time. In their analysis, they used linear regression models to determine what the cut-off points were in the rating scale. Their results showed that in the short-term, real GDP growth, government balances, GDP per capita and the level of public debt are the main determinants of sovereign ratings in this time horizon. External debt, external reserves and the effectiveness of a government are crucial determinants in the long-run.

Another test to determine the factors that determine a sovereign rating was done by Bissoondoyal-Bheenick (2005) and focused on the two main rating agencies, Standard

and Poor's and Moody's. The results from the tests found that qualitative factors are not the only important input when it comes to determining a sovereign rating. From the economic variables in the tests that were run, only inflation and Gross National Product per capita were the most relevant when it comes to determining the ratings, as they are forward looking. The level of foreign reserves and current account balance were also important factors. Bissoondoyal-Bheenick (2005), also found that qualitative factors such as political risk and cultural differences are also important, but the problem is that they are not easily quantifiable. A lot of countries face other challenges such as the way to manage their debt, suffer from weak banking systems and other inefficiencies that negatively affect productivity, when it comes to providing ratings. An additional point is that the way that a country is rated depends on its level of development and relative stability.

There are different views on whether to base sovereign ratings solely quantitative factors only or not. According to Afonso (2003), and Cantor and Packer (1996), they are not advocates of using qualitative factors such as political factors, because of the difficulty in measuring such factors accurately. Other writers such Feder and Uy (1985) and Lee (1993), suggest that using or adding political variables into a model added some explanatory power, and therefore such factors should definitely be included.

Credit rating agencies identify four categories that are used to assign ratings and these are; economic structure, macro-economic management, external viability and growth potential (Bhatia, 2002). When Altenkirch (2005) ran her tests on 26 countries, she found that external viability which included current account deficit balances and foreign reserves which were used as proxies, were found to be the most crucial area for rating agencies. This was particularly true for emerging markets as they are more prone or sensitive to external shocks. Current account deficit is important, especially when this deficit is persistent over a number of years, then it suggests an increase in the level of debt, and if

not corrected, will lead to an unsustainable level in future, therefore negatively affecting a rating.

Cantor and Packer (1996) found that low inflation, high GDP growth, and no credit default on foreign currency debt over the last 20 years, high levels of economic development and high per capita income, were all indicators in achieving a high rating. This theory was later supported by Gultekin-Karakas et al., (2011), who suggested that low ratings are usually attributed to low income level countries such as many of the emerging markets.

According to Afonso (2003), the rating that is attached to a particular country is correlated with the level of development in that country. Altenkirch (2005), found that current account deficits were important in determining a rating, Afonso (2003) found that current account as a percentage of GDP and debt to GDP ratio, were poorly correlated with sovereign credit ratings, and therefore they did not yield any significant results.

The determinants were also separated between developed vs developing economies. From the results of the countries analysed, 52 were developing and 29 were developed economies. GDP per capita was an important determinant in both developed and emerging economies, whereas the external debt was seen to be very important in developing economies (Afonso, 2003). Montes et al., (2016), carried out tests on the determinants of sovereign ratings in 40 developing countries. He found that if a country wants to improve on its sovereign rating, it should focus on the unemployment rate, foreign reserves, external debt, budget balance, inflation rate and GDP growth rate. Financial openness and inflation targeting were also seen as relevant factors for the developing economies. A less corrupt government and a democratic system that has law and order are also ways of improving sovereign ratings for emerging economies.

Rowland (2004) carried out some tests on the determinants of sovereign credit ratings on 49 developing economies, and identified that the level of international reserves and trade

and financial openness are also very important factors in achieving a good or a bad rating. Ozturk (2014), supports the inclusion of qualitative factors that earlier writers such as Feder and Uy (1985) and Lee (1993) had identified as important, and Ozturk (2014) suggests that governance efficiency and effectivenss are important determinants of ratings especially in developing nations. For developing economies, the rule of law, a strong judicial system and the protection of property rights are also seen as being determinants of sovereign ratings (Biglaiser & Staats, 2012).

Some other indicators that are similar to the ones as above can be external balances which is a measure which indicates the current account balance. A current account surplus may suggest that the economy does not rely heavily on external funds which may lead to a positive outlook for an economy. The other one may be real GDP growth which is basically an indication of the growth and increasing growth may indicate that a country may find it easy to meet their obligations as they fall due (Iyengar, 2012).

2.4 Impact of Ratings on Exchange rates, stock markets and bond markets

As pointed out by Bissoondoyal-Bheenick (2005), a sovereign rating is important as it provides a benchmark for the ratings that are assigned to companies within that particular country. Afonso et al., (2011), concurs with this evaluation, as they also point out that sovereign ratings definitely have an effect on the credit ratings of companies and banks in that country. Since most investors are risk averse, they really pay attention to the credit ratings of a particular country and therefore the companies involved, when choosing their optimal portfolio.

2.4.1 Impact of ratings on exchange rates

Credit rating agencies play a very important function in international financial markets as they present rating information through ratings, reviews and outlooks (Alsakka & Gwilym,

2012). Because of the way markets are integrated now due to the fact of increased globalisation, exchange rates play an important role in terms of financial performance (Alsakka & Gwilym, 2012).

Goldstein et al., (2000), carried out a series of tests to see whether sovereign ratings do indeed anticipate foreign currency crises, and their results showed that sovereign ratings do not do very well in predicting currency crises and are then adjusted after the fact. Alsakka and Gwilym (2012) conducted tests on 124 developed and developing countries on the effect of rating changes on exchange rates. They found that ratings and signals of ratings tend to significantly impact the home country exchange rates, the reason for this being exchange rates usually incorporate new information in a quick and timely manner. If market participants view ratings to be country specific, then there will be little spill-over effects on other exchange rates as a result (Ferreira & Gama, 2007). Since financial markets are more integrated now, spill-over effects of exchange rates should arise.

In addition, Alsakka and Gwilym (2012) analysed the downgrading of Greece in 2011 from A3 to Ba1, and found that the euro ended up depreciating against the dollar.

2.4.2 Impact of sovereign ratings on stock and debt markets

Market participants such as investors have different responses to rating announcements. The reason for this is that sovereign ratings are usually based on several factors which are publicly available. The challenge with this is that rating agencies do not only use publicly available information, and hence different responses in the market place (Pukthuanthong-Le et al., 2007). The accessing of ratings is of particular importance to these investors as they are the main market participants, so therefore particular attention is paid to the sovereign ratings (Pukthuanthong-Le et al., 2007). The question here is that are ratings an important factor in the stock and equity markets or are they independent of each other?

A downgrade of sovereign bonds might have a negative effect on the equity markets. The reason for this is that, there will be a higher tax rate that is charged on firms as a result to offset the negative impact of the higher interest rates as a result of a downgrade (Kaminsky & Schmukler, 2002). Additionally Kaminsky and Schmukler (2002) carried out some tests on emerging markets over ten years and found that a change in a rating is a result of a change in the outlook. Therefore what this means is that a new credit rating is not really considered as a shock and hence the movements in equity and bond prices do not reflect the valuation that is caused by the rating.

This is in contradiction to what Cantor and Packer (1996) found. They wanted to see if announcements of sovereign ratings have an impact on US dollar bond spreads. Their results showed that sovereign ratings are strongly linked with changes in bond spreads.

A number of empirical studies that have been carried out have tried to find out whether ratings have a significant influence on markets using vector autoregressive (VAR) modelling and Granger-Causality tests. The results from the tests carried out have been very contradictory.

Cantor and Packer (1996), carried out tests on 35 emerging market countries and the effects of sovereign credit ratings on government yield spreads, and reached the conclusion that upgrades were followed by significant declines in government yield spreads, but downgrades did not produce significant effects. The impact of these ratings were seen to be stronger for the speculative-grade rather than the investment-grade. Reisen and Von Maltzan (1999) came up with different conclusions. They carried out a study on 29 countries from 1989 to 1997. What they found was that when there is a possibility for a downgrade and the outlook is negative for a country, there was a significant effect on the government yield spread. The only consistency between the two

different tests carried out was that, the effect on the yield spreads was much stronger for those countries which were below the investment-grade.

Kraussl (2000), examined the connection between credit rating announcements and government bond yield spreads using VAR models. He concluded that a sudden change in a rating does not automatically have an immediate effect on emerging market bond yield spreads.

Gropp and Richards (2001), are of the view that financial markets are both efficient and semi-strong, and therefore the market prices should not be affected by credit ratings. This view is also supported by Kraussl (2003), who says that rating agencies such as Moody's only have access to readily available information which can only be accessed publicly.

When it comes to the impact of ratings on financial markets, there are conflicting views. Corporate securities are indeed affected as a result of rating announcements (Hard *et al*, 1992), whereas Richards and Deddouche (1999) focused on emerging markets and found that bank stock prices are not affected by rating changes. Later, Kaminsky and Schmukler (2002) who also focused on emerging markets, found that for those countries being rated, equity and bond markets are directly affected as a result of the rating change and outlook.

Pukthuanthong-Le et al., (2007) carried out tests on 34 countries, both developed and emerging markets on the effects of rating changes on equity and debt prices. They found that rating agencies, do indeed provide financial markets with new information and changes in both the ratings and the outlook do indeed affect equity and bond markets. Markets do react to new information, but countries tend to react to this information differently. They found that bond markets react positively when the outlook is that of an upgrade as a result of an increase in economic growth and a decrease in the chances of default. A reduction is default risk or a credit rating upgrade does not really help stocks, but definitely has a positive impact on bonds.

Brooks et al., (2004) found that a rating downgrade has a positive effect on equity returns and they also found that the reaction of rating changes is not equal across the rating agencies. Brooks et al., (2004) found that downgrades affect a country's stock market negatively, but the effects of an upgrade are insignificant.

Equity markets are definitely expected to react to a sovereign credit downgrade because if a country is downgraded, it tends to affect the borrowing costs in the international markets and this will assist in a credit crunch, which usually tends to harm the stock markets (Ferreira & Gama, 2007).

Ferreira and Gama (2007) took it a step further by trying to identify what are the spill-over effects of a rating change to other countries equity returns. They found that rating downgrades do tend to affect markets negatively, but upgrades have no real impact. They also found that a country's status as an emerging market is positively correlated with a downgrade input.

Harper et al., (2008), analysed 42 countries in terms of their volatility when ratings change. What they found was that upgrades tend to reduce volatility whereas downgrades increase the volatility of both stock and bond markets, but usually to varying degrees. According to Afonso et al., (2014), who carried out tests on 21 European Union countries, they found that in this Euro-area, a downgrade of a particular country leads to an increase in the volatility of other countries, whereas an upgrade does not really affect the volatility of bonds and equities.

2.5 Ratings and their effect on capital flows and financial development

Emerging markets have some special features that distinguish them from emerging markets. Because of their low and sometimes negative correlation with developed economies, and usually offering higher returns, emerging markets offer investors a chance to diversify their portfolios (Buckberg, 1995). As a result of market integration and

globalisation, which has capital flows, there has been an increase in the demand for sovereign ratings by investors, especially since they want to diversify their portfolios (Bissoondoyal-Bheenick, 2005). Altenkirch (2005) also emphasises the importance of credit ratings in an emerging market context as they are important when it comes to capital flows which may include foreign portfolio investments for both private and public projects. Ratings act as a signal or rather a simple summary of a country's political, economic and financial situation, therefore are important as they attract investments and capital flows (Erdem & Varli, 2014).

Reisen and Von Maltzan (1998) said that capital flows are definitely affected by sovereign ratings. During periods of high economic growth and activity, a positive rating and outlook increases the expectations of investors, therefore increasing capital flows. In periods of recession, when a country is downgraded, it causes panic and unrest amongst investors and capital flight is the result. They conducted tests on 26 emerging economies to test for market volatility and found that bond and stock market volatility is reduced after positive rating announcements, and volatility in the market increases following negative rating announcements.

Kim and Wu (2008) believe that the only way for a country to increase international capital inflows and financial sector development is through keeping borrowing costs low, have good credit ratings, good rule of law and transparency. Reinhart and Rogoff (2004) had earlier confirmed this by saying that the major factor that influences developed economies to want to invest in emerging markets are the sovereign credit ratings. For financial intermediation to take place and the allocation of capital in any market, there has to be financial development (Kim and Wu, 2008) which is very important in emerging markets. Emphasis is placed on the importance of financial development because this is usually expected to increase investments and savings, thereby aiding in economic growth

(Adrianaivo & Yartey, 2010). Emerging markets face several challenges such as corruption, a lack of transparency and political risk, which usually stunt the level of financial intermediation and therefore lack of development (Kim & Wu, 2008).

Demand in a country can be increased through improved sovereign ratings, which signal investor protection, transparency and low country risk, which in turn will foster and increase financial development (Rajan & Zingales, 2003).

Kim and Wu (2008) carried out tests on 51 emerging markets to analyse how both short and long term ratings affect international capital flows and financial development. They found that capital inflows such as foreign direct investment increases as a result of an improvement in foreign currency long-term ratings of emerging markets. With regards to the short-term ratings, they found that both financial market development and capital inflows are deterred by improvements in short-term ratings. The reason for this is that, an improvement in short-term ratings, causes sovereigns to then neglect long-term financing, which lessens the importance of long-term financial markets such as foreign direct investment, and increases liquidity risk. Local currency long-term ratings had a negative impact on international capital flows but it did lead to the growing importance of developments in both the banking sector and stock markets.

2.6 Stability and reliability of rating agencies

Credit rating agencies exist not only to provide ratings to lenders and borrowers, but also reduce or eliminate the information asymmetry that exists between them. Sovereign ratings are mainly based on information that is available in the public setting, but rating agencies have often been accused of incorporating private information that is given by private borrowers and lenders (Reisen & Von Maltzan, 1998). Moody's and Standard and Poor's dominate the market share and usually charge governments and corporates to get their ratings. Because of this, rating agencies may not want to upset their clients by

downgrading them, because doing so would decrease the demand of their services (Reisen & Von Maltzan, 1998).

The importance of rating agencies has increased over the years as a result of market integration and globalisation. These agencies have often come under criticism for being reactive rather than being proactive when it comes to issuing ratings in the market. Reisen and Von Maltzan (1999) suggested that the Mexican disaster of 1994-1995 was not anticipated by rating agencies, but rather they reacted to the crisis.

Rating agencies were also accused of playing a huge role in the subprime mortgage-backed securities crisis by assigning high ratings in order to increase their overall profits (Lugano et al., 2015). The continuous criticisms of rating agencies has led them to aiming towards providing correct and accurate information all the time (Reisen & Von Maltzan, 1999).

Hill et al., (2010) claimed that rating agencies often disagree on the ratings and their quality and say that these differences are usually attributable to the way the ratings are used, the current rating and the timing and changing of the rating quality. They conducted tests on 129 countries to see whether rating agencies tend to follow each other, and they found that rating agencies tend to disagree more often than not on ratings, therefore usually have contrasting opinions.

Devenow and Welch (1996) came up with a term “herding”. What this term means is that, because rating agencies tend to rival each other and are concerned with their reputation, they can sometimes let the ratings of other agencies influence their own ratings that they attach. Mariano (2012), supports the fact that those rating agencies with good reputations tend to have an influence on lower reputational agencies, therefore a strong herding influence by highly reputable agencies.

Guttler and Wahrenburg (2007) said that a way for rating agencies to save on time and money is by adjusting a rating once another agency does so. Guttler (2011) carried out tests to see the lead-lag relationship between Standard and Poor's and Moody's on corporates over a 10 year period and found that an upgrade by one agency leads to a higher upgrade, usually by one grade by the other agency. The opposite was also true for downgrades.

Alsakka and Gwilym (2010) wanted to study lead-lag relationships on sovereign ratings. They used sovereign ratings because of the increase in globalisation in the world. They carried out tests on all sovereigns rated by 5 rating agencies: Moody's, Fitch, Standard and Poor's, Japan Credit Rating agency (JCR) and Rating and Investment Information (R&I). The last two are Japanese agencies. The tests were carried out over a 15 year data set. They found that Moody's is usually the first mover in upgrading sovereigns whereas Standard and Poor's leads Moody's when it comes to downgrading. They also found that Standard and Poor's is the most independent agency when it comes to rating sovereigns. Moody's and the Japanese agencies tend to have more stable ratings, as opposed to Standard and Poor's which has high rating volatility.

Lugano et al., (2015) conducted tests on the subprime crisis and the way the agencies reacted. What they found was that Standard and Poor's and Moody's tend to influence each other since they hold the majority of the market share, but Fitch does not influence any of the two agencies.

The main objective of rating agencies is to provide accurate and timely information. Market participants especially investors, have accused rating agencies of being slow in adjusting their ratings and this creates a problem for investors as they do not want to always re-adjust their portfolios (Altman & Rijken, 2004). Stability in ratings can only be achieved by focusing on the long-term and only adjusting ratings when significant events trigger a

change (Standard and Poor's, 2003). Gaillard (2013) said that the level of accuracy of sovereign ratings can be measured by calculating how accurate the ratings are in the form of a ratio, getting cumulative default rates and analysing the rates before default. Cantor (2001) says that rating agencies only take action when it comes to rating, only if the rating is unlikely to change over the short-term, therefore achieving stability.

2.7 Developed vs developing ratings

Compared to developed economies, developing economies ratings should be analysed differently both with respect to their quality and focus. There are a large number of economic factors that have different effects on sovereign credit ratings. For quantifiable factors, both Moody's and Standard and Poor's rely on a large number of criteria in order to measure ratings such as external debt which measures the amount that of debt that a firm or country holds in foreign currency (Cantor & Packer, 1996). From the tests that they conducted to find out whether there is a relationship exists between ratings and their determinants, they found out that higher ratings tend to be as a result of higher per capita income.

Kraeussl (2005), conducted a study on 28 emerging markets and found out that sovereign ratings have a harmful effect on their financial stability as a result of a downgrade. This therefore shows that rating agencies do tend to affect the markets differently, but as outlined in the problem statement, the objective is to find out to what extent and whether different rating agencies affect the markets differently and to what extent. Another set of tests that were conducted by Elkhoury (2009), found out that the expansion of credit rating agencies into new and developing markets would lead to economies tightening their macro-economic policies and conflicts of interest will lead to weaker financial systems. These credit ratings should aid in the intermediation process in order to avoid weakening

financial systems and accurate ratings should be used in order to correctly input prices (Smith & Fryer, 2012).

Smith and Fryer (2012), carried out tests on six emerging market economies to test the quality of information used in imputing ratings. The results showed that the emerging economies had poor information content, the ratings were not evenly distributed and they concluded that rating agencies do not lead to market efficiency. The quality of ratings were uneven as a result of a number of local factors in the different economies. It is therefore important to the research that I will be conducting to see whether these rating agencies tend to follow a certain trend when issuing corporate or sovereign ratings.

Rating agencies list the relevant factors that influence sovereign credit ratings, but the certain weights that are attached to each factor and roles and qualitative information plays are not know or included at times. Both Standard and Poor's and Moody's investor services will be investigated to identify what these underlying factors are and if there are indeed differences in the weights which lead to different ratings and different outlooks as well (Kraussl, 2003).

An example is that, according to Kraussl (2003), an upgrade by an agency leads to increased confidence which also leads to an increased investor base. There will therefore be an increase in the demand for the stable financial instruments such as bonds in that particular emerging market. On the other hand, a downgrade below the investment-grade tends to lead to investors pulling out from those emerging markets.

Chapter 3: Data and Methodology

There are 3 major credit rating agencies. These are Fitch, Moody's Investor Services and Standard and Poor's which we can call the "Big 3" in the ratings game. These three agencies dominate the market and together they hold at least 95% of total market share, and those concerned with policy such as Nazareth (2003), have argued that rating agencies tend to abuse their power so that they can put a large stamp on the market and therefore dominate.

These rating agencies attach ratings to companies and debt instruments. A debt instrument is rated or judged on the basis that the instrument, which includes bonds, will be received if there is a non-payment of the instrument (Hill, 2007).

Table 3 below shows the long-term ratings for both Standard and Poor's and Moody's investor services. The ratings are split into investment grade and speculative grade. With the investment grade, it means that the government has little chance of defaulting on the obligation. Those which are rated below BBB- and Baa3 are known as the speculative grade. Rating agencies designate letters to stand for a particular rating. Table 3 below also provides a summary of the different rating scales that are used by the top two rating agencies which are Moody's and Standard and Poor's agency, with a sliding scale from 1 to 22.

Table 3: **Ratings for both S&P and Moody's**

Number	Standard and Poor's ratings	Moody's ratings	Investment Grade
1	AAA	Aaa	
2	AA+	Aa1	
3	AA	Aa2	
4	AA-	Aa3	
5	A+	A1	
6	A	A2	
7	A-	A3	
8	BBB+	Baa1	
9	BBB	Baa2	
10	BBB-	Baa3	
			Speculative Grade
11	BB+	Ba1	
12	BB	Ba2	
13	BB-	Ba3	
14	B+	B1	
15	B	B2	
16	B-	B3	
17	CCC+	Caa1	
18	CCC	Caa2	
19	CCC-	Caa3	
20	CC	Ca	
21	C	C	
22	SD		

Source: Standard and poor's (2014) and Moody's (2016)

The highest and most esteemed rating that a government or company will want to receive is that of AAA if we are using S&P and a rating of Aaa if we that organisation is using Moody's. The investment grade is what is encouraged if the entity is a trust company, bank, pension funds and many others such as insurance companies, as the chance of default is low (Hill, 2007).

I will examine data from 5 emerging markets from 5 different continents, namely, Brazil in South America, Russia from Europe, South Africa from Africa, and China from Asia, which are classified as upper-middle economies, and Mexico from North America which is classified as a lower-middle-income economy by the World Bank (2014). These 5 countries mentioned above are designated as emerging markets by Moody's (2016). Because of the availability of data and the fact that I am using sovereign ratings, I will be

using annual data which will cover a 20 year period from 1995 to 2015. Data on sovereign ratings will be sourced from Moody's investor services and Standard and Poor's portal database. These sovereign ratings are foreign currency long term ratings. I use foreign currency ratings because most countries do not trade in a closed economy, but rather as open economies.

From table 3 above, it can be seen that the ratings have been arranged in a sliding scale from 1 to 22. Where the highest rating is given a 1, and the lowest rating is given a 22. This is in line with what Cantor and Packer (1996) did, except in their sliding scale, 22 was for the highest rating and 1 was for the lowest rating. They converted the ratings of both agencies into numerical figures, so as to analyse the determinants of sovereign ratings. My study will use the same method of converting the ratings into numerical values, and this was done in table 3 above, since I will be using the Ordinary Least Squares method.

Quantitative data analysis methods will be used as opposed to qualitative data. In as much as some value judgements are used by rating agencies are used, the focus of my study will mainly be on the quantitative data.

The method of analysis of the data will be cross sectional data. The advantage that this method has is that an analysis of the data can be made using many variables and over different periods of time, since my models will incorporate various macro-economic variables.

Regression analysis will be used of the ratings as well as some of the indicators that were identified by Cantor and Packer (1996), which are determinants of credit ratings. Some of these determinants that were identified include:

GDP per capita ($): a higher GDP per capita indicates the willingness of a sovereign to pay its debts as they fall due.

Inflation (CPI index): this can be said to correlate with the credit rating. A higher rate of inflation may indicate structural problems and may indicate difficulties in paying the debt.

Fiscal balance: a balance deficit may show that the sovereign is a net borrower, and if it continues to do, this will impact on the rating negatively.

Real GDP growth: a higher level of economic growth may indicate that a country is able to finance its debt and make payments as they fall due.

Because rating agencies provide sovereign ratings for countries, it is important to see whether there any differences in the ratings as this may create confusion and conflicting interpretations for the sovereign that is being rated. For example, a country might be given an AAA by S&P and that same country may be rated Aa2 by Moody's. The lower the rating assigned by an agency, the higher the chances of a default by a country. As a first step, I will determine whether there are any significant variations between the rating agencies and the various economic indicators, and this will be done by plotting a correlation matrix. I expect that there will be differences in the ratings, which is why I will then proceed to answer the research questions with the models below.

The regression analysis will be done for all the emerging economies involved and the aim is find out whether there is a significant difference in the rating agencies and whether these ratings affect the economies differently.

For the hypothesis tests being carried out, the research aims to find out whether there is a significant difference in the ratings used by the agencies and what causes these differences.

The second part of the study will therefore take the economic indicators and see which ones are significant in these emerging economies. I obtained the data on the macro-economic variables from the World Bank and trade economics. These variables are collected on an annual basis and also cover the period from 1994 to 2015. These variables

include GDP per capita, CPI inflation, external balances as % of GDP, the GDP growth rate, the exchange rate and external debt % of GDP. The data on inflation is collected from the worldwide inflation database.

I will make use of multiple regression analysis for the first model. The aim of this model is to see the significance of the economic variables of the emerging markets by the two agencies. The regressions will be run on each individual country separately, so as to identify the key macro-economic variables used by the two rating agencies. The model (1) below shows the estimation of the model:

$Yi,t=a+\beta 1X1+\beta 2X2+\beta 3X3+\beta 4X4+\beta 5X5+\beta 6X6+ut$ (1)

Where:

Y= dependent variable: Emerging country's individual rating. Both S&P and Moody's ratings

$X1$= External Balance (%)

$X2$= Inflation rate

$X3$= external debt as % of GDP

$X4$= GDP per capita

$X5$= GDP growth

$X6$= exchange rate

ut= the random error term

t= is the year to be observed

i= the country being analysed

The model (1) above will serve as the baseline model, and in the regression analysis, ordinary least squares (OLS) will be used. Running the regression for the two different agencies for the same country should help explain why these agencies may reach different conclusions for the same country being analysed.

The second model aims to incorporate interest rate spreads and the objective here is to identify whether these spreads are positively or negatively affected by the credit rating

differentials, if any do exist in that particular year. The spreads data is obtained from the World Bank, and annual frequency is used from 1995 to 2015. An increase in a credit rating should lower the cost of borrowing by institutions in theory. This model aims to study the impact of ratings on the spread in emerging economies. I will use the interest rate spreads charged by the banks in these emerging economies as a proxy for the credit spreads of the different sovereigns. The rating differential is calculated as the credit ratings of Moody's subtracted from the credit ratings of Standard and Poor's.

The estimation of the model (2) is estimated as follows:

$$yi,t = \alpha + \beta \Delta Rating + ut \qquad (2)$$

Where:

y= the interest rate spread

$\Delta Rating$= rating differential (S&P rating – Moody's rating)

ut= the random error term

t= year to be observed

i= country being analysed

With these two models, it is important that we know how well the regressions fit the data, or rather how well the data is explained. The statistic that does this the best is the R^2 test. In essence it helps in answering how well the explanatory variables explain the dependent variable. R^2 lies between 0 and 1. The closer it is to 1, the better the regression model fits the data (Brooks, 2014).

Another test that will need to be conducted once the models have been estimated is that of any presence of autocorrelation or serial correlation. This is when the errors are correlated with each other. A formal test to use to see whether there is any auto correlation is the Durbin-Watson test, or DW test for short. This test only tests for the correlation between an error and its most recent value, which is termed first order autocorrelation (Brooks, 2014). The test has a null and alternative hypothesis, whereby H_o: $p = 0$ and H_1: $p \neq 0$.

When there is no autocorrelation present we do not reject the null hypothesis and therefore DW would approximately be equal to 2. Autocorrelation must not be ignored as it may lead to wrong inferences being made about the model (Brooks, 2014).

I will estimate the above models and see if they help in answering the questions identified in the problem statement. I will start off with a correlation matrix between the rating agencies and the macro-economic indicators which will aim to find out whether there are any significant differences between the two rating agencies. Once I have completed that, I will then identify the most significant economic variables that affect emerging economies using the baseline model, and end off with the third model which will see whether the ratings positively or negatively affect interest rate spreads.

Chapter 4: Estimation Results

In this section, the results and findings which were outlined by the research questions will be answered. The estimation results will be presented in this section.

According to Chris Brooks (2014), the estimators in a regression have to be BLUE, which stands for Best Linear Unbiased Estimators. I will conduct a number of tests on both the variables and the model itself.

The inflation and GDP per capita data had to be transformed into natural logarithms. The reason for this is that, because of their large numbers in value, a conversion to natural logs was necessary.

The first thing that I will do, is to provide a set of descriptive statistics of the data, for each of the 5 countries being analysed. Descriptive statistics are calculated from the data that is available which will be used in the running of the regressions. After providing a set of descriptive statistics, I will proceed on to doing a correlation matrix for each country, to identify the correlations between the ratings and the macro-economic variables. I will then proceed on to running the regressions using models 1 and 2 provided in the third chapter.

The tables below show a number of measures of dispersion and central tendency to illustrate the distributions of each macro-economic variable and full versions in appendix A.

4.1: Descriptive statistics of macro-economic variables

Table 4: Brazil descriptive statistics

Summary statistic	External Balance	Inflation Rate	External Debt %	GDP per Capita	GDP Growth	Exchange Rate
Mean	-1.998126	2.098676	25.61759	8.682029	2.850663	1.970652
Median	-2.838794	1.822303	21.41500	8.556843	3.127606	1.950063
Maximum	1.753670	6.820518	43.74000	9.475709	7.528797	3.327990
Minimum	-4.310274	0.500775	15.29000	7.939414	-3.847362	0.665000
Std. Dev	2.001825	1.171655	9.531494	0.514261	2.560846	0.719086
Skewness	0.672789	3.050199	0.675084	0.179970	-0.548673	0.029644
Kurtosis	2.074186	13.39349	2.027360	1.642962	3.439340	2.371644
J-B	2.445402	133.16362	2.538237	1.806849	1.280756	0.365151

Table 5*:* Mexico Descriptive statistics

Summary statistic	External Balance	Inflation Rate	External Debt %	GDP per Capita	GDP Growth	Exchange Rate
Mean	-1.803880	1.844015	23.78659	8.879424	3.016820	10.54762
Median	-1.512029	1.481605	19.78500	8.906951	3.812915	10.89857
Maximum	-0.458544	3.950667	54.18000	9.245075	9.784892	15.84827
Minimum	-5.625082	0.756122	11.13000	8.199968	-12.67379	3.375000
Std. Dev	1.174117	0.789824	10.85623	0.299715	4.431497	2.725212
Skewness	-1.551909	1.212882	1.297608	-0.709956	-2.105411	-0.600838
Kurtosis	6.046998	3.697816	4.216627	2.569894	8.507602	3.705296
J-B	17.34140	5.840336	7.530712	2.017714	44.05931	1.779680

Table 6: Russia Descriptive statistics

Summary statistic	External Balance	Inflation Rate	External Debt %	GDP per Capita	GDP Growth	Exchange Rate
Mean	5.899949	2.813361	41.42323	8.510381	2.160486	25.43297
Median	4.982809	2.479047	38.10000	8.449601	4.383951	28.54909
Maximum	17.47435	5.369568	90.90000	9.651948	10.00000	60.93765
Minimum	-0.206270	1.809927	27.10000	7.193499	-12.57000	2.191000
Std. Dev	4.401387	0.954268	14.53543	0.818680	5.956847	13.28729
Skewness	0.775828	1.488491	2.025308	0.031751	-0.874055	0.140529
Kurtosis	3.235935	4.298003	7.283590	1.494695	2.889983	3.979730
J-B	2.258029	9.668229	31.86026	2.080812	2.8123326	0.952293

Table 7: South Africa Descriptive statistics

Summary statistic	External Balance	Inflation Rate	External Debt %	GDP per Capita	GDP Growth	Exchange Rate
Mean	-2.483796	1.670539	22.41273	8.456889	2.992754	7.309385
Median	-1.920818	1.770312	18.95000	8.550588	3.069867	7.153249
Maximum	0.874059	2.603430	40.70000	8.996896	5.585046	12.75893
Minimum	-5.886516	0.488580	11.80000	7.840302	-1.538089	3.550000
Std. Dev	2.138959	0.560591	8.727818	0.354113	1.648373	2.327972
Skewness	-0.237429	-0.649809	1.023404	-0.149798	-0.723053	0.383362
Kurtosis	1.762335	2.645341	2.855882	1.731387	3.974523	2.917339
J-B	1.610863	1.663558	3.859344	1.557542	2.787506	0.545140

Table 8: China Descriptive statistics

Summary statistic	External Balance	Inflation Rate	External Debt %	GDP per Capita	GDP Growth	Exchange Rate
Mean	3.459273	0.761827	11.78182	7.576571	9.644318	7.559477
Median	2.620000	0.683938	11.70500	7.394152	9.46800	8.175950
Maximum	9.943000	3.238678	17.96000	8.990651	14.23100	8.503300
Minimum	0.220000	-1.203973	8.070000	6.160137	6.914000	6.073800
Std. Dev	2.665335	1.061343	2.844772	0.917698	1.936185	0.900679
Skewness	1.278258	0.209584	0.461565	0.208438	0.742760	-0.527564
Kurtosis	3.653940	3.059365	2.180759	1.645313	2.909209	1.527824
J-B	6.383130	0.164290	1.396381	1.841548	2.030428	3.007214

The tables above are a representation of the summary statistics of the 5 emerging economies that I have selected. The figures in the tables show that none of the series are not normally distributed. This can be seen from the skewness and kurtosis values for the variables. For a series to be normally distributed, it has to have a skewness which is equal to 0 and a kurtosis of 3. The only series that come close to being normally distributed is the South African exchange rate, which is positively skewed with a value of 0.3833362 and a kurtosis of 3, the Chinese inflation rate which is positively skewed with 0.209584 and a kurtosis of 3.059365 and the Chinese GDP growth which has a kurtosis of 2.909209 and a skewness of 0.742760 Other than this variable for South Africa, none of the other variables show strong signs of being normally distributed.

Russia has the largest variation in external balances, while Mexico recorded the smallest variation in its external balance. In terms of inflation, Russia experienced the highest inflation, averaging2.8% over the period, while China experienced the lowest average inflation of only 0.76% over the same period. However, the lowest variation in inflation as measured by the standard deviation was in South Africa with a standard deviation of only 0.56% and the largest variation was in Brazil with a standard deviation of 1.17%. External debt as a percentage of GDP was also largest in Russia, averaging 41.4% with a standard deviation of 14.5%. China recorded the lowest external debt to GDP ratio, averaging only

11.8% and a standard deviation of 2.8%. The growth rate was largest in China, with an average of 9.6% and a standard deviation of 1.9%, while the lowest growth rate was experienced in Russia, averaging 2.2% and a standard deviation of 6%. Variations in exchange rates were largest in Russia with a standard deviation of 13.2, while Brazil had the smallest variation of 0.72.

4.2: Correlation Matrix of each Country

In this section of chapter 4, I will provide a correlation matrix of the ratings provided by Moody's and Standard and Poor's and the macro-economic variables. A correlation between a variable and itself is always 1. The correlation coefficient shows how strongly a set of variables are related or rather the association between the variables. The correlation coefficient is always between 1 and -1, where 1 shows a perfect positive relationship, whereas a coefficient of -1 shows a perfect negative relationship (Brooks, 2014).

I went a step further, in calculating the differences between the correlations of the rating agencies. This was done by subtracting Moody's correlations from those of Standard and Poor's. The extracts of the tables below provide the correlation matrix tables of the 5 countries. A full set of correlation matrix tables is found in appendix B. The tables below were just dealing with the ratings and the macro-economic variables. I did this first before I went to find out which of the variables are statistically significant in regression analysis. These correlations just help explain how much the dependent variables are explained by the independent ones.

Table 9: Brazil correlation matrix

Independent Variables	Dependent Variables		Difference
	S&P	Moody's	
External Balance	0.210734	0.148376	0.062358
Inflation Rate	0.422934	0.214693	0.208295
External Debt %	0.664348	0.705791	-0.041443
GDP per Capita	-0.935707	-0.942524	0.006817
GDP growth	0.040793	0.035375	0.005418
Exchange Rate	-0.180316	-0.150694	-0.029622

Table 9 above shows that, for Brazil there is a moderate positive relationship between the external debt as a percentage of GDP and the ratings provided by both agencies. There is a strong negative relationship between the GDP per capita and the ratings, and this may be significant when these agencies rate a country, with a very minimal difference between the correlations of 0.006817.

Table 10: Mexico correlation matrix

Independent Variables	Dependent Variables		Difference
	S&P	Moody's	
External Balance	-0.195459	-0.44762	0.252161
Inflation Rate	0.760653	0.636210	0.124443
External Debt %	0.697173	0.511886	0.185287
GDP per Capita	-0.884811	-0.776550	-0.108261
GDP growth	0.027860	0.059340	-0.03148
Exchange Rate	-0.741045	-0.811483	0.070438

Mexico, in table 10 above, has a strong to moderate negative relationship between the GDP per capita and the ratings provided by both agencies. What is also different between table 9 and table 10 is that, in table 10, the exchange rate has a moderate to strong negative relationship, and the inflation rate has a moderate positive relationship with the ratings provided. The largest difference is that of 0.252161 on the external balances, with Moody's ratings having a higher correlation between the rating and the external balances variable.

Table 11: Russia correlation matrix

Independent Variables	Dependent Variables		Difference
	S&P	Moody's	
External Balance	0.205942	0.233240	-0.027298
Inflation Rate	0.613190	0.660902	-0.047712
External Debt %	0.896674	0.838813	0.057861
GDP per Capita	-0.834318	-0.894939	0.0060621
GDP growth	-0.108272	-0.116771	0.008499
Exchange Rate	-0.342595	-0.362966	0.020371

Table 11 has similar characteristics to that of Mexico. Once again the external debt and the GDP per capita have strong relationships with the credit ratings. The differences are also small with GDP per capita having a difference of 0.0060621 and the external debt as a percentage of GDP having a difference of 0.057861. The inflation rate for both agencies has a moderate positive relationship with the ratings, but the external balance and the exchange rate have weak relationships here with the ratings.

Table 12: South Africa correlation matrix

Independent Variables	Dependent Variables		Difference
	S&P	Moody's	
External Balance	0.534746	0.493038	0.041708
Inflation Rate	0.289514	0.149782	0.139732
External Debt %	-0.031053	-0.102652	0.071599
GDP per Capita	-0.688715	-0.779712	0.6107438
GDP growth	-0.182769	0.047015	-0.229784
Exchange Rate	-0.365011	-0.406907	0.041896

South Africa has a very weak correlation between the external debt and the ratings. GDP per capita has a moderately negative relationship, but here the difference between the two is quiet large, with a difference of 0.6107438. GDP growth seems to have a weaker correlation with Moody's than it does with Standard and Poor's.

Table 13: China correlation matrix

Independent Variables	Dependent Variables		Difference
	S&P	Moody's	
External Balance	0.333120	-0.242800	0.57592
Inflation Rate	-0.077203	-0.157845	0.080642
External Debt %	0.820223	0.846911	-0.026688
GDP per Capita	-0.955332	-0.970228	0.014908
GDP growth	0.177086	0.177168	-0.000082
Exchange Rate	0.964759	0.962533	0.002226

Both Standard and Poor's and Moody's ratings have very strong correlations with GDP per capita and the external debt as a percentage of GDP. The largest difference between the ratings and the correlations is found with the external balance, with a difference of 0.57592.

The correlation matrix tables above were used just to get an understanding of what the research questions are trying to answer. It has been seen from the correlation tables, that some of the variables have large differences amongst them when used by the rating agencies. The next step will be an estimation of the regression results, together with the coefficients and diagnostic tests on the variables.

4.3: Regression Analysis of macro-economic variables and ratings

As identified in the previous chapter, the empirical evidence will be presented based on the two models. The first model will aim to identify which are the most significant variables that are used by Standard and Poor's and which variables are most significant when looked at by Moody's, whereas model two will seek to find out whether ratings positively or negatively affect interest rate spreads. In the tables that I will provide, the variables with statistically significant coefficients will have an asterisk by the t-stat, whereby *, ** and *** register significance at 10%, 5% and 1%, respectively. Full regression results are in appendix C.

Tables 14 to 18 provide the regression results of the first model whereby the ratings are the dependent variables and the macro-economic variables are the explanatory variables.

Table 14: Brazil regression results

Independent Variables	Results	Dependent Variables	
		S&P ratings	Moody's ratings
Intercept	Coefficient	49.49702	46.55641
	t-stat	5.956670	5.699589
External Balance	Coefficient	-0.045028	0.106581
	t-stat	-0.298009	0.717572
	p-value	0.7698	0.4840
Inflation rate	Coefficient	0.176968	-0.422085
	t-stat	1.247648	**-3.027180*** **
	p-value	0.2313	0.0088
External Debt %	Coefficient	-0.037099	0.064641
	t-stat	-0.663788	1.176550
	p-value	0.5169	0.2577
GDP per Capita	Coefficient	-4.132471	-3.690441
	t-stat	**-4.456727*** **	**-4.048780*** **
	p-value	0.0005	0.0010
GDP growth	Coefficient	-0.081304	-0.046720
	t-stat	-1.331173	-0.778162
	p-value	0.2030	0.4486
Exchange rate	Coefficient	-0.432619	-1.307305
	t-stat	-0.949865	**-2.919934** **
	p-value	0.3572	0.0106
R-squared		0.940829	0.960172

Note: * significance at 10%, ** significance at 5% and *** significance at 1%

For Brazil, it can be seen that the coefficient of inflation rate is significant at 1% for Moody's but is not statistically significant when we make Standard and Poor's the dependent variable. The coefficient of GDP per capita is statistically significant at 1% for both agencies, indicating that a fall in the per capita income, will lead to a possible downgrade by both agencies. This is because the measurement of the dependent variable was such that an increase in the rating numbers was equivalent to its downgrading, that is, the best grade was 1. The exchange rate is also important in this case to Moody's, and its coefficient is statistically significant at 5%, which suggests that a depreciating currency will lead to a change in the outlook or a possible upgrading by Moody's. The R-squared for both models is above 90%, which suggests a significant amount of explanatory power of the macro-economic variables. R-squared shows us how well the explanatory variables explain the dependent variable.

Table 15: Mexico regression results

Independent variables	Results	Dependent Variables	
		S%P ratings	Moody's ratings
Intercept	Coefficient	59.15685	61.12768
	t-stat	4.232981	5.160603
External Balance	Coefficient	-0.279627	-0.619468
	t-stat	-1.533409	**-4.007912*** **
	p-value	0.1460	0.0011
Inflation rate	Coefficient	0.333714	0.658639
	t-stat	0.586390	1.365565
	p-value	0.5663	0.1922
External debt %	Coefficient	-0.049583	-0.105770
	t-stat	-1.253366	**-3.154471*** **
	p-value	0.2293	0.0065
GDP per Capita	Coefficient	-5.657295	-5.909177
	t-stat	**-3.526144*** **	**-4.345497*** **
	p-value	0.0031	0.0006
GDP growth	Coefficient	0.008649	0.003948
	t-stat	0.239142	0.128785
	p-value	0.8142	0.8992
Exchange Rate	Coefficient	0.08019	0.061700
	t-stat	0.646448	0.534647
	p-value	0.5278	0.6007
R-squared		0.826108	0.878613

Note: * significance at 10%, ** significance at 5% and *** significance at 1%

In Mexico's case, the coefficient of external balances is statistically significant at 1% for Moody's but not significant when looked at by Standard and Poor's. Once again, coefficient of the GDP per capita is statistically significant for Mexico at 1% for both agencies, which shows the importance of the per capita income of a country when it comes to a credit rating. The coefficient of external debt % is statistically significant at 1% for Moody's, but not for Standard and Poor's.

Table 16: Russia regression results

Independent Variables	Results	Dependent Variables	
		S&P ratings	Moody's ratings
Intercept	Coefficient	13.81820	20.90190
	t-stat	1.856991	3.817963
External Balance	Coefficient	-0.080898	-0.078947
	t-stat	-0.703306	-0.932882
	p-value	0.4926	0.3657
Inflation Rate	Coefficient	0.718603	0.683905
	t-stat	1.332983	1.724322
	p-value	0.2024	0.1052
External debt %	Coefficient	0.164176	0.073332
	t-stat	**5.682016*** **	**3.449622*** **
	p-value	0.0000	0.0036
GDP per Capita	Coefficient	-1.276494	-1.839481
	t-stat	**-1.759492***	**-3.446286*** **
	p-value	0.0989	0.0036
GDP growth	Coefficient	-0.021584	0.011302
	t-stat	-0.253868	0.180687
	p-value	0.8030	0.8590
Exchange Rate	Coefficient	0.020427	0.035948
	t-stat	0.611766	1.453354
	p-value	0.5499	0.1640
R-squared		0.918330	0.918207

Note: * significance at 10%, ** significance at 5% and *** significance at 1%

For Russia, coefficient of the external debt % is statistically significant for both agencies at the 1% level. What this means is that an increase in the level of external debt, will lead to a possible downgrade or a change in the outlook of a country from positive to stable, or from stable to negative. It is therefore important for a country such as Russia to keep their external debts at sustainable levels, so as to avoid a downgrade. Once again the coefficient of GDP per capita appears as statistically significant here, but at 10% for Standard and Poor's, and at 1% for Moody's.

Table 17: South Africa regression results

Independent Variables	Results	Dependent Variables	
		S&P ratings	Moody's ratings
Intercept	Coefficient	17.49233	27.79056
	t-stat	2.575028	5.100085
External Balance	Coefficient	0.450750	0.083069
	t-stat	**2.588402****	0.595675
	p-value	0.0206	0.5609
Inflation rate	Coefficient	0.097029	-0.175565
	t-stat	0.359852	-0.811715
	p-value	0.7240	0.4296
External debt %	Coefficient	0.158396	0.094292
	t-stat	**4.128691*****	**3.064006*****
	p-value	0.0009	0.0079
GDP per capita	Coefficient	-0.882063	-2.209273
	t-stat	-1.109963	**-3.465803*****
	p-value	0.2845	0.0035
GDP growth	Coefficient	-0.006331	0.068381
	t-stat	-0.058917	0.793323
	p-value	0.9538	0.4400
Exchange Rate	Coefficient	-0.424998	-0.294504
	t-stat	**-4.50817*****	**-3.894349*****
	p-value	0.0004	0.0014
R-squared		0.820308	0.828000

Note: * significance at 10%, ** significance at 5% and *** significance at 1%

In South Africa, Standard and Poor's pays more attention to the external balances, external debt % and the exchange rate. This is similar to those indicators that Moody's looks at, but the only difference is that, the coefficient of external balance is not statistically significant for Moody's. Exchange rate plays an important role for both agencies, with its coefficient being statistically significant at 1% in both models, which should make sense as the exchange rate affects how the external debt will be paid. The R-squared in this case is at 82% which is still good in terms of explanatory power.

Table 18: China regression results

Independent Variables	Results	Dependent Variables	
		S&P ratings	Moody's ratings
Intercept	Coefficient	4.947929	13.78350
	t-stat	0.579006	3.408797
External Balance	Coefficient	-0.108012	0.025284
	t-stat	-1.647078	0.489340
	p-value	0.1203	0.6317
Inflation Rate	Coefficient	0.048891	-0.163028
	t-stat	0.280132	**-2.974129***
	p-value	0.7832	0.0671
External debt %	Coefficient	-0.167523	-0.018412
	t-stat	-1.637423	-0.380338
	p-value	0.1223	0.7090
GDP per capita	Coefficient	-1.072971	-1.218883
	t-stat	**-1.760218***	**-4.225924****
	p-value	0.0987	0.0007
GDP growth	Coefficient	-0.057245	-0.037427
	t-stat	-0.480714	-0.664214
	p-value	0.6377	0.5166
Exchange Rate	Coefficient	1.695417	0.241853
	t-stat	**3.475738****	1.047860
	p-value	0.0034	0.3113
R-squared		0.970597	0.981252

Note: * significance at 10%, ** significance at 5% and *** significance at 1%

The coefficient of inflation rate is statistically significant at 10% for Moody's, but does not a play role when looked at by Standard and Poor's as it is not statistically significant. The GDP per capita is also important for the agencies when rating China, and so is the exchange rate. The R-squared for both models is very high, at a level of above 95% for both models.

As we have seen from the above table, both agencies seem to weigh the GDP per capita very highly, as its coefficient is statistically significant in 9 out of the 10 regressions that we ran. This is true because as GDP per capita increases, the credit rating of a country and the outlook should also have a favourable change. But it is clear from the tables that Moody's places more importance on the GDP per capita than S&P.

The coefficient of external debt % is statistically significant in 5 out of the 10 regressions, which also shows their importance. Because the ratings are foreign ratings, the level of

external debt would be important. The rating agencies need to know that a sovereign is able and willing to service their debt. A decrease in the level of external debt would increase the credit rating favourably.

In all our regressions, the coefficient of inflation rate was only statistically significant when looked at by Moody's. None of the S&P ratings considered the rate of inflation as an important factor when rating a country. This is because, as the rate of inflation increases, this triggers more downward effects on the economy and this is unfavourable when it comes to serving a debt.

What is puzzling with the above results is that the exchange rate is not really considered by the agencies. The exchange rate affects the way the external debt is paid. If there is a depreciation of the local currency, this will lead to the debt becoming more expensive to service, and if the depreciation continues, may lead to the debt exploding. What this then does, would make the sovereign unable to make payments as they fall due, which would signal to the rating agencies that a possible upgrade and a negative outlook would be on the plate.

The GDP growth of a country is not considered to be a significant factor in credit rating by both agencies. This is also another puzzle as the level of growth of a country would lead to a better outlook on the economy. But none of the regressions consider the level of GDP growth as an important factor when rating a country.

The regressions clearly show that the rating agencies have similar variables that they look at when rating a country, but the GDP per capita and the external debt % are considered to be of more value when rating a country. As identified in the literature review, these agencies may attach different weights to their ratings. The literature also suggests that ratings sometimes may be subjective and this is when factors such as political risk would come into play. This could be another cause for some of the differences in the ratings.

Regression Analysis of interest rate spreads and rating differentials

This part of the analysis will focus on the second model identified in the previous chapter. We have already identified the factors that the agencies place importance on when rating a particular emerging economy. This second model aims to identify whether the differences in the ratings or rating differential, positively or negatively affects interest rate spreads. The interest rate spread is = lending rate (%) – deposit rate (%). The rating differential in our model is (Standard and Poor's rating – Moody's rating).

Once again, the coefficients which are statistically significant will have an asterisk by the t-stat, whereby *, ** and ***, register significance at 10%, 5% and 1%, respectively. Full regression results are in appendix C.

Table 19: Interest Rate Spread results

Independent Variable	Results	Dependent Variable
Brazil	Coefficient	-0.200412
	t-stat	**-1.907467***
	p-value	0.0717
	R-squared	0.160719
China	Coefficient	-0.017773
	t-stat	-0.307395
	p-value	0.7619
	R-squared	0.004949
Mexico	Coefficient	0.186852
	t-stat	1.010876
	p-value	0.3248
	R-squared	0.051038
Russia	Coefficient	0.226989
	t-stat	1.397658
	p-value	0.1783
	R-squared	0.093228
South Africa	Coefficient	-0.10519
	t-stat	-1.172429
	p-value	0.2555
	R-squared	0.067466

Note: * significance at 10%, ** significance at 5% and *** significance at 1%

Table 19 shows the results of the impact of ratings on the interest rate spreads. The expected sign with these results should be a negative sign. This is because a credit rating downgrade will increase the spread, whereas an upgrade will decrease the credit spread.

Brazil has the expected sign and is statistically significant at 10%. China and South Africa are the other two countries that have the expected negative sign, but their coefficients are not statistically significant. In Brazil, it is clear that a change in a rating or a rating announcement will have an effect on the capital markets, by either an increasing or decreasing interest rate, this is seen by the statistically significant coefficient. In Mexico and Russia, the coefficients do not have the expected negative sign and are also not statistically significant. Which is a good thing, as they are not statistically significant with the wrong sign.

4.4: Residual and Stability Diagnostics

After running the regressions above, and identifying the variables with significant coefficients, I proceeded to test for autocorrelation. This involves checking the model. The ways this can be done is either what is called overfitting, which involves fitting a larger model than required to capture the diagnosis of the data. The second way is to conduct residual diagnostics, which means checking the residuals for any dependence. I then proceeded to test the second model for the presence of any correlation. The full tables are provided in appendix D.

I used the Breusch-Godfrey serial correlation LM test whereby the hypothesis states that:

Hn: There is no autocorrelation Ha: Presence of autocorrelation

Table 20: Brazil LM test

	S&P	Moody's
F-statistic	0.354055	0.304543
Obs*R-squared	1.136439	0.984628
Prob. F(2,13)	0.7084	0.7426
Prob. Chi-Square(2)	0.5665	0.6112
Durbin-Watson stat	1.962919	2.053772

As can be seen from the table above, the DW stat is 1.96 and 2.05 for the rating agencies. This suggests there is no autocorrelation as the Durbin-Watson stat says for there to be no

auto correlation the DW figure should be at least 2. The chi-square of 0.5665 and 0.6112 also show that we do not reject the null hypothesis of no auto correlation.

Table 21: China LM test

	S&P	Moody's
F-statistic	2.259164	0.361125
Obs*R-squared	5.674240	1.157936
Prob. F(2,13)	0.1439	0.7037
Prob. Chi-Square(2)	0.0586	0.5605
Durbin-Watson stat	2.511008	2.154354

The chi-square values of 0.0586 and 0.5605 show that we do not reject the null hypothesis of no auto correlation, and this is also supported by the DW stats of 2.5 and 2.15 which are close to the value 2.

Table 22: Mexico LM test

	S&P	Moody's
F-statistic	2.039565	1.439028
Obs*R-squared	5.254417	3.987720
Prob. F(2,13)	0.1697	0.2726
Prob. Chi-Square(2)	0.0723	0.1362
Durbin-Watson stat	2.115838	1.927794

The table above shows that the DW stats of 2.115838 and 1.927794 are close to 2, and the chi-square figures of 0.0723 and 0.1362 show that we do not reject the null hypothesis of no auto correlation.

Table 23: Russia LM test

	S&P	Moody's
F-statistic	0.191249	0.083039
Obs*R-squared	0.628803	0.277509
Prob. F(2,13)	0.8282	0.9208
Prob. Chi-Square(2)	0.7302	0.8704
Durbin-Watson stat	1.955643	1.929907

DW figures of 1.95 and 1.92 are present as well as chi-square figures of 0.7302 and 0.8704, showing that we do not reject the null hypothesis of no auto correlation.

Table 24: South Africa LM test

	S&P	Moody's
F-statistic	0.495073	0.666548
Obs*R-squared	4.365246	6.768394
Prob. F(5,10)	0.7734	0.6798
Prob. Chi-Square(5)	0.4981	0.3428
Durbin-Watson stat	1.935509	2.245307

The chi-square figures of 0.4981 and 0.3428 show that we fail to reject the null hypothesis of no auto correlation and the DW figures also support the fact that there is no auto correlation as the figures are close to the DW stat of 2.

I then went on to conduct stability tests on the models. The test that I used was the Ramsey RESET test. This is a test that is used when wanting to find out whether a model is linear and if it is specified correctly (Brooks, 2014).

The Ramsey RESET test has the following hypothesis:

Hn: The model is correctly specified

Ha: The model is not specified correctly

The tables with the results of the Ramsey RESET test are found in appendix D. The results show that for all models, we fail to reject the null hypothesis that the model is correctly specified, therefore the models are correctly specified.

Chapter 5: Conclusions

This chapter will present a summary of the findings from the previous chapter, the conclusions drawn from the study and any further recommendations.

The first set of tests that I ran were to provide a summary of the descriptive statistics, and from these results we saw that Russia had the largest variations in most of the variables, namely the external balances, exchange rate, inflation rate and the external debt as a % of GDP, however Russia had the lowest variation when it came to the GDP growth, whereas China recorded the largest variation in the growth rate out of the five emerging economies.

I then went on to test the strength of the relationships between the ratings and the macro-economic variables. What came out is that the external debt as a % of GDP and the GDP per capita had the strongest correlations with the ratings when looked at over the countries. What this means is that both rating agencies place these two variables as probably the most important when it comes to rating a particular country.

The GDP growth and the external balances had the lowest correlations with the ratings. A possible reason for the low correlation with the GDP growth could be the fact that developing countries tend to grow faster than developed economies. This was supported by Solow (1956), who stated that the reason for this phenomenon is that small amounts of capital added to the country would increase productivity. Another reason for this is that developing economies are usually playing “catch up” when it comes to technological innovations, therefore the growth rate is faster, since developed countries would have already acquired such technologies, so growth would not be that high. This could be a reason for the low correlation with the GDP growth, so rating agencies may not place a lot of importance on this fundamental.

The poor correlations between the external balances and the credit ratings is due to the fact that as a country seeks to improve its overall rating, that particular country will adopt a

more cautious fiscal policy and writers have suggested that these deficits may not be the best indicators for the fiscal position (Claessens & Embrechts, 2002). Due to these two reasons, credit agencies may not place a lot of importance on these two factors, which is supported with the low correlations in the previous chapter. Therefore there seems to be no clear relationship between GDP growth, external balances and credit ratings.

The regression results showed similar findings to that of the previous literature carried about by Cantor and Packer in 1996. The difference here is that I chose an emerging country from each continent so that I could see how rating agencies rate particular emerging economies. As identified in the literature review in chapter two, rating agencies have come under scrutiny on their reliability, and being rated by these agencies as an emerging economy isn't any easier. The quality of ratings in emerging markets has come under fire as a result of them being perceived as being riskier due to the fact of poor corporate governance structures and they generally tend to be more politically unstable than developed economies (Bruner et al., 2002). Hameed (2005), states that countries tend to be rated better if they are more transparent which signals to the markets the ability and willingness of a sovereign to pay its debts as they fall due.

The regression results from chapter four show that Moody's and Standard and Poor's both place importance on the external debt as a % of GDP and the GDP per capita as their coefficients were statistically significant in the models. The external debt as a % of shows the amount of external debt that the country has. A country should aim to have a low external debt % as this will signal to investors and other interested parties, the sovereign's ability and willingness to make debt payments as they fall due. The emerging economies should seek to have a high GDP per capita, as this helps in the positive changing of a credit rating should it be high enough.

The only difference that was found in the results was that Moody's took inflation into account when rating Brazil and China. The coefficients were statistically significant at 10% and 1% respectively. The inflation should be important due to the fact that a lower inflation should increase the credit rating and an increase in the inflation rate should have the undesired effect of reducing the rating and the outlook. The GDP growth coefficient was not statistically significant in any of the models, and this was already identified by the low correlation between this variable and the credit ratings. The reason for rating agencies not considering this variable was identified earlier and stems from the reason that developing countries tend to have higher growth rates as a result of having to play a catch up game when it comes to technological advancements, therefore the GDP growth would tend to give biased results, therefore in our models the coefficients did not come out to be statistically significant.

The exchange rate coefficient also comes out to be statistically significant in some of the countries when rated by either Moody's or Standard and Poor's, since the ratings used in this analysis were foreign ratings and no the local based ratings. The importance of the exchange rate for a country should be when it is now making international payments, especially for the value of the external debt. If the local exchange rate depreciates, the ability and willingness to service the debt are affected as the payments will become more expensive, therefore an emerging or developing economy's ability or willingness to service the external debt will be negatively affected. A large depreciation of the local currency would cause the debt to explode, which negatively affects the willingness to pay, which therefore sends a signal to the rating agencies of a possible negative change in the outlook or rating.

Diagnostics and stability tests were also run on the models to check for any serial correlation between the errors, and also to check if the models were correctly specified.

The impact of rating differentials on the interest rate spreads was also identified. Brazil was the only country where the ratings had a statistically significant coefficient at 10%, while, China and South Africa had the expected negative sign but the coefficients were not statistically significant. The spreads also show the way in which markets can be affected by ratings. This is because, as a rating agency downgrades a country, the yields tend to increase, and these yields will decrease as the ratings and outlooks are of a positive nature. An increase in the spreads as a result of a downgrade would suggest that it would be more expensive for the general population to borrow money from the bank, which would affect the way bank clients make their payments, hence a possible default by clients on their debts as they fall due. A downgrade or a rating decrease would have the effect of increasing the interest spread, which in turn would decrease the price of bonds in that country. It would make it difficult for these emerging economies to raise funds through the sale of these assets, as the cost of borrowing would have increased. The overall effect of such an action would be that there will be capital flight by local and foreign investors.

We have seen that the most important factors that are considered by rating agencies are the external balance as a % of GDP, GDP per capita and in most cases, the exchange rate. The inflation rate is also an important factor under Moody's. For these emerging economies to become more competitive in the markets, they should aim for a lower external debt as a % of GDP, a high GDP per capita and a favourable exchange rate. Countries should also take consideration of the inflation rate.

The issue with these credit rating agencies is that they send conflicting signals when there are differences in the ratings. Normally a country will pay more attention that gives it a favourable rating both in the good times and in the bad times. Conflicting signals will affect the country in terms of which fundamentals to focus on, and will also confuse potential and current investors. That is why when analysing the effect of ratings on interest rate spreads,

I took the differential between the two agencies. An increase in the credit ratings therefore improves the cost and terms of borrowing for that country. The opposite is also true for a rating decrease. Therefore the importance of credit ratings on emerging economies is an important one, as identified earlier, that investors consider investing in emerging economies a riskier option, and therefore ratings are important for them. Access to finance is not as easy as in developed economies, hence these countries need to focus on improving their ratings by focusing on their fundamentals which will end up having a positive impact on their ratings.

Some further recommendations for this study would be possibly increase the time period, rather than analysing 21 years. Another study would be to look at if there is a single dominant rating agency, by considering if there is a leader-follow relationship amongst agencies. This would be to test if rating agencies are really objective, or some base their ratings on a single dominant agency. Another study would be to test if a rating in one emerging economy has large spill-over effects in other economies that may have a different rating.

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Appendix A: Descriptive Statistics

Brazil

Sample: 1994 2015

	BRAZIL EXT BAL	BRAZIL_CPILG	BRAZIL_EXT_DEBT___GDP	BRAZIL_GDP_PER_CAPITALG	BRAZIL_GROWTH	BRAZIL_XRATE
Mean	-1.998126	2.098676	25.61759	8.682029	2.850663	1.970652
Median	-2.838794	1.822303	21.41500	8.556843	3.127606	1.950063
Maximum	1.753670	6.820518	43.74000	9.475709	7.528797	3.327990
Minimum	-4.310274	0.500775	15.29000	7.939414	-3.847362	0.665000
Std. Dev.	2.001825	1.171655	9.531494	0.514261	2.560846	0.719086
Skewness	0.672789	3.050199	0.675084	0.179970	-0.548673	0.029644
Kurtosis	2.074186	13.39349	2.027360	1.642962	3.439340	2.371644
Jarque-Bera	2.445402	133.1362	2.538237	1.806849	1.280756	0.365151
Probability	0.294434	0.000000	0.281079	0.405180	0.527093	0.833122
Sum	-43.95878	46.17087	563.5870	191.0046	62.71458	43.35435
Sum Sq. Dev.	84.15335	28.82828	1907.837	5.553762	137.7165	10.85879
Observations	22	22	22	22	22	22

China

Sample: 1994 2015

	CHINA EXT BAL	CHINA_CPILG	CHINA_GDP_PER_CAPITALG	CHINA_GDP_GROWTH	CHINA_EXCHANGE_RATE	CHINA_EXTERNAL_DEBT_TO_G
Mean	3.459273	0.761827	7.576571	9.644318	7.559477	11.78182
Median	2.620000	0.683938	7.394152	9.468000	8.175950	11.70500
Maximum	9.943000	3.238678	8.990651	14.23100	8.503300	17.96000
Minimum	0.220000	-1.203973	6.160137	6.914000	6.073800	8.070000
Std. Dev.	2.665335	1.061343	0.917698	1.936185	0.900679	2.844772
Skewness	1.278258	0.209584	0.208438	0.742760	-0.527564	0.461565
Kurtosis	3.653940	3.059365	1.645313	2.909209	1.527824	2.180759
Jarque-Bera	6.383130	0.164290	1.841548	2.030428	3.007214	1.396381
Probability	0.041107	0.921138	0.398211	0.362325	0.222327	0.497485
Sum	76.10400	16.76020	166.6846	212.1750	166.3085	259.2000
Sum Sq. Dev.	149.1842	23.65543	17.68555	78.72503	17.03567	169.9473
Observations	22	22	22	22	22	22

Mexico

Sample: 1994 2015

	MEXICO EXT BAL	MEXICO_CPILG	MEXICO_EXT_DEBT___GDP	MEXICO_GDP_PER_CAPITALG	MEXICO_GROWTH	MEXICO_XRATE
Mean	-1.803880	1.844015	23.78659	8.879424	3.016820	10.54762
Median	-1.512029	1.481605	19.78500	8.906951	3.812915	10.89857
Maximum	-0.458544	3.950667	54.18000	9.245075	9.784892	15.84827
Minimum	-5.625082	0.756122	11.13000	8.199968	-12.67379	3.375000
Std. Dev.	1.174117	0.789824	10.85623	0.299715	4.431497	2.725212
Skewness	-1.551909	1.212882	1.297608	-0.709956	-2.105411	-0.600838
Kurtosis	6.046998	3.697816	4.216627	2.569894	8.507602	3.705296
Jarque-Bera	17.34140	5.840336	7.530712	2.017714	44.05931	1.779680
Probability	0.000172	0.053925	0.023159	0.364635	0.000000	0.410721
Sum	-39.68537	40.56833	523.3050	195.3473	66.37003	232.0476
Sum Sq. Dev.	28.94954	13.10025	2475.011	1.886406	412.4015	155.9624
Observations	22	22	22	22	22	22

Russia

Sample: 1994 2015

	RUSSIA EXT BAL	RUSSIA_CPILG	RUSSIA_EXT_DEBT___GDP	RUSSIA_GDP_PER_CAPITALG	RUSSIA_GROWTH	RUSSIA_XRATE
Mean	5.899949	2.813361	41.42323	8.510381	2.160486	25.43297
Median	4.982809	2.479047	38.10000	8.449601	4.383951	28.54909
Maximum	17.47435	5.369568	90.90000	9.651948	10.00000	60.93765
Minimum	-0.206270	1.809927	27.10000	7.193499	-12.57000	2.191000
Std. Dev.	4.401387	0.954268	14.53543	0.818680	5.956847	13.28729
Skewness	0.775828	1.488491	2.025308	0.031751	-0.874055	0.140529
Kurtosis	3.235935	4.298003	7.283590	1.494695	2.889983	3.979730
Jarque-Bera	2.258029	9.668299	31.86026	2.080812	2.812326	0.952293
Probability	0.323352	0.007953	0.000000	0.353311	0.245082	0.621172
Sum	129.7989	61.89395	911.3110	187.2284	47.53069	559.5253
Sum Sq. Dev.	406.8164	19.12319	4436.852	14.07498	745.1646	3707.593
Observations	22	22	22	22	22	22

South Africa
Sample: 1994 2015

	SOUTH AFRICA EXT BAL	SOUTH_AFRICA_CPILG	SOUTH_AFRICA_EXT_DEBT__	SOUTH_AFRICAPERCAPLG	SOUTH_AFRICA_XRATE	SOUTH_AFRICA_GROWTH
Mean	-2.483796	1.670539	22.41273	8.456889	7.309385	2.992754
Median	-1.920818	1.770312	18.95000	8.550588	7.153249	3.069867
Maximum	0.874059	2.603430	40.70000	8.996896	12.75893	5.585046
Minimum	-5.886516	0.488580	11.80000	7.840302	3.550000	-1.538089
Std. Dev.	2.138959	0.560591	8.727818	0.354113	2.327972	1.648373
Skewness	-0.237429	-0.649809	1.023404	-0.149798	0.383362	-0.723053
Kurtosis	1.762335	2.645341	2.855882	1.731387	2.917339	3.974523
Jarque-Bera	1.610863	1.663558	3.859344	1.557542	0.545140	2.787506
Probability	0.446895	0.435274	0.145196	0.458970	0.761420	0.248142
Sum	-54.64350	36.75187	493.0800	186.0516	160.8065	65.84059
Sum Sq. Dev.	96.07807	6.599518	1599.671	2.633323	113.8085	57.05981
Observations	22	22	22	22	22	22

Appendix B: Correlation Matrix

Brazil Moody's matrix

	BRA MOODY'S	BRA CA	BRA CPI	BRA EXT DEBT %	BRA PER CAPITA	BRA GROWTH	BRA XRATE
BRA MOODY'S	1.000000	0.148376	0.214693	0.705791	-0.942524	0.035375	-0.150694
BRA CA	0.148376	1.000000	0.161728	-0.048604	-0.292267	0.367746	0.277395
BRA CPI	0.214693	0.161728	1.000000	0.201001	-0.313449	0.182782	-0.291943
BRA EXT DEBT %	0.705791	-0.048604	0.201001	1.000000	-0.795479	-0.286963	0.393195
BRA PER CAPITA	-0.942524	-0.292267	-0.313449	-0.795479	1.000000	-0.035488	-0.049523
BRA GROWTH	0.035375	0.367746	0.182782	-0.286963	-0.035488	1.000000	-0.346011
BRA XRATE	-0.150694	0.277395	-0.291943	0.393195	-0.049523	-0.346011	1.000000

Brazil S&P matrix

	BRA S&P	BRA CA	BRA CPI	BRA EXT DEBT %	BRA PER CAPITA	BRA GROWTH	BRA XRATE
BRA S&P	1.000000	0.210734	0.422934	0.664348	-0.935707	0.040793	-0.180316
BRA CA	0.210734	1.000000	0.161728	-0.048604	-0.292267	0.367746	0.277395
BRA CPI	0.422934	0.161728	1.000000	0.201001	-0.313449	0.182782	-0.291943
BRA EXT DEBT %	0.664348	-0.048604	0.201001	1.000000	-0.795479	-0.286963	0.393195
BRA PER CAPITA	-0.935707	-0.292267	-0.313449	-0.795479	1.000000	-0.035488	-0.049523
BRA GROWTH	0.040793	0.367746	0.182782	-0.286963	-0.035488	1.000000	-0.346011
BRA XRATE	-0.180316	0.277395	-0.291943	0.393195	-0.049523	-0.346011	1.000000

China Moody's matrix

	CHI MOODY'S	CHI CA	CHI CPI	CHI EXT DEBT %	CHI PER CAPITA	CHI GROWTH	CHI XRATE
CHI MOODY'S	1.000000	-0.242800	-0.157845	0.846911	-0.970228	0.177168	0.962533
CHI CA	-0.242800	1.000000	-0.047299	-0.300522	0.271109	0.498066	-0.163612
CHI CPI	-0.157845	-0.047299	1.000000	0.221621	-0.036955	0.590565	-0.063839
CHI EXT DEBT %	0.846911	-0.300522	0.221621	1.000000	-0.919698	0.350996	0.839874
CHI PER CAPITA	-0.970228	0.271109	-0.036955	-0.919698	1.000000	-0.295697	-0.961841
CHI GROWTH	0.177168	0.498066	0.590565	0.350996	-0.295697	1.000000	0.315629
CHI XRATE	0.962533	-0.163612	-0.063839	0.839874	-0.961841	0.315629	1.000000

China S&P matrix

	CHI S&P	CHI CA	CHI CPI	CHI EXT DEBT %	CHI PER CAPITA	CHI GROWTH	CHI XRATE
CHI S&P	1.000000	-0.333120	-0.077203	0.820223	-0.955332	0.177086	0.964759
CHI CA	-0.333120	1.000000	-0.047299	-0.300522	0.271109	0.498066	-0.163612
CHI CHPI	-0.077203	-0.047299	1.000000	0.221621	-0.036955	0.590565	-0.063839
CHI EXT DEBT %	0.820223	-0.300522	0.221621	1.000000	-0.919698	0.350996	0.839874
CHI PER CAPITA	-0.955332	0.271109	-0.036955	-0.919698	1.000000	-0.295697	-0.961841
CHI GROWTH	0.177086	0.498066	0.590565	0.350996	-0.295697	1.000000	0.315629
CHI XRATE	0.964759	-0.163612	-0.063839	0.839874	-0.961841	0.315629	1.000000

Mexico Moody's matrix

	MEX MOODY'S	MEX CA	MEX CPI	MEX EXT DEBT %	MEX PER CAPITA	MEX GROWTH	MEX XRATE
ME MOODY'S	1.000000	-0.447672	0.636210	0.511886	-0.776550	0.059340	-0.811483
MEX CA	-0.447672	1.000000	0.041924	-0.057622	0.047882	-0.101860	0.351654
MEX CPI	0.636210	0.041924	1.000000	0.864048	-0.886070	-0.014212	-0.707489
MEX EXT DEBT %	0.511886	-0.057622	0.864048	1.000000	-0.853121	-0.042996	-0.540322
MEX [ER CAPITA	-0.776550	0.047882	-0.886070	-0.853121	1.000000	0.017061	0.774630
MEX GROWTH	0.059340	-0.101860	-0.014212	-0.042996	0.017061	1.000000	-0.088942
MEX XRATE	-0.811483	0.351654	-0.707489	-0.540322	0.774630	-0.088942	1.000000

Mexico S&P matrix

	MEX S&P	MEX CA	MEX CPI	MEX EXT DEBT %	MEX PER CAPITA	MEX GROWTH	MEX XRATE
MEX S&P	1.000000	-0.195459	0.760653	0.697173	-0.884811	0.027860	-0.741045
MEX CA	-0.195459	1.000000	0.041924	-0.057622	0.047882	-0.101860	0.351654
MEX CPI	0.760653	0.041924	1.000000	0.864048	-0.886070	-0.014212	-0.707489
MEX EXT DEBT %	0.697173	-0.057622	0.864048	1.000000	-0.853121	-0.042996	-0.540322
MEX PER CAPITA	-0.884811	0.047882	-0.886070	-0.853121	1.000000	0.017061	0.774630
MEX GROWTH	0.027860	-0.101860	-0.014212	-0.042996	0.017061	1.000000	-0.088942
MEX XRATE	-0.741045	0.351654	-0.707489	-0.540322	0.774630	-0.088942	1.000000

Russia Moody's matrix

	RUS MOODY'S	RUS CA	RUS CPI	RUS EXT DEBT %	RUS PER CAPITA	RUS GROWTH	RUS XRATE
RUS MOODY'S	1.000000	0.233240	0.660902	0.838813	-0.894939	-0.116771	-0.362966
RUS CA	0.233240	1.000000	-0.163973	0.366717	-0.309448	0.682210	0.343476
RUS CPI	0.660902	-0.163973	1.000000	0.363562	-0.647763	-0.557600	-0.627657
RUS EXT DEBT %	0.838813	0.366717	0.363562	1.000000	-0.725019	0.139656	-0.156142
RUS PER CAPITA	-0.894939	-0.309448	-0.647763	-0.725019	1.000000	0.055638	0.503394
RUS GROWTH	-0.116771	0.682210	-0.557600	0.139656	0.055638	1.000000	0.339079
RUS XRATE	-0.362966	0.343476	-0.627657	-0.156142	0.503394	0.339079	1.000000

Russia S&P matrix

	RUS S&P	RUS CA	RUS CPI	RUS EXT DEBT %	RUS PER CAPITA	RUS GROWTH	RUS XRATE
RUS S&P	1.000000	0.205942	0.613190	0.896674	-0.834318	-0.108272	-0.342595
RUS CA	0.205942	1.000000	-0.163973	0.366717	-0.309448	0.682210	0.343476
RUS CPI	0.613190	-0.163973	1.000000	0.363562	-0.647763	-0.557600	-0.627657
RUS EXT DEBT %	0.896674	0.366717	0.363562	1.000000	-0.725019	0.139656	-0.156142
RUS PER CAPITA	-0.834318	-0.309448	-0.647763	-0.725019	1.000000	0.055638	0.503394
RUS GROWTH	-0.108272	0.682210	-0.557600	0.139656	0.055638	1.000000	0.339079
RUS XRATE	-0.342595	0.343476	-0.627657	-0.156142	0.503394	0.339079	1.000000

South Africa Moody's matrix

	SA MOODY'S	SA CA	SA CPI	SA EXT DEBT %	SA PER CAPITA	SA GROWTH	SA XRATE
SA MOODY'S	1.000000	0.493038	0.149782	-0.102652	-0.779712	0.047015	-0.406907
SA CA	0.493038	1.000000	0.021456	-0.651490	-0.791824	0.009101	-0.387501
SA CPI	0.149782	0.021456	1.000000	0.167742	-0.145694	-0.119551	-0.022934
SA EXT DEBT%	-0.102652	-0.651490	0.167742	1.000000	0.345676	-0.396001	0.707497
SA PER CAPITA	-0.779712	-0.791824	-0.145694	0.345676	1.000000	-0.052245	0.293293
SA GROWTH	0.047015	0.009101	-0.119551	-0.396001	-0.052245	1.000000	-0.304902
SA XRATE	-0.406907	-0.387501	-0.022934	0.707497	0.293293	-0.304902	1.000000

South Africa S&P matrix

	SA S&P	SA CA	SA CPI	SA EXT DEBT %	SA PER CAPITA	SA GROWTH	SA XRATE
SA S&P	1.000000	0.534746	0.289514	-0.031053	-0.688715	-0.182769	-0.365011
SA CA	0.534746	1.000000	0.021456	-0.651490	-0.791824	0.009101	-0.387501
SA CPI	0.289514	0.021456	1.000000	0.167742	-0.145694	-0.119551	-0.022934
SA EXT DEBT %	-0.031053	-0.651490	0.167742	1.000000	0.345676	-0.396001	0.707497
SA PER CAPITA	-0.688715	-0.791824	-0.145694	0.345676	1.000000	-0.052245	0.293293
SA GROWTH	-0.182769	0.009101	-0.119551	-0.396001	-0.052245	1.000000	-0.304902
SA XRATE	-0.365011	-0.387501	-0.022934	0.707497	0.293293	-0.304902	1.000000

Appendix C: Regression Outputs

Brazil Moody's
Dependent Variable: BRA_MOODY_S
Method: Least Squares
Date: 03/13/17 Time: 11:27
Sample: 1994 2015
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	46.55641	8.168380	5.699589	0.0000
BRAZIL_CA	0.106581	0.148530	0.717572	0.4840
BRAZIL_CPILG	-0.422085	0.139432	-3.027180	0.0085
BRAZIL_EXT_DEBT___GDP	0.064641	0.054941	1.176550	0.2577
BRAZIL_GDP_PER_CAPITALG	-3.690441	0.911495	-4.048780	0.0010
BRAZIL_GROWTH	-0.046720	0.060039	-0.778162	0.4486
BRAZIL_XRATE	-1.307305	0.447717	-2.919934	0.0106

R-squared	0.960172	Mean dependent var	12.36364
Adjusted R-squared	0.944241	S.D. dependent var	2.381385
S.E. of regression	0.562325	Akaike info criterion	1.939898
Sum squared resid	4.743143	Schwarz criterion	2.287048
Log likelihood	-14.33888	Hannan-Quinn criter.	2.021676
F-statistic	60.27004	Durbin-Watson stat	2.111389
Prob(F-statistic)	0.000000		

Brazil S&P
Dependent Variable: BRA_S_P
Method: Least Squares
Date: 03/13/17 Time: 12:11
Sample: 1994 2015
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	49.49702	8.309513	5.956670	0.0000
BRAZIL_CA	-0.045028	0.151096	-0.298009	0.7698
BRAZIL_CPILG	0.176968	0.141841	1.247648	0.2313
BRAZIL_EXT_DEBT___GDP	-0.037099	0.055891	-0.663788	0.5169
BRAZIL_GDP_PER_CAPITALG	-4.132471	0.927243	-4.456727	0.0005
BRAZIL_GROWTH	-0.081304	0.061077	-1.331173	0.2030
BRAZIL_XRATE	-0.432619	0.455453	-0.949865	0.3572

R-squared	0.940829	Mean dependent var	12.04545
Adjusted R-squared	0.917161	S.D. dependent var	1.987515
S.E. of regression	0.572041	Akaike info criterion	1.974159
Sum squared resid	4.908463	Schwarz criterion	2.321309
Log likelihood	-14.71575	Hannan-Quinn criter.	2.055937
F-statistic	39.75077	Durbin-Watson stat	1.865941
Prob(F-statistic)	0.000000		

China Moody's
Dependent Variable: CHI_MOODY_S
Method: Least Squares
Date: 03/13/17 Time: 16:53
Sample: 1994 2015
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.78350	4.043507	3.408797	0.0039
CHINA_CA	0.015184	0.031030	0.489340	0.6317
CHINA_CPILG	-0.163028	0.082582	-1.974129	0.0671
CHINA_EXTERNAL_DEBT_TO_G	-0.018412	0.048410	-0.380338	0.7090
CHINA_GDP_PER_CAPITALG	-1.218883	0.288430	-4.225924	0.0007
CHINA_GDP_GROWTH	-0.037427	0.056347	-0.664214	0.5166
CHINA_EXCHANGE_RATE	0.241853	0.230807	1.047860	0.3113

R-squared	0.981252	Mean dependent var	5.727273
Adjusted R-squared	0.973753	S.D. dependent var	1.279204
S.E. of regression	0.207242	Akaike info criterion	-0.056483
Sum squared resid	0.644242	Schwarz criterion	0.290667
Log likelihood	7.621312	Hannan-Quinn criter.	0.025295
F-statistic	130.8491	Durbin-Watson stat	2.081592
Prob(F-statistic)	0.000000		

China S&P
Dependent Variable: CHI_S_P
Method: Least Squares
Date: 03/13/17 Time: 16:53
Sample: 1994 2015
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.947913	8.545535	0.579006	0.5712
CHINA_CA	-0.108012	0.065578	-1.647078	0.1203
CHINA_CPILG	0.048891	0.174529	0.280132	0.7832
CHINA_EXTERNAL_DEBT_TO_G	-0.167523	0.102309	-1.637423	0.1223
CHINA_GDP_PER_CAPITALG	-1.072971	0.609567	-1.760218	0.0987
CHINA_GDP_GROWTH	-0.057245	0.119084	-0.480714	0.6377
CHINA_EXCHANGE_RATE	1.695417	0.487786	3.475738	0.0034

R-squared	0.970597	Mean dependent var	6.772727
Adjusted R-squared	0.958836	S.D. dependent var	2.158743
S.E. of regression	0.437986	Akaike info criterion	1.440110
Sum squared resid	2.877471	Schwarz criterion	1.787260
Log likelihood	-8.841212	Hannan-Quinn criter.	1.521888
F-statistic	82.52573	Durbin-Watson stat	1.521237
Prob(F-statistic)	0.000000		

Mexico Moody's

Dependent Variable: MEX_MOODY_S
Method: Least Squares
Date: 03/13/17 Time: 12:34
Sample: 1994 2015
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	61.12768	11.84506	5.160603	0.0001
MEXICO_CA	-0.619468	0.154561	-4.007912	0.0011
MEXICO_CPILG	0.658639	0.482355	1.365465	0.1922
MEXICO_EXT_DEBT___GDP	-0.105770	0.033530	-3.154471	0.0065
MEXICO_GDP_PER_CAPITAL G	-5.909177	1.359839	-4.345497	0.0006
MEXICO_GROWTH	0.003948	0.030654	0.128785	0.8992
MEXICO_XRATE	0.061700	0.115404	0.534647	0.6007

R-squared	0.878613	Mean dependent var	9.136364
Adjusted R-squared	0.830058	S.D. dependent var	1.489502
S.E. of regression	0.614033	Akaike info criterion	2.115835
Sum squared resid	5.655545	Schwarz criterion	2.462985
Log likelihood	-16.27418	Hannan-Quinn criter.	2.197613
F-statistic	18.09523	Durbin-Watson stat	1.205943
Prob(F-statistic)	0.000004		

Mexico S&P

Dependent Variable: MEX_S_P
Method: Least Squares
Date: 03/13/17 Time: 12:37
Sample: 1994 2015
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	59.15685	13.97522	4.232981	0.0007
MEXICO_CA	-0.279627	0.182357	-1.533409	0.1460
MEXICO_CPILG	0.333714	0.569099	0.586390	0.5663
MEXICO_EXT_DEBT___GDP	-0.049583	0.039560	-1.253366	0.2293
MEXICO_GDP_PER_CAPITAL G	-5.657295	1.604386	-3.526144	0.0031
MEXICO_GROWTH	0.008649	0.036167	0.239142	0.8142
MEXICO_XRATE	0.088019	0.136158	0.646448	0.5278

R-squared	0.826108	Mean dependent var	9.818182
Adjusted R-squared	0.756551	S.D. dependent var	1.468279
S.E. of regression	0.724457	Akaike info criterion	2.446584
Sum squared resid	7.872578	Schwarz criterion	2.793734
Log likelihood	-19.91242	Hannan-Quinn criter.	2.528362
F-statistic	11.87672	Durbin-Watson stat	1.090168
Prob(F-statistic)	0.000058		

Russia Moody's

Dependent Variable: RUS_MOODY_S
Method: Least Squares
Date: 03/13/17 Time: 12:55
Sample: 1994 2015
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	20.90190	5.474620	3.817963	0.0017
RUSSIA_CA	-0.078947	0.084627	-0.932882	0.3657
RUSSIA_CPILG	0.683905	0.396622	1.724322	0.1052
RUSSIA_EXT_DEBT___GDP	0.073332	0.021258	3.449622	0.0036
RUSSIA_GDP_PER_CAPITALG	-1.839481	0.533757	-3.446286	0.0036
RUSSIA_GROWTH	0.011302	0.062550	0.180687	0.8590
RUSSIA_XRATE	0.035948	0.024565	1.463354	0.1640

R-squared	0.918207	Mean dependent var	10.68182
Adjusted R-squared	0.885490	S.D. dependent var	2.625631
S.E. of regression	0.888495	Akaike info criterion	2.854796
Sum squared resid	11.84136	Schwarz criterion	3.201946
Log likelihood	-24.40276	Hannan-Quinn criter.	2.936574
F-statistic	28.06507	Durbin-Watson stat	1.789756
Prob(F-statistic)	0.000000		

Russia S&P

Dependent Variable: RUS_S_P
Method: Least Squares
Date: 03/13/17 Time: 12:56
Sample: 1994 2015
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.81820	7.441175	1.856991	0.0831
RUSSIA_CA	-0.080898	0.115026	-0.703306	0.4926
RUSSIA_CPILG	0.718603	0.539094	1.332983	0.2024
RUSSIA_EXT_DEBT___GDP	0.164176	0.028894	5.682016	0.0000
RUSSIA_GDP_PER_CAPITALG	-1.276494	0.725490	-1.759492	0.0989
RUSSIA_GROWTH	-0.021584	0.085019	-0.253868	0.8030
RUSSIA_XRATE	0.020427	0.033390	0.611766	0.5499

R-squared	0.918330	Mean dependent var	11.77273
Adjusted R-squared	0.885662	S.D. dependent var	3.571472
S.E. of regression	1.207654	Akaike info criterion	3.468608
Sum squared resid	21.87643	Schwarz criterion	3.815758
Log likelihood	-31.15469	Hannan-Quinn criter.	3.550386
F-statistic	28.11098	Durbin-Watson stat	1.946823
Prob(F-statistic)	0.000000		

South Africa Moody's
Dependent Variable: SOUTH_AFRICA_MOODY_S
Method: Least Squares
Date: 03/13/17 Time: 12:58
Sample: 1994 2015
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	27.79056	5.449039	5.100085	0.0001
SOUTH_AFRICA_CA	0.083069	0.139688	0.594675	0.5609
SOUTH_AFRICA_CPILG	-0.175565	0.216288	-0.811715	0.4296
SOUTH_AFRICA_EXT_DEBT___	0.094292	0.030774	3.064006	0.0079
SOUTH_AFRICAPERCAPLG	-2.209273	0.637449	-3.465803	0.0035
SOUTH_AFRICA_GROWTH	0.068381	0.086195	0.793323	0.4400
SOUTH_AFRICA_XRATE	-0.294504	0.075623	-3.894349	0.0014

R-squared	0.828000	Mean dependent var	8.772727
Adjusted R-squared	0.759200	S.D. dependent var	1.066004
S.E. of regression	0.523103	Akaike info criterion	1.795295
Sum squared resid	4.104551	Schwarz criterion	2.142444
Log likelihood	-12.74824	Hannan-Quinn criter.	1.877073
F-statistic	12.03486	Durbin-Watson stat	1.622603
Prob(F-statistic)	0.000054		

South Africa S&P
Dependent Variable: SOUTH_AFRICA_S_P
Method: Least Squares
Date: 03/13/17 Time: 12:59
Sample: 1994 2015
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	17.49233	6.793063	2.575028	0.0211
SOUTH_AFRICA_CA	0.450750	0.174142	2.588402	0.0206
SOUTH_AFRICA_CPILG	0.097029	0.269637	0.359852	0.7240
SOUTH_AFRICA_EXT_DEBT___	0.158396	0.038365	4.128691	0.0009
SOUTH_AFRICAPERCAPLG	-0.882063	0.794678	-1.109963	0.2845
SOUTH_AFRICA_GROWTH	-0.006331	0.107455	-0.058917	0.9538
SOUTH_AFRICA_XRATE	-0.424998	0.094276	-4.508017	0.0004

R-squared	0.820308	Mean dependent var	9.500000
Adjusted R-squared	0.748431	S.D. dependent var	1.300183
S.E. of regression	0.652128	Akaike info criterion	2.236220
Sum squared resid	6.379066	Schwarz criterion	2.583370
Log likelihood	-17.59842	Hannan-Quinn criter.	2.317998
F-statistic	11.41269	Durbin-Watson stat	1.543767
Prob(F-statistic)	0.000073		

Brazil
Dependent Variable: BRAZIL_SPREADLG
Method: Least Squares
Date: 03/16/17 Time: 14:37
Sample: 1995 2015
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.611244	0.091710	39.37682	0.0000
BRAZIL_RATING	-0.200412	0.105067	-1.907467	0.0717

R-squared	0.160719	Mean dependent var	3.687592
Adjusted R-squared	0.116547	S.D. dependent var	0.402299
S.E. of regression	0.378130	Akaike info criterion	0.983233
Sum squared resid	2.716658	Schwarz criterion	1.082712
Log likelihood	-8.323949	Hannan-Quinn criter.	1.004823
F-statistic	3.638432	Durbin-Watson stat	0.444337
Prob(F-statistic)	0.071692		

China
Dependent Variable: CHINA_SPREADLG
Method: Least Squares
Date: 03/16/17 Time: 14:37
Sample: 1995 2015
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.112456	0.080786	13.77033	0.0000
CHINA_RATING	-0.017773	0.057817	-0.307395	0.7619

R-squared	0.004949	Mean dependent var	1.094683
Adjusted R-squared	-0.047422	S.D. dependent var	0.252645
S.E. of regression	0.258566	Akaike info criterion	0.223059
Sum squared resid	1.270269	Schwarz criterion	0.322538
Log likelihood	-0.342123	Hannan-Quinn criter.	0.244649
F-statistic	0.094492	Durbin-Watson stat	0.748388
Prob(F-statistic)	0.761886		

Mexico
Dependent Variable: MEXICO_SPREADLG
Method: Least Squares
Date: 03/16/17 Time: 14:38
Sample: 1995 2015
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.555732	0.180387	8.624414	0.0000
MEXICO_RATING	0.186852	0.184842	1.010876	0.3248

R-squared	0.051038	Mean dependent var	1.698096
Adjusted R-squared	0.001092	S.D. dependent var	0.516832
S.E. of regression	0.516550	Akaike info criterion	1.607103
Sum squared resid	5.069650	Schwarz criterion	1.706581
Log likelihood	-14.87458	Hannan-Quinn criter.	1.628692
F-statistic	1.021870	Durbin-Watson stat	0.560444
Prob(F-statistic)	0.324777		

Russia
Dependent Variable: RUSSIA_SPREADLG
Method: Least Squares
Date: 03/16/17 Time: 14:38
Sample: 1995 2015
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.099260	0.285727	7.347097	0.0000
RUSSIA_RATING	0.226989	0.162407	1.397658	0.1783

R-squared	0.093228	Mean dependent var	2.347867
Adjusted R-squared	0.045503	S.D. dependent var	1.048841
S.E. of regression	1.024701	Akaike info criterion	2.977071
Sum squared resid	19.95022	Schwarz criterion	3.076549
Log likelihood	-29.25924	Hannan-Quinn criter.	2.998660
F-statistic	1.953447	Durbin-Watson stat	0.314742
Prob(F-statistic)	0.178323		

South Africa
Dependent Variable: SOUTH_AFRICA_SPREADLG
Method: Least Squares
Date: 03/16/17 Time: 14:39
Sample: 1995 2015
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.490610	0.073234	20.35410	0.0000
SOUTH_AFRICA_RATING	-0.105159	0.089693	-1.172429	0.2555

R-squared	0.067466	Mean dependent var	1.420505
Adjusted R-squared	0.018385	S.D. dependent var	0.195565
S.E. of regression	0.193759	Akaike info criterion	-0.354013
Sum squared resid	0.713306	Schwarz criterion	-0.254535
Log likelihood	5.717141	Hannan-Quinn criter.	-0.332424
F-statistic	1.374590	Durbin-Watson stat	0.193282
Prob(F-statistic)	0.255516		

Appendix D: Residual and Stability Diagnostics

Brazil Moody's
Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.304543	Prob. F(2,13)	0.7426
Obs*R-squared	0.984628	Prob. Chi-Square(2)	0.6112

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 03/14/17 Time: 16:57
Sample: 1994 2015
Included observations: 22
Pre sample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.866221	9.333814	0.092805	0.9275
BRAZIL_CA	0.008356	0.190644	0.043829	0.9657
BRAZIL_CPILG	-0.038725	0.163497	-0.236853	0.8165
BRAZIL_EXT_DEBT___GDP	-0.001727	0.063440	-0.027230	0.9787
BRAZIL_GDP_PER_CAPITALG	-0.060606	1.057990	-0.057284	0.9552
BRAZIL_GROWTH	-0.010022	0.076002	-0.131863	0.8971
BRAZIL_XRATE	-0.089497	0.565786	-0.158181	0.8767
RESID(-1)	-0.175637	0.372962	-0.470925	0.6455
RESID(-2)	-0.203292	0.320497	-0.634302	0.5369

R-squared	0.044756	Mean dependent var	3.04E-15
Adjusted R-squared	-0.543087	S.D. dependent var	0.475251
S.E. of regression	0.590362	Akaike info criterion	2.075928
Sum squared resid	4.530860	Schwarz criterion	2.522264
Log likelihood	-13.83521	Hannan-Quinn criter.	2.181071
F-statistic	0.076136	Durbin-Watson stat	2.053772
Prob(F-statistic)	0.999461		

Brazil S&P

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.354055	Prob. F(2,13)	0.7084
Obs*R-squared	1.136439	Prob. Chi-Square(2)	0.5665

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 03/14/17 Time: 16:58
Sample: 1994 2015
Included observations: 22
Pre sample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.388334	9.387351	0.254420	0.8032
BRAZIL_CA	-0.017237	0.159432	-0.108115	0.9156
BRAZIL_CPILG	-0.020358	0.150571	-0.135208	0.8945
BRAZIL_EXT_DEBT___GDP	-0.010703	0.060741	-0.176207	0.8628
BRAZIL_GDP_PER_CAPITALG	-0.242174	1.031965	-0.234673	0.8181
BRAZIL_GROWTH	-0.006681	0.068687	-0.097268	0.9240
BRAZIL_XRATE	0.000417	0.476586	0.000875	0.9993
RESID(-1)	-0.016999	0.311622	-0.054551	0.9573
RESID(-2)	-0.280902	0.337747	-0.831695	0.4206

R-squared	0.051656	Mean dependent var	3.28E-15
Adjusted R-squared	-0.531940	S.D. dependent var	0.483463
S.E. of regression	0.598389	Akaike info criterion	2.102939
Sum squared resid	4.654910	Schwarz criterion	2.549275
Log likelihood	-14.13233	Hannan-Quinn criter.	2.208082
F-statistic	0.088514	Durbin-Watson stat	1.962919
Prob(F-statistic)	0.999073		

China Moody’s

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.361125	Prob. F(2,13)	0.7037
Obs*R-squared	1.157936	Prob. Chi-Square(2)	0.5605

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 03/14/17 Time: 16:59
Sample: 1994 2015
Included observations: 22
Pre sample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.750723	4.319582	0.173795	0.8647
CHINA_CA	0.005557	0.033155	0.167606	0.8695
CHINA_CPILG	-0.000696	0.087958	-0.007912	0.9938
CHINA_EXTERNAL_DEBT_TO_G	-0.005080	0.051203	-0.099219	0.9225
CHINA_GDP_PER_CAPITALG	-0.055638	0.308637	-0.180270	0.8597
CHINA_GDP_GROWTH	-0.003559	0.060632	-0.058692	0.9541
CHINA_EXCHANGE_RATE	-0.033784	0.245228	-0.137767	0.8925
RESID(-1)	-0.062726	0.286050	-0.219285	0.8298
RESID(-2)	-0.238046	0.285958	-0.832453	0.4202

R-squared	0.052633	Mean dependent var	-1.14E-15
Adjusted R-squared	-0.530361	S.D. dependent var	0.175152
S.E. of regression	0.216676	Akaike info criterion	0.071266
Sum squared resid	0.610333	Schwarz criterion	0.517602
Log likelihood	8.216074	Hannan-Quinn criter.	0.176409
F-statistic	0.090281	Durbin-Watson stat	2.154254
Prob(F-statistic)	0.999005		

China S&P

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.259164	Prob. F(2,13)	0.1439
Obs*R-squared	5.674240	Prob. Chi-Square(2)	0.0586

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 03/14/17 Time: 17:00
Sample: 1994 2015
Included observations: 22
Pre sample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.322198	8.365809	-0.636184	0.5357
CHINA_CA	-0.040689	0.063768	-0.638087	0.5345
CHINA_CPILG	-0.052970	0.163422	-0.324130	0.7510
CHINA_EXTERNAL_DEBT_TO_G	0.027823	0.096870	0.287222	0.7785
CHINA_GDP_PER_CAPITALG	0.361500	0.592448	0.610179	0.5523
CHINA_GDP_GROWTH	0.064307	0.114305	0.562594	0.5833
CHINA_EXCHANGE_RATE	0.239523	0.478529	0.500540	0.6251
RESID(-1)	0.400099	0.267943	1.493224	0.1592
RESID(-2)	-0.519259	0.281657	-1.843586	0.0882

R-squared	0.257920	Mean dependent var	-9.65E-16
Adjusted R-squared	-0.198745	S.D. dependent var	0.370165
S.E. of regression	0.405284	Akaike info criterion	1.323630
Sum squared resid	2.135314	Schwarz criterion	1.769966
Log likelihood	-5.559931	Hannan-Quinn criter.	1.428773
F-statistic	0.564791	Durbin-Watson stat	2.511008
Prob(F-statistic)	0.788753		

Mexico Moody's
Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.439028	Prob. F(2,13)	0.2726
Obs*R-squared	3.987720	Prob. Chi-Square(2)	0.1362

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 03/14/17 Time: 17:01
Sample: 1994 2015
Included observations: 22
Pre sample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.608696	11.70953	0.308184	0.7628
MEXICO_CA	0.013024	0.150437	0.086573	0.9323
MEXICO_CPILG	-0.092318	0.497028	-0.185741	0.8555
MEXICO_EXT_DEBT___GDP	-0.000185	0.033648	-0.005499	0.9957
MEXICO_GDP_PER_CAPITAL G	-0.406161	1.343944	-0.302216	0.7673
MEXICO_GROWTH	0.009764	0.031666	0.308354	0.7627
MEXICO_XRATE	0.015163	0.113019	0.134163	0.8953
RESID(-1)	0.495863	0.294300	1.684892	0.1158
RESID(-2)	-0.255265	0.323888	-0.788129	0.4448

R-squared	0.181260	Mean dependent var	2.31E-14
Adjusted R-squared	-0.322580	S.D. dependent var	0.518952
S.E. of regression	0.596813	Akaike info criterion	2.097664
Sum squared resid	4.630421	Schwarz criterion	2.544000
Log likelihood	-14.07431	Hannan-Quinn criter.	2.202807
F-statistic	0.359757	Durbin-Watson stat	1.927794
Prob(F-statistic)	0.924039		

Mexico S&P
Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.039565	Prob. F(2,13)	0.1697
Obs*R-squared	5.254417	Prob. Chi-Square(2)	0.0723

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 03/14/17 Time: 17:01
Sample: 1994 2015

Included observations: 22
Pre sample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.609253	13.14587	0.122415	0.9044
MEXICO_CA	0.132981	0.185524	0.716788	0.4862
MEXICO_CPILG	-0.043532	0.533923	-0.081531	0.9363
MEXICO_EXT_DEBT___GDP	0.002987	0.037106	0.080491	0.9371
MEXICO_GDP_PER_CAPITALG	-0.149729	1.507300	-0.099336	0.9224
MEXICO_GROWTH	0.016835	0.035694	0.471639	0.6450
MEXICO_XRATE	-0.009521	0.127720	-0.074546	0.9417
RESID(-1)	0.617682	0.314413	1.964557	0.0712
RESID(-2)	-0.092766	0.294271	-0.315239	0.7576

R-squared	0.238837	Mean dependent var	1.24E-14
Adjusted R-squared	-0.229571	S.D. dependent var	0.612278
S.E. of regression	0.678931	Akaike info criterion	2.355494
Sum squared resid	5.992314	Schwarz criterion	2.801830
Log likelihood	-16.91043	Hannan-Quinn criter.	2.460637
F-statistic	0.509891	Durbin-Watson stat	2.115838
Prob(F-statistic)	0.828629		

Russia Moody's
Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.083039	Prob. F(2,13)	0.9208
Obs*R-squared	0.277509	Prob. Chi-Square(2)	0.8704

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 03/14/17 Time: 17:02
Sample: 1994 2015
Included observations: 22
Pre sample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.206441	5.865406	-0.035196	0.9725
RUSSIA_CA	0.014439	0.101254	0.142598	0.8888
RUSSIA_CPILG	-0.011767	0.438155	-0.026856	0.9790
RUSSIA_EXT_DEBT___GDP	-0.002814	0.025007	-0.112535	0.9121
RUSSIA_GDP_PER_CAPITALG	0.047258	0.590175	0.080075	0.9374
RUSSIA_GROWTH	-0.000401	0.067106	-0.005976	0.9953
RUSSIA_XRATE	-0.004944	0.031912	-0.154925	0.8793
RESID(-1)	0.143795	0.366822	0.392001	0.7014
RESID(-2)	0.012043	0.374777	0.032133	0.9749

R-squared	0.012614	Mean dependent var	-5.50E-15
Adjusted R-squared	-0.595008	S.D. dependent var	0.750915
S.E. of regression	0.948358	Akaike info criterion	3.023920
Sum squared resid	11.69199	Schwarz criterion	3.470256
Log likelihood	-24.26312	Hannan-Quinn criter.	3.129063
F-statistic	0.020760	Durbin-Watson stat	1.929907
Prob(F-statistic)	0.999996		

Russia S&P

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.191249	Prob. F(2,13)	0.8282
Obs*R-squared	0.628803	Prob. Chi-Square(2)	0.7302

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 03/14/17 Time: 17:02
Sample: 1994 2015
Included observations: 22
Pre sample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.146730	7.888317	-0.018601	0.9854
RUSSIA_CA	-0.021900	0.127165	-0.172216	0.8659
RUSSIA_CPILG	0.149216	0.623093	0.239476	0.8145
RUSSIA_EXT_DEBT___GDP	-0.000681	0.031528	-0.021596	0.9831
RUSSIA_GDP_PER_CAPITALG	-0.042153	0.775952	-0.054324	0.9575
RUSSIA_GROWTH	0.025970	0.103676	0.250493	0.8061
RUSSIA_XRATE	0.006801	0.038748	0.175519	0.8634
RESID(-1)	0.042163	0.334963	0.125873	0.9018
RESID(-2)	-0.204825	0.337028	-0.607739	0.5538

R-squared	0.028582	Mean dependent var	-1.65E-15
Adjusted R-squared	-0.569214	S.D. dependent var	1.020654
S.E. of regression	1.278556	Akaike info criterion	3.621428
Sum squared resid	21.25116	Schwarz criterion	4.067763
Log likelihood	-30.83571	Hannan-Quinn criter.	3.726571
F-statistic	0.047812	Durbin-Watson stat	1.955643
Prob(F-statistic)	0.999904		

South Africa Moody's

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.537881	Prob. F(5,10)	0.7440
Obs*R-squared	4.662703	Prob. Chi-Square(5)	0.4584

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 03/14/17 Time: 17:02
Sample: 1994 2015
Included observations: 22

Pre sample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.151753	12.89975	-0.321848	0.7542
SOUTH_AFRICA_CA	0.002363	0.159478	0.014818	0.9885
SOUTH_AFRICA_CPILG	-0.024044	0.258605	-0.092975	0.9278
SOUTH_AFRICA_EXT_DEBT___	-0.003360	0.039334	-0.085431	0.9336
SOUTH_AFRICAPERCAPLG	0.524685	1.567811	0.334661	0.7448
SOUTH_AFRICA_GROWTH	0.002756	0.101010	0.027289	0.9788
SOUTH_AFRICA_XRATE	-0.018465	0.102313	-0.180475	0.8604
RESID(-1)	0.172485	0.434097	0.397343	0.6995
RESID(-2)	-0.017552	0.718493	-0.024428	0.9810
RESID(-3)	0.269382	0.749773	0.359284	0.7269
RESID(-4)	0.699569	0.767060	0.912014	0.3832
RESID(-5)	-0.068046	0.652481	-0.104289	0.9190

R-squared	0.211941	Mean dependent var	-1.15E-15
Adjusted R-squared	-0.654924	S.D. dependent var	0.442103
S.E. of regression	0.568738	Akaike info criterion	2.011658
Sum squared resid	3.234628	Schwarz criterion	2.606772
Log likelihood	-10.12823	Hannan-Quinn criter.	2.151849
F-statistic	0.244491	Durbin-Watson stat	1.879175
Prob(F-statistic)	0.985248		

South Africa S&P

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.862552	Prob. F(6,9)	0.5558
Obs*R-squared	8.032054	Prob. Chi-Square(6)	0.2358

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 03/14/17 Time: 17:03
Sample: 1994 2015
Included observations: 22
Pre sample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.846285	14.10701	0.201764	0.8446
SOUTH_AFRICA_CA	0.071280	0.187369	0.380428	0.7125
SOUTH_AFRICA_CPILG	-0.204931	0.312134	-0.656548	0.5279
SOUTH_AFRICA_EXT_DEBT___	0.014016	0.056487	0.248134	0.8096
SOUTH_AFRICAPERCAPLG	-0.252226	1.647404	-0.153105	0.8817
SOUTH_AFRICA_GROWTH	0.029741	0.138239	0.215146	0.8345
SOUTH_AFRICA_XRATE	-0.095547	0.149135	-0.640673	0.5377
RESID(-1)	0.006387	0.438440	0.014568	0.9887
RESID(-2)	-0.191672	0.542560	-0.353273	0.7320
RESID(-3)	-0.193008	0.690762	-0.279413	0.7862
RESID(-4)	0.266006	0.668495	0.397918	0.7000
RESID(-5)	-0.320852	0.688342	-0.466122	0.6522
RESID(-6)	-0.870892	0.566585	-1.537089	0.1586

R-squared	0.365093	Mean dependent var	2.52E-16
Adjusted R-squared	-0.481449	S.D. dependent var	0.551149

S.E. of regression	0.670830	Akaike info criterion	2.327397
Sum squared resid	4.050112	Schwarz criterion	2.972104
Log likelihood	-12.60137	Hannan-Quinn criter.	2.479271
F-statistic	0.431276	Durbin-Watson stat	2.209468
Prob(F-statistic)	0.912147		

Ramsey RESET tests

Brazil Moody's
Ramsey RESET Test
Equation: BRAMOOD
Specification: BRA_MOODY_S C BRAZIL_CA BRAZIL_CPILG BRAZIL_EXT_DEBT___GDP BRAZIL_GDP_PER_CAPITALG BRAZIL_GROWTH BRAZIL_XRATE
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.416850	14	0.6831
F-statistic	0.173764	(1, 14)	0.6831
Likelihood ratio	0.271376	1	0.6024

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.058149	1	0.058149
Restricted SSR	4.743143	15	0.316210
Unrestricted SSR	4.684995	14	0.334642
Unrestricted SSR	4.684995	14	0.334642

LR test summary:

	Value	df
Restricted LogL	-14.33888	15
Unrestricted LogL	-14.20319	14

Brazil S&P
Ramsey RESET Test
Equation: BRASP
Specification: BRA_S_P C BRAZIL_CA BRAZIL_CPILG BRAZIL_EXT_DEBT___GDP BRAZIL_GDP_PER_CAPITALG BRAZIL_GROWTH BRAZIL_XRATE
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.435292	14	0.1732
F-statistic	2.060062	(1, 14)	0.1732
Likelihood ratio	3.020121	1	0.0822

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.629620	1	0.629620
Restricted SSR	4.908463	15	0.327231
Unrestricted SSR	4.278843	14	0.305632
Unrestricted SSR	4.278843	14	0.305632

LR test summary:

	Value	df
Restricted LogL	-14.71575	15
Unrestricted LogL	-13.20569	14

China Moody's

Ramsey RESET Test

Equation: CHINAMOOD

Specification: CHI_MOODY_S C CHINA_CA CHINA_CPILG CHINA_EXTERNAL_DEBT_TO_G CHINA_GDP_PER_CAPITALG CHINA_GDP_GROWTH CHINA_EXCHANGE_RATE

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.286520	14	0.7787
F-statistic	0.082094	(1, 14)	0.7787
Likelihood ratio	0.128628	1	0.7199

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.003756	1	0.003756
Restricted SSR	0.644242	15	0.042949
Unrestricted SSR	0.640486	14	0.045749
Unrestricted SSR	0.640486	14	0.045749

LR test summary:

	Value	df
Restricted LogL	7.621312	15
Unrestricted LogL	7.685626	14

Mexico Moody's

Ramsey RESET Test

Equation: MEXMOOD

Specification: MEX_MOODY_S C MEXICO_CA MEXICO_CPILG MEXICO_EXT_DEBT___GDP MEXICO_GDP_PER_CAPITALG MEXICO_GROWTH MEXICO_XRATE

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.070989	14	0.3023
F-statistic	1.147017	(1, 14)	0.3023
Likelihood ratio	1.732418	1	0.1881

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.428269	1	0.428269
Restricted SSR	5.655545	15	0.377036
Unrestricted SSR	5.227275	14	0.373377
Unrestricted SSR	5.227275	14	0.373377

LR test summary:

	Value	df
Restricted LogL	-16.27418	15
Unrestricted LogL	-15.40797	14

Mexico S&P

Ramsey RESET Test

Equation: MEXSP

Specification: MEX_S_P C MEXICO_CA MEXICO_CPILG MEXICO_EXT_DEBT___GDP MEXICO_GDP_PER_CAPITALG MEXICO_GROWTH MEXICO_XRATE

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.469076	14	0.6462
F-statistic	0.220032	(1, 14)	0.6462
Likelihood ratio	0.343076	1	0.5581

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.121815	1	0.121815
Restricted SSR	7.872578	15	0.524839
Unrestricted SSR	7.750762	14	0.553626
Unrestricted SSR	7.750762	14	0.553626

LR test summary:

	Value	df
Restricted LogL	-19.91242	15
Unrestricted LogL	-19.74088	14

Russia Moody's
Ramsey RESET Test
Equation: RUSSMOOD
Specification: RUS_MOODY_S C RUSSIA_CA RUSSIA_CPILG
RUSSIA_EXT_DEBT___GDP RUSSIA_GDP_PER_CAPITALG
RUSSIA_GROWTH RUSSIA_XRATE
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.275030	14	0.7873
F-statistic	0.075642	(1, 14)	0.7873
Likelihood ratio	0.118545	1	0.7306

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.063635	1	0.063635
Restricted SSR	11.84136	15	0.789424
Unrestricted SSR	11.77772	14	0.841266
Unrestricted SSR	11.77772	14	0.841266

LR test summary:

	Value	df
Restricted LogL	-24.40276	15
Unrestricted LogL	-24.34349	14

South Africa Moody's
Ramsey RESET Test
Equation: SOUTHMOOD
Specification: SOUTH_AFRICA_MOODY_S C SOUTH_AFRICA_CA SOUTH_AFRICA_CPILG SOUTH_AFRICA_EXT_DEBT___ SOUTH_AFRICAPERCAPLG SOUTH_AFRICA_GROWTH SOUTH_AFRICA_XRATE
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.555094	14	0.1422
F-statistic	2.418317	(1, 14)	0.1422
Likelihood ratio	3.505486	1	0.0612

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.604575	1	0.604575
Restricted SSR	4.104551	15	0.273637
Unrestricted SSR	3.499976	14	0.249998
Unrestricted SSR	3.499976	14	0.249998

LR test summary:

	Value	df
Restricted LogL	-12.74824	15
Unrestricted LogL	-10.99550	14