

A critical appraisal of sovereign credit ratings in emerging markets

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Abstract

Despite the meaningful impact that credit ratings have on sovereign countries and financial markets, research has not fully explored the determinants of these ratings in many emerging markets (EMs). The aim of this study was to identify and quantify the extent to which different macroeconomic factors impact sovereign ratings. Based on a review of the literature, an analysis of rating agencies' methodology papers, and economic intuition, it was hypothesised that measures of wealth, economic growth, monetary stability, fiscal trajectory, external accounts and governance would predict EM credit ratings. This hypothesis was largely supported by regression models that anticipated actual ratings with predictive power comparable to extant research, but across a much broader set of EM countries. By identifying the key drivers of these ratings, the current research suggests several areas that policymakers can address to improve their own sovereign ratings.

Key terms: economics, macroeconomics, governance, monetary, fiscal, balance of payments, emerging markets, developed markets, frontier markets, credit ratings, sovereign ratings, rating agencies

Acknowledgments and certification

I declare that "A critical appraisal of sovereign credit ratings in emerging markets" is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references. I further declare that I have not previously submitted this work, or part of it, for examination at Unisa for another qualification or at any other higher education institution.

Glen William

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Acronyms**Meaning**

ABS	Asset-backed securities
CRA	Credit rating agency
EM	Emerging market
EMU	Economic and Monetary Union
FX	Foreign exchange
IMF	International Monetary Fund
MBS	Mortgage-backed securities
NRSRO	Nationally recognised statistical rating organisation
OLS	Ordinary least squares
SEC	Securities and Exchange Commission

CHAPTER 1: INTRODUCTION TO THE STUDY

“There are two superpowers in the world today in my opinion. There’s the United States and there’s Moody’s Bond Rating Service. The United States can destroy you by dropping bombs, and Moody’s can destroy you by downgrading your bonds. And believe me, it’s not clear sometimes who is more powerful” (Friedman 1996).

1.1 BACKGROUND

Credit rating agencies (CRAs) have long been a controversial group of businesses. In a near oligopoly, three agencies issue ratings on corporations, municipal governments, securitised instruments, and perhaps most visibly, sovereign nations. Changes in sovereign credit ratings often have enormous immediate market impact. When Moody’s downgraded Portugal in January 2012, the yield on its government bonds rose by 200 basis points. Across emerging markets (EMs), a downgrade is often associated with a statistically significant increase in bond yields as well as CDS spreads (Afonso, Furceri & Gomes 2012; Cantor & Packer 1996). Conversely, upgrades often result in immediately positive effects in local markets. When Colombia was upgraded to investment-grade in March 2011, the local stock market spiked 4.3% in a single day (Colombia gains investment-grade... 2011).

Agencies, and the ratings themselves, are critical in financial markets (Jaramillo & Tejada 2011). The sharp increase in bond yields associated with rating downgrades mechanically increases the cost of funding for countries that seek bond issuance in global markets. Moreover, countries that are downgraded can risk exclusion from critical

global bond indices. For example, in the case of Portugal's downgrade, its selloff was more acute because it was subsequently dropped from investment-grade bond indices. Overnight, Portugal became un-investable for many global investors.

Sovereign credit ratings not only raise funding costs for countries, but they also raise the cost of funding for quasi-sovereign and corporate entities in the country (Hornung et al. 2013). Indeed, more often than not, the sovereign rating represents a ceiling on the maximum rating that a company domiciled in the country can receive. Therefore, sovereign ratings often "trickle down" to banks, real estate companies, mining companies, utilities and every facet of a country's credit markets.

Although difficult to quantify, it is reasonable to assume that sovereign credit ratings also affect the global perception of countries. In some cases, such as Greece and Russia, downgrades have been caused in part by political or geopolitical strife. A downgrade may not only be a *symptom* of weakness in underlying economic and governance factors, but it can also *cause* incrementally more negative attention on a country.

Given the tremendous importance of sovereign ratings, they have been well studied by researchers in terms of at least two aspects. First, much research has been done on the impact that credit changes have on financial markets. Cantor and Packer (1996) found that changes in credit ratings had a significant impact on dollar bond spreads across 39 different historical rating events. Indeed, in more recent research, Afonso et al. (2012) found that government bond yield spreads changed significantly after changes in credit ratings. Moreover, they discovered a "persistence effect" in

which countries that had suffered a rating downgrade had higher bond spreads for at least six months after the downgrade.

Second, research has focused on the determinants of credit ratings in developed markets and, to a much lesser extent, *large* EMs. In their seminal research, Cantor and Packer (1996) identified eight critical variables (*GDP per capita, GDP growth, IMF development index, inflation, fiscal balance, current account, external debt, and default history*), which explained the level of sovereign credit ratings across almost 50 countries. Unfortunately, within the dataset, only about half of the countries could be classified as an “emerging market” or EM economy. In subsequent research, Afonso (2003) was able to confirm five of the variables originally investigated by Cantor and Packer (1996), and found that *GDP per capita, GDP growth, industrial indicator, external debt* and a *default history indicator* were significant predictors of ratings. Despite the impressive analyses that were able to explain over 90% of the variability in credit ratings, Afonso (2003) chose to focus the analyses on developed markets, which comprised more than half of the dataset. Many authors after Afonso (2003) also chose to include both developed markets and EMs in the datasets (see figure 1.1 below).

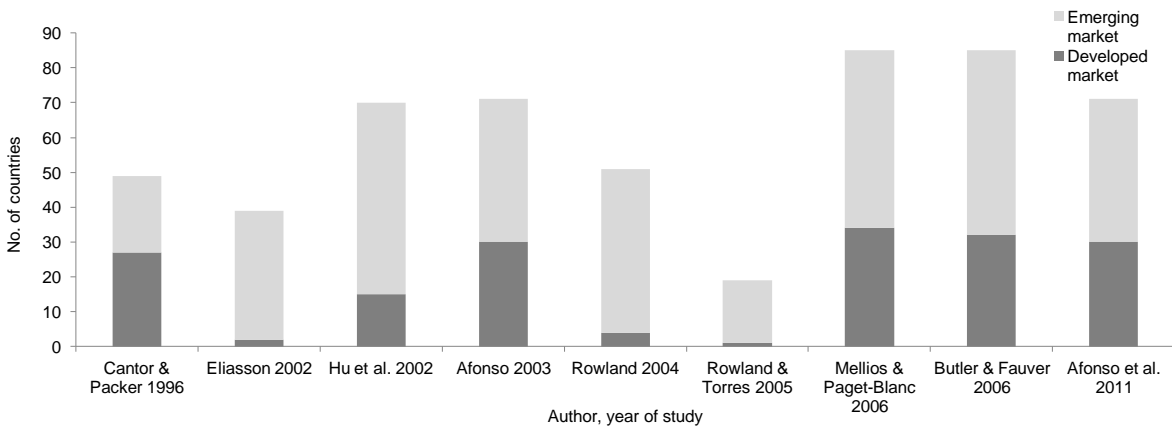


Figure 1.1: Number of EM and developed market countries included in each paper's sample

Previous research may have committed aggregation errors by including highly developed countries, such as Japan and Switzerland, with emerging countries such as Honduras and Ecuador. The current research minimises this risk by only focusing on EMs. The current study has a dataset with nearly twice the number of emerging markets as earlier research, as shown in figure 1.2.

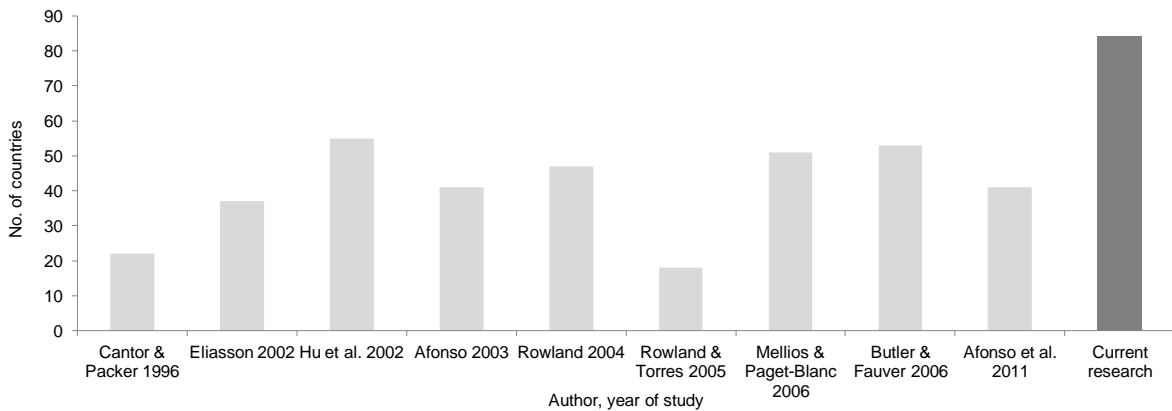


Figure 1.2: Number of EM countries in each paper's sample versus number of countries in current research

Of special consideration in the current research are “frontier markets”, which are loosely defined as having GDP per capita levels of less than USD 2000 per year. Hitherto, these countries have been largely ignored in empirical efforts as shown in figure 1.3 (Speidell & Krohne 2007).

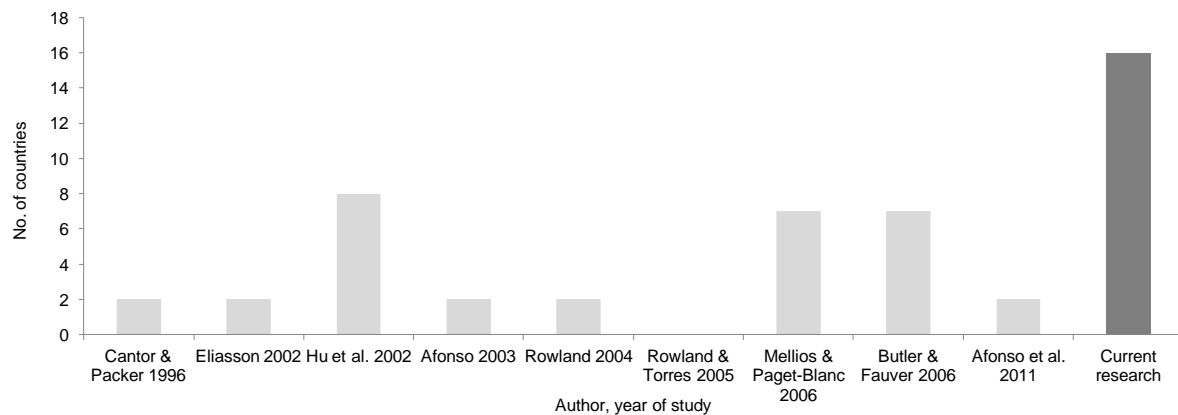


Figure 1.3: Number of frontier market countries in each paper’s sample versus number of countries in current research

1.2 PROBLEM STATEMENT

Despite substantial research on the determinants of sovereign ratings, very little research has exclusively focused on EMs. There are many plausible reasons for the omission. First, it is difficult to gather consistent economic data from some EMs. As an example, as of November 2015, Venezuela had not published GDP growth estimates since 2014 (most countries had already published Q3 2015 GDP estimates). Even if a developing country publishes economic statistics, occasionally they cannot be trusted.

Inflation rates in both Argentina and Venezuela are severely underestimated by official statistical agencies in each country (Bronstein 2015; By hook or crook 2015).

Second, many countries have started receiving fresh coverage by CRAs. Obviously it would have been impossible to include countries in the early analyses that were simply not rated. Remarkably, Moody's did not cover Nigeria (the largest economy in Africa), Kenya and Zambia until 2012 (Els 2012). Moody's launched coverage of Nigeria, Ghana, Kenya and Zambia in 2012, adding Serbia and the Democratic Republic of the Congo in 2013. Many of these countries have sufficient economic statistics that are published by the IMF which, in turn, permit analysis of the drivers of their ratings (IMF 2015).

Finally, researchers may have wanted to identify the determinants of ratings for countries with which they were familiar, rather than smaller and less well-developed countries. It is easier to gather data for Brazil and South Africa, which are covered by all three agencies than for Rwanda or Benin, which are only covered by S&P and Fitch. There is some parallel in both investor research with "home bias" (Coval & Moskowitz 1999), and in behavioural psychology with the "familiarity effect" (Zajonc 1968).

Regardless of the historical reasons for omitting EMs, it now behoves researchers to identify the determinants of ratings in these markets. As of 2014, EMs represent nearly 51% of global GDP, versus only 31% in 1980 (IMF 2014). Historically, many global crises that damaged developed markets may have originated in EMs, for example, the Mexican currency crisis in 1994, the Asian financial crisis in 1997, the Russian debt crisis in 1998, to name a few. More recently, much attention has been given to the sovereign debt crisis in Greece (Barber 2009; Fidler 2015). EMs are

powerful enough in the global economy that it is no longer true that they are unilaterally influenced by developed markets only—rather they influence each other and larger economies as well. When emerging markets catch a cold, developed markets also get sick.

1.3 RESEARCH OBJECTIVES

Given the plethora of research on developed market credit ratings, and the notable lack of focus on EMs, the research objective of the current study was to establish the determinants of credit ratings in EMs. To achieve this objective, it was necessary to perform detailed reviews of the existing literature, analyse CRA methodology papers and propose determinants of credit quality with intuitive economic rationale. After potential determinants of credit ratings had been identified, empirical tests were performed to examine their efficacy in predicting ratings, as described in chapter 3.

1.4 RESEARCH HYPOTHESES

Based on a detailed review of the existing literature and sovereign rating methodology papers, the following primary hypotheses were formulated. These are described further in chapter 3:

Hypothesis 1. Measures of wealth, economic growth, monetary stability, fiscal prudence, balance of payments vulnerability and governance predict both EM local and foreign-currency credit ratings.

Hypothesis 2. Measures of policy strength, political stability and institutional frameworks predict both EM local and foreign-currency ratings.

Hypothesis 3. The lower the development of a country is, the more important measures of governance become in predicting both EM local and foreign-currency ratings.

1.5 RESEARCH METHOD OVERVIEW

Given the primary research objective, as well as structure of the dataset, the above hypotheses were tested using regression analysis. To test hypotheses 1 and 2, ordinary least squares regression (OLS) was used. OLS has often been used to measure the predictive power of economic determinants of credit ratings (Cantor & Packer 1996; Eliasson 2002). To test hypothesis 3, an OLS model with interaction variables was used.

1.6 STRUCTURE OF THESIS

Chapter 1 presented the background and problem statement, namely that there is a scarcity of research on the determinants of EM credit ratings, as well as the research objectives and hypotheses that follow from this gap in the literature. Chapter 2 presents the theoretical background of the study with an extensive review of the frameworks the three major CRAs use to issue sovereign ratings. It continues with a review of the extant studies to identify potential variables that previous researchers have used to predict sovereign ratings, and then analyses the economic rationale for other proposed variables. Chapter 3 introduces the research methodology and hypotheses, and concomitant methods of investigating the hypotheses. Chapter 4 describes the formal research findings and interpretations, and continues by contrasting these with previous research. Chapter 5 summarises the study and explores policy and research implications.

CHAPTER 2: CREDIT RATING AGENCIES AND LITERATURE REVIEW

This chapter starts with an overview of CRAs and continues with an analysis of the philosophy and process that each of the three major agencies follows to determine creditworthiness. The chapter proceeds with an analysis of the literature and identifies the relative lack of empirical attention given to EMs, a problem which, in turn, is the impetus for the primary research objective discussed at the beginning of chapter 3.

2.1 OVERVIEW OF RATING AGENCIES

Assigning a sovereign credit rating is inherently subjective. Each of the major agencies concedes that it is challenging to assess qualitative factors such as “willingness to pay” and “political volatility”, as well as “institutional strength” of fiscal and monetary institutions. (Fitch research...2013; Hornung et al. 2013; S&P: Sovereign government... 2011). However, before examining the historical literature that details the empirical determinants of sovereign ratings, it is clearly informative to go to the sources of these ratings, namely the CRAs themselves, to understand how ratings are assigned. Each CRA periodically publishes working papers on its rating philosophy. Although the papers differ widely in their level of detail, they are useful in understanding some of the broad approaches that the agencies take to render ratings. As a starting point, the current study analysed the most recent commentaries on rating methodologies from each of the major agencies.

Collectively, three CRAs, based in the USA, capture at least 90% of all global credit ratings that are issued. Hence Fitch, S&P and Moody’s are often called the so-called “Big Three” (Alessi, Wolverson & Sergie 2013:2). Each of the agencies is

considered a Nationally Recognised Statistical Rating Organisation (NRSRO) by the Securities and Exchange Commission (SEC). Although each agency issues thousands of ratings across companies, municipalities, asset-backed obligations and state-dependent companies, the focus for the current research was on long-term sovereign ratings for both foreign and local-currency bonds.

2.2 FITCH: PHILOSOPHY AND PROCESS

Fitch ratings was founded in 1913 by John Knowles Fitch and is currently headquartered in New York and London. It issues ratings across various sectors, issuers and securities in over 100 countries (Fitch research... 2013). Fitch's sovereign ratings are used "by over 90% of the world's largest investors" (Fitch research... 2013:para. 1). Fitch maintains a disciplined and quantitative approach to issuing sovereign ratings. The motivation for its sovereign rating framework is to "capture the willingness as well as the capacity of the sovereign to meet its debt obligations" (Riley, Stringer, Fox & Colquhoun 2012:1). Fitch attempts to issue ratings that are consistent across time and countries. To issue ratings through the full economic cycle, the agency accounts for both cyclical and structural trends.

Similar to other agencies, Fitch issues both short and long-term foreign-currency debt ratings (to reflect the credit quality of bonds not issued in local currency), as well as local-currency debt ratings (Riley et al. 2012). Short-term ratings refer to debt with maturities of 13 months or fewer. The primary analytical difference between foreign and local-currency debt considerations is that of exchange rate risk. This refers to the fact that countries that issue foreign-currency bonds must often collect revenues in the local

currency. Therefore, large currency depreciations mechanically increase the foreign-currency debt load. However, there are some exceptions. First, if a country is a large commodity exporter, much of its foreign-exchange needs can be satisfied through commodity exports. Second, many countries are partially dollarised (e.g. Panama, Peru and Bolivia), and generate revenues in dollars that can be used to support foreign-currency debt. Third, some countries are part of currency unions (e.g. the EMU) and the foreign and local-currency ratings are thus identical.

Nevertheless, most countries that issue bonds in a currency other than their own are subject to exchange rate risk and, as a result, Fitch usually issues a local-currency bond rating that is equal to or slightly better than the foreign-currency rating (Riley et al. 2012). Local-currency ratings can be weaker than foreign-currency ratings because national governments can control some of the domestic money supply and in theory “monetise” their local-currency debts. For examples of the natural inflationary consequences of countries that chronically monetise local debts, one need only examine Argentina and Venezuela’s price dynamics.

Does exchange rate risk present enough of a threat to foreign-currency ratings to change the rating framework that Fitch uses to issue ratings? As before, local-currency ratings are often the same or slightly better than foreign-currency ratings, but Fitch contends that “sovereign creditworthiness in terms of both foreign and local-currency debt is a function of all the various factors that influence the stand-alone credit quality of the government ... the relationship between various factors that influence the intrinsic credit quality of the sovereign and the ability to access foreign-exchange are complex, change over time and cannot be clearly delineated” (Riley et al. 2012:4). Therefore,

even though the current study examined the determinants of both foreign and local-currency debt ratings, no substantial differences were expected (or found) in the results.

In terms of the actual mechanics of assigning a rating, Fitch analyses four broad economic and governance factors, in terms of current and forecasted performance. First, the agency examines the overall macroeconomic potential, as well as associated policies and their credibility. This factor accounts for 10.3% of the overall rating (Riley et al. 2012). Fitch's second component comprises 47.4% of the overall rating and is composed of structural features of the economy, such as governance indicators, wealth, money supply and the number of years since the last default. Fitch's third component accounts for 16.9% of the overall rating and captures external factors such as current account deficit, international reserve levels and commodity dependence. The final factor represents 25.4% of the rating and includes factors related to public finances such as debt levels, fiscal balance and interest burden.

2.3 MOODY'S: PHILOSOPHY AND PROCESS

The second of the Big Three, Moody's Investors Service was founded in 1909 by John Moody and, like Fitch, is considered an NRSRO by the SEC. Similar to Fitch, Moody's includes over 100 countries and rates them according to a quantitative and qualitative framework that captures the willingness and ability of a sovereign to pay its debts. However, Moody's, unlike Fitch, seems relatively more focused on qualitative frameworks in issuing sovereign ratings. Its rating methodology concentrates on four factors with quantitative and discretionary components (Hornung, Byrne & Robinson 2013).

As with Fitch, significant discretion is exercised when rendering ratings. The agency can take into account all four factors for the rating, but it is not necessarily bound to them. It uses “supplementary adjustment factors” to reflect nuances specific to individual countries (Hornung et al. 2013:para. 31). Moreover, ratings incorporate expectations around future economic and political developments and these are difficult to quantify, and it follows that the agency exercises significant discretion. Finally, in some cases, the agency receives confidential information that it cannot disclose, but can still use in its rating assessment. For these three reasons, there is no deterministic methodology that allows an exact rating to be assigned given quantifiable factors. Rather, there is always some subjective judgement involved.

The first factor considered by Moody’s relates to “economic strength”, which measures the wealth, actual growth and potential growth, competitiveness and economic diversity of a country (Hornung et al. 2013). Similar to Fitch, Moody’s uses measures of both current economic strength, and forecasted economic strength. Because the ability of the sovereign to extinguish its debt obligations is predicated on its ability to grow and generate more revenues, this factor is critical. In fact, according to analyses conducted by the agency, at least 51% of sovereign defaults were related to underlying economic weakness and associated problems sustaining a high debt burden with low growth. Included in this factor of “economic strength” is an assessment of the vulnerability of a country to a terms of trade shock– for example, the recent collapse in oil prices has caused a major adjustment in terms of trade in Russia which, along with extreme political factors, catalysed the downgrade to non-investment grade by all three CRAs in 2014 and 2015. Within this factor, the agency analyses overall GDP growth,

competitiveness measures and GDP per capita. There is also a measure of discretion involved in examining credit growth in a country and the extent of diversification. Countries with economic growth not driven by credit growth alone, as well as countries with more economic diversity, are often subjectively assigned higher ratings within this first factor.

The second factor Moody's considers is the overall institutional strength of the country. The agency tries to identify the extent to which fiscal and monetary policies promote economic development. Within this factor, there are sub-factors that measure government effectiveness, corruption and the rule of law. In their estimation, 30% of defaults have been directly related to institutional strength. For example, Mongolia missed debt payments and defaulted in 1997 largely because of poor budget management (Hornung et al. 2013). Paraguay defaulted in 2002 on domestically issued dollar bonds held by foreign banks and the sovereign required that the maturities be extended by three years (Hornung et al. 2013). The classic cautionary tale of budget mismanagement is perhaps Venezuela's default in 1998 to the amount of \$270 million in local bonds – even though the Venezuelan Treasury had sufficient funds, the payments were made a week late and, because the bonds had no grace period, the delay was considered a default (McLaughlin & Ellsworth 2015). Within this factor, Moody's also includes political willingness to pay, a relevant example being Ecuador's default in 2008. After being elected in 2007, President Rafael Correa fulfilled his pre-election promises to repudiate the debt, and even though Ecuador had sufficient foreign exchange (FX) reserves, it defaulted and the bonds instantly fell 80% (Salmon 2009).

The third factor considered by Moody's is fiscal strength, measured with standard debt burden and affordability metrics. Although the level of debt alone does not necessarily predict sovereign default, it certainly contributes. To measure debt burden, the agency includes general government debt, which captures all debt from the local, regional and central governments. To measure the affordability of the debt stock, the agency examines the size of interest payments relative to fiscal revenues. In addition to these quantitative measures, it has much discretion in how it assesses contingent liabilities, sovereign wealth funds and the overall composition of the debt stock. In its estimation, the agency believes over 33% of sovereign defaults have resulted from weak fiscal accounts. As examples of defaults driven by fiscal mismanagement, consider Belize in 2006, Jamaica in 2010 and Greece in 2012.

The final factor considered is "susceptibility to event risk", which denotes the general ability to respond to shocks relating to credit markets, FX or trade (Hornung et al. 2013:para. 1). Within this factor, there are four sub-factors. First, "political risk" measures the degree of uncertainty around normal political processes and elections. Second, "liquidity risk" codifies borrowing requirements and market-implied ratings as a measure of challenges a sovereign has in maintaining liquidity. Third, "banking sector risk" measures the size and vulnerability of the banking system. Finally, "external risk" captures the size and types of funding of external accounts, including the current account balance. Together, these four factors are believed to account for at least five sovereign defaults, namely Ecuador in 1999, Uruguay in 2003, Nicaragua in 2003, Dominican Republic in 2005 and Cyprus in 2013. As with all four major factors, summarized in figure 2.1, this factor involves discretion.

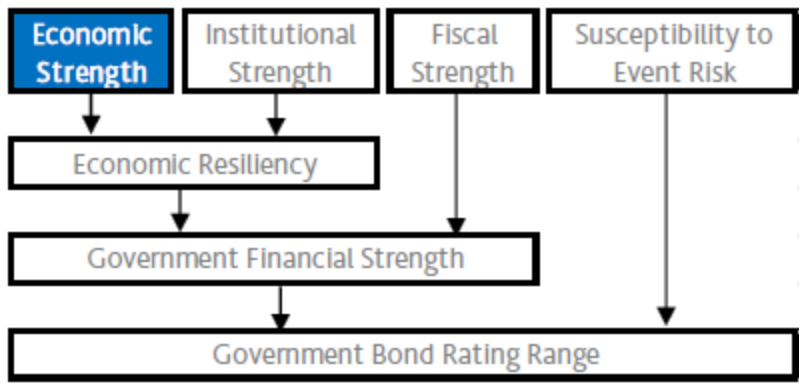


Figure 2.1: Moody’s conceptual framework for assigning sovereign ratings (Hornung et al. 2013:8)

2.4 S&P: PHILOSOPHY AND PROCESS

S&P is the last of the Big Three and was founded in 1860 by Henry Poor. Like Fitch and Moody’s, it is considered an NRSRO by the SEC. Similar to the other rating agencies, S&P’s philosophy is to identify, analyse and interpret the major factors that influence the government’s ability and willingness to pay its debts (S&P: Sovereign government... 2011). Unlike the other agencies, S&P has five factors that form the basis for sovereign credit analysis, namely institutional and political risk, economy, external vulnerabilities, fiscal performance and monetary performance.

The first factor considered by S&P encompasses institutional and political risks. Similar to Moody’s, the political factor is not related to any specific political or economic ideology (democracy, command economies, etc.). The political measure captures institutional and political strength behind the country, including the effectiveness, stability and predictability of policymaking. A country with exceptionally strong political scores would likely be engaged in forward-thinking policymaking that can anticipate and respond to economic crises. Countries with top ratings would have transparent

institutions, as well as reliable economic and statistical data about the health of the economy (S&P: Sovereign government... 2011).

The second factor reflects economic characteristics, including the wealth, resiliency and flexibility of the economy over the long-term. Similar to both Fitch and Moody's, S&P uses forecasted measures of economic strength. Wealthier countries have the potential to support more taxes and, in turn, support overall credit quality. Moreover, faster growing economies are better able to service their debt, so S&P not only closely monitors overall GDP growth, but also "trend growth" that estimates sustainable GDP growth over multiple cycles. As with other CRAs, S&P projects GDP growth over multiple years and bases these estimates on government calculations, proprietary research and IMF projections.

The third factor, external vulnerabilities, refers to all measures of international transactions that could affect creditworthiness. The three sub-factors that determine a country's external vulnerabilities are the status of the country's currency, external liquidity and external debt levels. In the first sub-factor, sovereigns with "reserve currency" status benefit from global demand for this currency. Some examples include the US dollar, Japanese yen and euro. No EM country enjoys reserve currency status, but Mexico is considered sufficiently actively traded by the Bank for International Settlement (BIS) that S&P would consider this a positive factor in its analysis of external vulnerabilities (S&P: Sovereign government... 2011). In the second sub-factor, S&P examines external financing needs, measured by current account receipts and international FX reserves. In the final sub-factor, S&P calculates narrow net external debt by subtracting liquid external assets from total external debt levels.

The fourth factor, fiscal score, refers to both short and long-term fiscal trends and associated government debt stock dynamics. Although the fiscal balance is important, S&P considers it amenable to political influence and therefore places significant weight on the simple change in general government debt stock as a percentage of GDP. As with the other factors, S&P projects forward government debt stocks using official statistics, proprietary calculations and IMF projections. On the revenue side, S&P examines the ability and determination of the government to maintain existing tax rates, broaden the tax base and implement asset sales. On the expenditure side, fiscal rigidities are examined for their long-term impact on basic deficits and debt stocks.

The final factor, monetary score, combines with the other four factors shown in figure 2.2 and measures the ability of the central bank or other governing monetary institutions to control inflation, support overall economic goals and dampen economic crises (S&P: Sovereign government... 2011). Within this factor, the structure of the national exchange rate regime, presumed central bank independence and objectives and extent of financial market development all impact the overall score. As an example of a hypothetical country with an extremely strong monetary score, the monetary authority would have total discretion in interest rate policy, high credibility and a track record longer than 10 years of implementing effective policy, as well as relative control of inflation and inflation expectations.

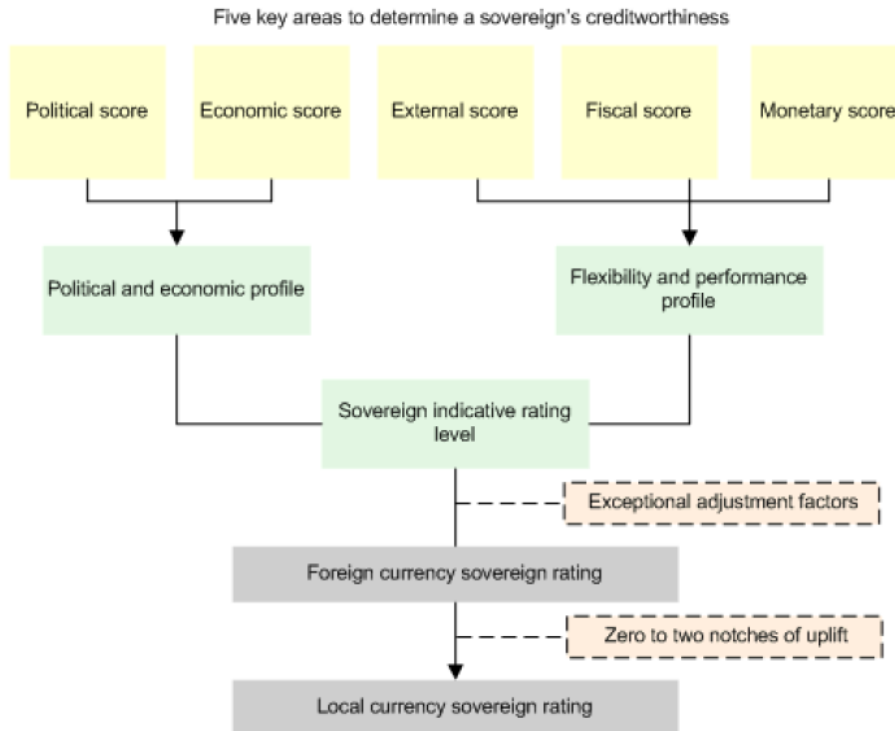


Figure 2.2: S&P's conceptual framework for assigning sovereign ratings (S&P: Sovereign government... 2011)

2.5 ANALYSIS ACROSS AGENCIES

There are substantive similarities across the Big Three agencies in their rating philosophies and factors that help them determine sovereign ratings. In terms of philosophy, all three agencies focus intensely on the willingness and ability of a country to pay its obligations and acknowledge the inherent subjectivity of this assessment (in corporate analyses, a similar framework related to willingness and ability to pay is also used by CRAs). Each uses judgement in determining how willing the government is to pay its debts on time and in full. Although there are some quantitative measures to determine the strength of governance (IMF 2014), usually provided by the World Bank, each agency must exercise discretion in assessing willingness to pay. In some instances, it is fairly clear that willingness has deteriorated. For example, when

Ecuador's president, Rafael Correa, gave his inaugural address in 2007, he explicitly stated that Ecuador's debt is not legitimate because part of it was issued during a military regime (Avenger against... 2009). More recently, Greece's former Finance Minister, Yanis Varoufakis, campaigned on promises to reduce the country's debt burden even though it had the resources to continue to service the debt (Fidler 2015).

With both Ecuador and Greece, each rating agency attempted to account for political climates and rhetoric that indicated changes in willingness to pay. In 2008, Moody's downgraded Ecuador's government bonds to "Ca" and assigned the country a negative outlook based on willingness to pay. Moody's commented in the release "the government's decision to default is based on ideological and political grounds and is not related to liquidity and solvency issues... the nature of this default, Ecuador's second in the past decade, is unprecedented as it is occurring in a situation of relative macroeconomic strength..." (Cailleteau 2008: para. 2). In S&P's unprecedented three notch downgrade of Ecuador in 2008, it noted the following: "... willingness, not capacity, to pay is currently the overwhelming credit weakness" (Brandimarte 2008: para. 1). Fitch downgraded Ecuador on major concerns about willingness to pay after the government had identified the global bonds due in 2030 as "illegitimate" (Riordan 2008: para. 2). Similar concerns have been voiced by all three agencies about Greece's willingness to pay.

Ability to pay is arguably the more quantitative aspect of the agency philosophies. The ability to pay is directly linked to each of the four or five factors described previously that the agencies use to assign ratings. Each agency has some measure of economic wealth, prosperity, diversity and growth. Similarly, each agency

has measures for macroeconomic policies, fiscal responsibility and monetary policy management. Clearly, there are broad similarities across the quantitative measures used to assign ratings, as shown in Table 2.1.

	Philosophy	Ratings factors
Fitch	“Fitch’s approach to sovereign credit risk analysis is a synthesis of quantitative and qualitative judgments that capture the willingness as well as the capacity of the sovereign to meet its debt obligations” (Riley et al. 2012:1).	<ul style="list-style-type: none"> • Discretion • Forecasted macroeconomic performance and policies • Structural features • Public finances • External finances
Moody’s	“The four rating factors in the scorecard may not in all cases constitute an exhaustive treatment of the considerations that are important for a particular sovereign rating and the rating may differ from the one applied by the scorecard range” (Hornung 2013:26).	<ul style="list-style-type: none"> • Discretion • Forecasted economic performance • Institutional factors • Fiscal factors • Event risk
S&P	“... methodology addresses the factors that affect a sovereign government’s willingness and ability to service its debt on time and in full” (S&P: Sovereign government... 2011, p. 3).	<ul style="list-style-type: none"> • Discretion • Political risk • Forecasted economic performance • External factors • Fiscal factors • Monetary factors

Table 2.1: Philosophies and rating factors of the Big Three agencies

Given these similarities across methodologies, it is therefore not surprising that the correlations of ratings amongst the Big Three are extremely high, as shown in figure 2.3.

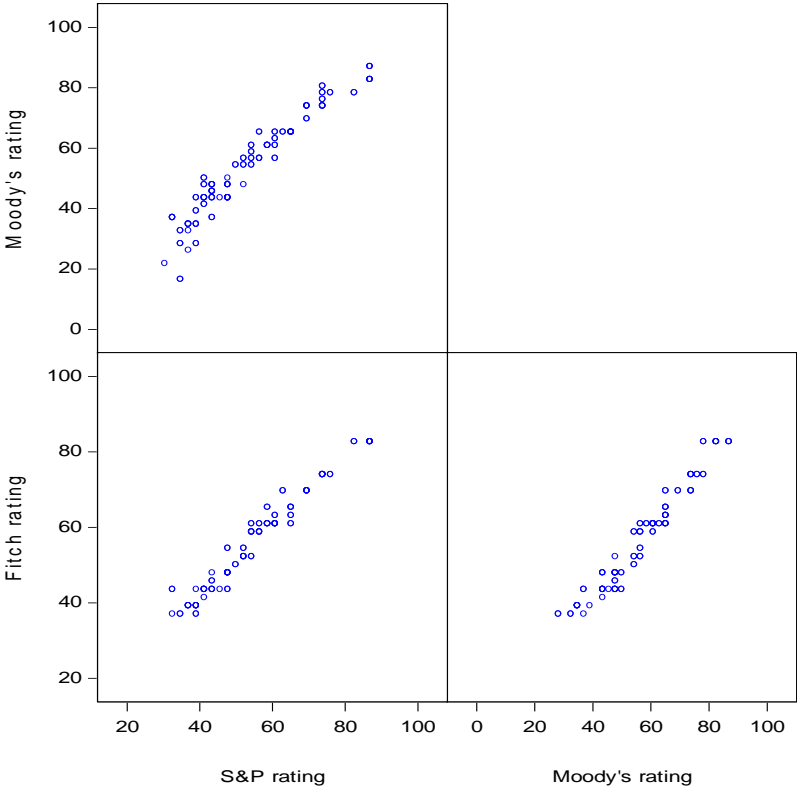


Figure 2.3: Correlations amongst agencies for EM sovereign ratings, AAA = 100, D = 0.

There are, however, some notable differences in the means by which each agency arrives at a rating. First, Fitch seems to adhere to a more rigorous quantitative and statistically driven process, which results in extremely specific weightings for each of its four factors (macroeconomic potential, 10.3%, structural factors, 47.4%, external factors, 16.9% and public finances, 25.4%). Although the other two CRAs have a plethora of quantitative measures, neither specify a comparably precise weighting scheme.

Second, Moody's seems to have been more qualitative before the global financial crisis, but is now moving towards a more quantitative position. In 2012, Moody's refined its sovereign rating methodology to become more quantitative: "... we proposed the following refinements to our rating methodology: enhanced quantification of sub-factors. We suggested increasing the usage and collective weight of quantifiable sub-factors that drive each factor's scoring..." (Hornung et al. 2013).

Finally, S&P has a unique approach in terms of how it combines its sub-factors into five main rating factors and, in turn, combines these into "profiles." S&P clearly uses a balance of quantitative and qualitative metrics, shown in figure 2.4. As described previously, there are five main sovereign rating factors for S&P: institutional effectiveness, economic structure, external position, fiscal flexibility and monetary flexibility. After a thorough review of the quantitative and qualitative determinants within each of the five factors, S&P assigns ratings based on a 1 to 6 scale, with "1" the strongest and "6" the weakest. In turn, the first two factors are combined to create the "political and economic profile" and the last three factors are combined to create the "flexibility and performance profile." Lastly, S&P uses these profiles to determine "an indicative rating level" (S&P: Sovereign government... 2011).

Indicative Rating Levels From The Combination Of (1) The Political And Economic Profile With (2) The Flexibility And Performance Profile												
Political and economic profile												
Flexibility and performance profile	Category	Superior	Extremely strong	Very strong	Strong	Moderately strong	Intermediate	Moderately weak	Weak	Very weak	Extremely weak	Poor
Category	Score	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Extremely strong	1 to 1.7	aaa	aaa	aaa	aa+	aa	a+	a	a-	bbb+	N/A	N/A
Very strong	1.8 to 2.2	aaa	aaa	aa+	aa	aa-	a	a-	bbb+	bbb	bb+	bb-
Strong	2.3 to 2.7	aaa	aa+	aa	aa-	a	a-	bbb+	bbb	bb+	bb	b+
Moderately strong	2.8 to 3.2	aa+	aa	aa-	a+	a-	bbb	bbb-	bb+	bb	bb-	b+
Intermediate	3.3 to 3.7	aa	aa-	a+	a	bbb+	bbb-	bb+	bb	bb-	b+	b
Moderately weak	3.8 to 4.2	aa-	a+	a	bbb+	bbb	bb+	bb	bb-	b+	b	b
Weak	4.3 to 4.7	a	a-	bbb+	bbb	bb+	bb	bb-	b+	b	b-	b-
Very weak	4.8 to 5.2	N/A	bbb	bbb-	bb+	bb	bb-	b+	b	b	b-	b-
Extremely weak	5.3 to 6	N/A	bb+	bb	bb-	b+	b	b	b-	b-	ccc/cc	ccc/cc

Figure 2.4: S&P methodology to imply rating levels from political and economic profiles (S&P: Sovereign government... 2011)

2.6 CRASH DURING THE GLOBAL FINANCIAL CRISIS

Given the agencies' supposedly forward-looking methodologies, there might be a broad conclusion that sovereign ratings anticipate crises. This was clearly not the case in the last financial crisis in 2008, in which agencies were intensely criticised over their late downgrades of Greece, as well as their optimistic treatment of asset-backed securities (ABSs). In fairness however, CRAs do not specifically attempt to anticipate

global crises. Rather, as shown above, the focus is primarily on anticipating default risk in select issuers.

In Greece's case, it was evident in the early fall of 2009 that the central government had substantially larger current fiscal deficits than it had reported, and the deficits in 2006 and 2007 were much larger than originally registered (Barber 2009). This should have driven immediate and severe downgrades. However, despite overwhelming evidence that multiple downgrades were necessary to reflect the extremely weak fiscal and debt positions, Moody's waited several months until it eventually downgraded. On October 20, 2009, George Papaconstantinou, the Finance Minister in Greece's new socialist government, stunned the world by announcing that the expected deficit would be over 12% (Barber 2009). However, in December 2009, Moody's described financial markets' concerns with Greece as "misplaced" (Creswell & Bowley 2011). Only 20 days later, Moody's reversed its opinion and finally downgraded Greece.

In another example of ratings failure, agencies were intensely criticised by economists, politicians and the broader public for their assessment of mortgage-backed securities (MBSs) and other, broader types of ABSs. Indeed, the US Congress established the Financial Crisis Inquiry Commission to understand the determinants of the crisis. The Commission (National Commission... 2011:122) noted the following:

The mortgage-related securities at the heart of the crisis could not have been marketed and sold without their seal of approval. Investors relied on them, often blindly. In some cases, they were obligated to use them, or regulatory capital standards were hinged on them. This crisis could not have happened without the rating agencies. Their ratings helped the market soar and their downgrades through 2007 and 2008 wreaked havoc across markets and firms.

The Commission also determined that of all the MBSs that Moody's had rated "AAA" (highest possible rating) in 2006, by 2010, over 70% were downgraded to junk status. The failure of CRAs to correctly assess the risk of these MBSs was well researched and verified within academia as well (Dennis 2009; Manns 2009; Pagano & Volpin 2010). In public forums, the criticism was sharp and frequent. The Economist magazine noted that "it is beyond argument that ratings agencies did a horrendous job evaluating mortgage-tied securities before the financial crisis hit" (Free speech... 2013, para. 1).

Although the causes of agency underperformance before and arguably during the crisis are many and controversial, there are perhaps three broad types of explanations. First, and most obviously, CRAs are paid by the issuers themselves. Clearly, an unfavourable rating could jeopardise revenues. Second, CRAs often have a mismatch in both the timing and methodology of their ratings relative to financial markets. In terms of timing, CRAs theoretically rate through the entire business cycle, lasting at least three years. Financial crises, however, can erupt in a matter of days. In terms of methodology mismatches, CRAs use economic statistics heavily, which often change slowly. GDP and other activity measures are usually reported quarterly, or even annually, for emerging markets (and often with a lag of one to two months). Although agencies purport to be forward looking and rely on their own economic projections, these projections often rely on official and reported economic statistics that are too infrequent to anticipate crises that ignite quickly.

Finally, there are a host of idiosyncratic reasons that suggest the last crisis was especially difficult to anticipate for CRAs, even relative to other crises (US tech crisis of

2001, Russian financial crisis of 1998, Asian financial crisis of 1997, etc.). Indeed, the vast majority of economists themselves did not foresee the speed, severity or duration of the global financial crisis. First, agency ratings are only as good as the information provided to them; Greece withheld critical fiscal/debt information from markets and statistical agencies (Timeline of a crisis... 2011). Second, it appears that agencies did not correctly weigh the effects of contagion in the EMU and therefore underestimated the impact that Greece would have on the entire monetary union. Contagion denotes an empirically supported phenomenon in which, in this case, news about Greece had significant impacts on the sovereign yields in Portugal, Ireland and Spain (Mink & De Haan 2013). In response to concerns about contagion, S&P re-emphasised in 2011 that their "scoring calibration reflects the importance of a sovereign's external and fiscal performance inside a monetary union relative to the rest of the zone" (S&P: Sovereign government... 2011).

How have agencies responded to criticism? Moody's (Hornung et al. 2013) argues as follows:

... a review of the performance of Moody's sovereign ratings since 1983 ... shows that our sovereign ratings accurately rank-order sovereign default risk. Benchmarking rating performance against actual default experience constitutes the strongest possible test of a rating system. The data demonstrate that, throughout the rating scale, higher-rated countries default significantly less frequently than lower-rated countries. This is true over both one-year and five-year periods.

These default rates are depicted in figure 2.5.

Five Year Default Rates by Rating Category (%)

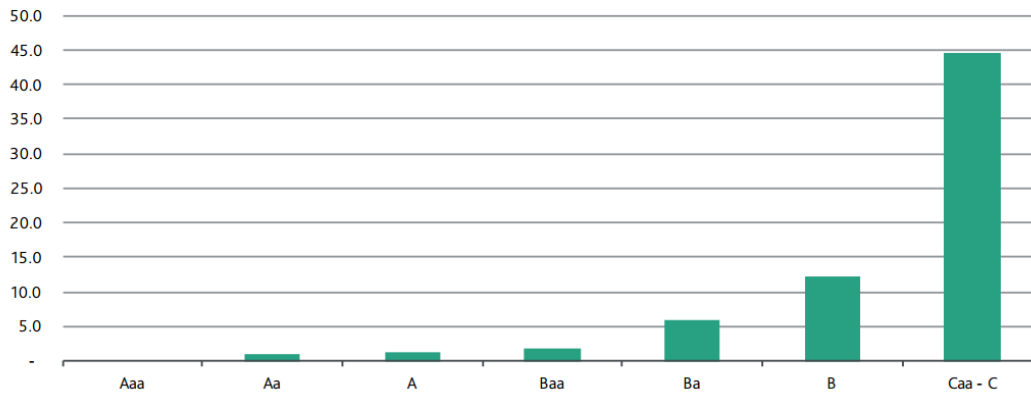


Figure 2.5: Five-year default rates by rating category (Hornung et al. 2013)

Similarly, beginning in 2010, S&P began "to incorporate the information derived from the 2008-2009 global recession, particularly regarding the potential effects of financial sector difficulties on governments' fiscal profiles" (S&P: Sovereign government... 2011: para. 1). Clearly, CRAs have begun to respond to the criticism and, in turn, have modified their sovereign rating methodologies to incorporate lessons from the global financial crisis.

2.7 LITERATURE REVIEW

Even though agencies concede that ratings are subject to significant discretion, researchers have attempted to quantify major predictors of these ratings. The seminal paper on the determinants of sovereign credit ratings is arguably the Cantor and Packer (1996) analysis. Across 49 developed and EMs, the authors identified eight critical variables that jointly explained a significant amount of the sample's variation in sovereign credit ratings. Consistent with sovereign rating methodologies previously discussed, they explored several factors that impact the capacity of a country to service

its debt. As discussed later, almost all of the independent variables map on to one of the four major categories that have been identified: economic/governance strength, monetary policy, fiscal/debt dynamics and external vulnerabilities. Specifically, the authors investigated these key variables and found them to be significant and in the predicted directions: *GDP per capita*, *real GDP growth*, *inflation*, *external debt*, *economic development* measured by the IMF and *default history*.

Even though these six variables accounted for over 90% of the variation in sovereign credit ratings, it was interesting that neither *fiscal balance* nor *external balance* contributed significantly to most of the prediction models (although *fiscal balance* was predictive of S&P sovereign ratings). The authors identify one potential reason for the lack of correlation between fiscal balance and sovereign ratings, namely endogeneity. Lower rated countries are often forced to adopt more disciplined fiscal positions (e.g. Portugal and Greece from 2009 to 2014). Therefore, weaker ratings can perversely be associated with optically better fiscal positions.

Another possibility for the lack of relationship between *fiscal balance* and ratings is that these balances are often subject to significant political pressure and accounting methods that are essentially gimmicks. For example, Brazil attempted to meet its fiscal surplus target in 2012 by omitting infrastructure spending, bringing forward dividends from state-owned banks and using funds from sovereign wealth accounts. During the next fiscal year, the Brazilian government delayed transfers from the energy development account, and delayed transfers under the Kandir Law. These delays in the recognition of expenditures artificially inflated the fiscal balance (Soto 2014).

A final possibility is that the size of the fiscal balance as a percentage of GDP matters less than the composition of the balance, and if there are significant rigidities in expenditures, countries are often punished with higher risk premia. For example, in Brazil, pensions and salaries represent 65% of expenses and are extremely difficult to reduce (IMF 2015). In fact, in 2014, minimum wages were legislatively increased by 9%. All agencies penalise countries for these rigidities, regardless of the absolute level of their fiscal balances.

In terms of the null relationship between *external balance* and ratings, it is significantly more difficult to propose a theoretical argument. However, one explanation might be related to the type of funding of the current account. Normally, countries with significant current account balances are not necessarily punished if the excess investment above savings is being channelled into productive infrastructure (e.g. Colombia and its 5 000-km highway programme). Moreover, countries with stable funding for the current account through foreign direct investment, rather than less permanent forms of capital such as portfolio flows, are often less of a concern for CRAs and investors. As an example, Brazil has a significant current account balance, but much of it is comfortably funded through foreign direct investment. Conversely, Turkey also has a significant current account deficit, but most of it is funded through portfolio flows.

Despite not finding consistent results for two variables, Cantor and Packer's (1996) analysis is remarkable for its foresight. In one of the best analogues of the original research, Eliasson (2002) produced both static and dynamic models to predict sovereign ratings. In the static model, the objective was to anticipate the specific credit

rating for a particular year. The author chose to use the same variables as Cantor and Packer (1996), but excluded the *economic development* and *default history* indicators. The R^2 of the resulting model was 86%, which compares favourably to Cantor and Packer (1996), whose R^2 ranged from 91% (in predicting Moody's ratings) to 93% (in predicting S&P's ratings).

In a second model, the author included four more variables to explore their incremental impact on explanatory power: *debt/exports*, *export growth*, *short-term debt/reserves* and *interest rate spreads*. Surprisingly, only *debt/export* registered a significant coefficient. Even *short-term debt/reserves* did not add to the existing predictive power of the original model. In another set of dynamic models, the author chose to include the most recent rating as an independent variable which, not surprisingly, significantly predicts future ratings. Moreover, the author investigates the impact of changes in independent variables on changes in ratings and in several of the models, the first difference of *GDP per capita*, *GDP growth*, *inflation* and measures of *external debt* are all significant and in the predicted directions. These measures are consistent with many of the measures that would eventually be tested and linked significantly to EM sovereign credit ratings, as shown in figure 2.6.

Legend

Variable operated consistently
Variable operated sporadically across models
Variable did not operate

	Cantor & Packer 1996	Eliasson 2002	Hu et al. 2002	Afonso 2003	Rowland 2004	Rowland & Torres 2005	Bennel et al. 2006	Mellios & Paget-Blanc 2006	Butler & Fauver 2006	Afonso et al. 2011
<u>Economic</u>										
GDP per capita	Consistent	Sporadic	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
GDP growth	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
IMF development index	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
Underdevelopment index	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
Unemployment	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
<u>Monetary</u>										
Inflation	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
<u>Fiscal/debt dynamics</u>										
Overall fiscal balance	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
Govt revenue/GDP	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
Debt/GNP	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
Debt/GDP	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
Debt service/exports	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
Debt/current acct receivables	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
<u>External</u>										
Current account/GDP	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
Savings/GDP	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
External debt/GDP	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
External debt/exports	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
Export growth	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
FX reserves to total imports	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
Reserves/M2	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
Reserves/GDP	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
Goods/total exports	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
Trade dependency	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
<u>Governance</u>										
Govt effectiveness	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
Legal environment	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
<u>Misc</u>										
Spreads	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
Default history	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
EMU membership	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
Regional dummies	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
REER	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
Corruption index	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent
EM dummy variable	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent	Consistent

Figure 2.6: Overview of the variables examined across 10 papers on the determinants of sovereign ratings

For example, in subsequent research by Afonso (2003) in which he used both linear and logistic models, it was found that for the linear models, *GDP per capita*, *inflation*, *GDP growth*, *level of economic development* and *external debt/exports* predicted both S&P and Moody's sovereign ratings. Like Cantor and Packer (1996), measures of political risk were unfortunately not included, and this is one of the major weaknesses in early research. Interestingly, unlike Eliasson (2002), it was discovered that fiscal balance did not significantly predict ratings. Perhaps this was due to the aforementioned reasons, changes in the data since 1996 and 2002, or changes in the sample size. Indeed, Afonso (2003) tested a total of 71 developed and EM countries, whereas Cantor and Packer (1996) and Eliasson (2002) tested 49 and 39 countries in total, respectively, and these are fairly large differences in sample size.

Afonso (2003) deviated in a subtle way from the Cantor and Packer (1996) analysis by including a measure of development other than *GDP per capita*. Most of the papers since Afonso (2003) have simply used measures of wealth. However, Afonso (2003) included the *IMF Index of Developed Countries* as well, which proved prescient because it had a standalone correlation with sovereign ratings of 0.85, although one would imagine it would have had a much lower partial correlation with ratings when the effect of GDP per capita was included.

Using a linear transformation of the ratings levels, Afonso (2003) discovered that the model did not accurately predict countries that were strongly rated, so the author transformed the rating scale using logistic transformation (see figure 2.7). Because the author was using both developed and EM countries (ranging from Venezuela at the lower end to the USA/Japan at the upper), this transformation was appealing because

there was sufficient variance in ratings. However, it would arguably not apply to EM countries, which have much less spread in ratings. Afonso (2003) argues that for countries that are at the top of a rating scale, it takes significant improvement in rating factors to experience an upgrade. However, when countries are developing their markets, there are presumably more attainable ways of immediately improving credit quality, for example publishing more timely economic statistics and improving the transparency of fiscal and monetary decisions.

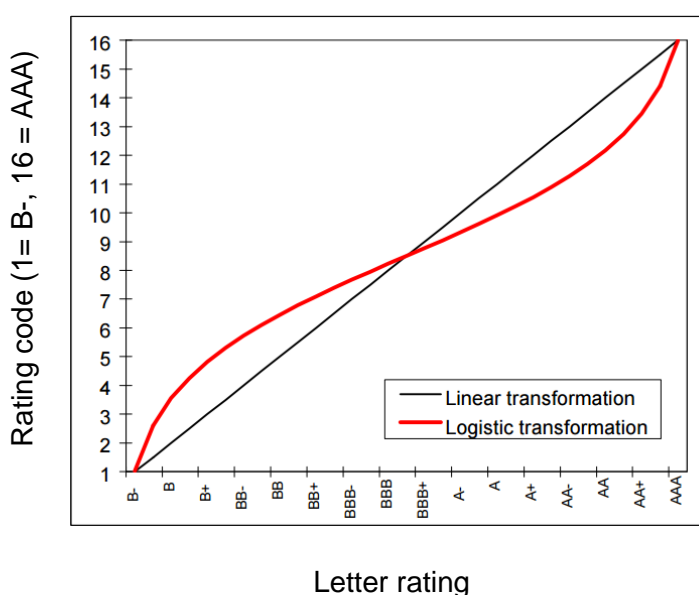


Figure 2.7: Example of linear/logistic transformations of letter ratings versus original letter ratings (Afonso 2003)

By using a logistic transformation, it was found that all of the earlier factors were similarly significant and in the expected direction, that is, *GDP per capita*, *inflation*, *GDP growth*, *level of economic development* and *external debt/exports*. For most of the models, the residual was smaller for the higher-quality countries. As an example, for the highest rated sovereigns (European countries, Japan, the USA, Australia, New Zealand,

Singapore, Norway and Switzerland), the average prediction error was reduced by 35% when using a logistic transformation.

In a study two years later, Rowland (2004) was one of the first to investigate *reserves* as a potential determinant of credit ratings, which is surprising given its role in servicing external debt. This is intuitively appealing because hard-currency reserves, measured against GDP, would be a general proxy for the ability of a country to service its hard-currency debt over the long term. The next year, Rowland and Torres (2005) confirmed the predictive power of this measure, even when included in a regression with measures of *GDP growth*, *external debt*, and similar to Afonso (2003), *default history*.

Rowland (2004), unlike previous authors, included several measures of external vulnerability. Owing to the fact that large *current accounts* can eventually generate unsustainable external debt levels, this variable was included, consistent with previous authors. However, a measure of market openness was also included, namely *trade openness*, or the sum of exports and imports as a percentage of GDP. It could be hypothesised that countries with large exports, and therefore significant access to foreign exchange, might be able to more easily service hard currency debt. However, an alternative argument is that countries with significant trade exposure could be more vulnerable to global downturns in growth.

Using linear regression analysis, Rowland (2004) found fairly similar results to Cantor and Packer (1996), even using different time frames and countries, which testifies to the robustness of the earlier seminal work. The author found *GDP per capita* and *debt ratios* to be significant. Interestingly, *GDP growth* significantly predicted S&P

ratings, but not Moody's. Also, *inflation* was not a significant predictor of ratings for Moody's, but did explain S&P ratings. As expected, *international reserves* significantly predicted both agencies' ratings. *Trade openness* predicted creditworthiness as well.

Perhaps as a result of Rowland (2004) including a sizable amount of factors that had not been tested until the author's research, there was a shift in the literature beginning in 2006 in which researchers began testing many more variables for their impact on credit ratings. They started testing other measures of economic development such as *unemployment rate* (Afonso, Gomes, & Rother 2011), while others analysed components of aggregate variables that had worked in previous literature (*government revenues*, instead of the *overall fiscal balance*, or *national savings* instead of *current account balance*) as well as specific measures of trade such as *non-manufactured goods* and *trade dependency* (Mellios & Paget-Blanc 2006).

Mellios and Paget-Blanc (2006) tested several of the standard predictors of sovereign credit ratings. However, they added some measures that had not previously been tested, including the *real exchange rate*, *investment as a percentage of GDP*, *corruption index* and specific measures of government effectiveness including *regulatory quality*, *accountability*, *rule of law* and *political stability*. The *real exchange rate* was advanced as predicting sovereign credit ratings because it is a measure of trade competitiveness. *Investment* was expected to be positively associated with stronger credit ratings – more current investment should increase future growth potential and allow the country to more effectively manage its future debt stock. Although the authors did not show the pairwise correlations, it would be expected that *investment* and *current account balance* would, by definition, be related. Measures of

governance were included in the regression model and were found to be significant in the predicted direction (lower *perceptions of corruption* associated with stronger *sovereign ratings*), unlike the earlier work of Cantor and Packer (1996) and Afonso (2003). *Real effective exchange rate, GDP, GDP per capita, inflation, trade dependency* and *government revenue* were also found to be significant predictors of sovereign ratings.

Across many of the aforementioned papers, there was an interesting amount of agreement along two dimensions. First, many authors identified a core group of variables to predict sovereign credit ratings based on economic development, monetary stability, fiscal responsibility and external balance. Second, the majority of authors chose a core group of EMs that tended to be relatively large (e.g. Brazil and Mexico rather than Guatemala and Honduras). Perhaps larger EMs were chosen because sovereign credit ratings were easily available, macroeconomic data more comprehensive, and possibly there was some comfort in knowing that previous researchers had simply used a similar cannon of countries.

However, upon close inspection, there is clearly a persistent pattern of neglecting certain EMs. Unlike Cantor and Packer (1996), who investigated both developed markets and EMs, Eliasson (2002) focuses the analyses on only EMs. However, for reasons that are not clear, the analyses are limited to only a small group of EMs. Later, other authors also seemed to ignore the least developed EMs. After 2003, the literature examined an average of only three “frontier” economies per paper (Afonso 2003; Afonso et al. 2011; Butler & Fauver 2006; Mellios & Paget-Blanc 2006; Rowland 2004; Rowland & Torres 2005).

The current, proposed research hopes to greatly improve upon the scope of coverage of EMs. Cantor and Packer (1996), Eliasson (2002) and even more recent researchers have often excluded many EMs from their analyses (Afonso et al. 2011; Butler & Fauver 2006; Mellios & Paget-Blanc 2006). For reasons that can only be surmised, researchers have often omitted these countries from their analyses, which makes them vulnerable to the criticism that their models do not, in fact, apply to all countries equally. *Indeed, without including all possible EMs, how can one confidently conclude anything about the determinants of sovereign risk across these markets?*

CHAPTER 3: RESEARCH METHODOLOGY AND STATISTICAL TECHNIQUES

This chapter starts with a discussion of the primary and secondary research objectives and the research design used to achieve these objectives. The chapter then explains the economic rationale for the proposed determinants of sovereign ratings, and concludes with the explicit research hypotheses, which are analysed empirically in chapter 4.

3.1 RESEARCH OBJECTIVES

Given the relative lack of research on EM sovereign ratings in the literature, the primary research objective was to fill this gap by identifying and quantifying the specific determinants of sovereign ratings in EMs. This corresponds to hypothesis 1 described later in the chapter.

Following from this primary research objective, there were two secondary research objectives that correspond to hypotheses 2 and 3. First, the aim of the current research was to explore the individual and joint impact of “governance” measures against EM credit ratings. Second, it attempted to quantify the interaction between the development of an EM, measured by GDP per capita, and the impact that governance measures have on credit ratings. A simple moderating effect was hypothesised: sovereign ratings in less developed EMs will depend even more strongly on measures of governance versus more developed EMs.

The objectives were entirely focused on EM economies and their associated agency ratings, given the notable scarcity in this area. Given that the vast majority of

research on sovereign ratings has focused on developed markets, or only the largest EMs, the proposed research could provide an initial platform for future research on emerging and frontier markets. Indeed, the proposed research used a dataset with twice the number of EM countries versus comparable research.

3.2 RESEARCH DESIGN AND MODEL SPECIFICATION

On the basis of the research objectives, the design for the model, data collection and subsequent analyses was considered. Several statistical models have been used to study the impact of economic and political variables on sovereign ratings, namely, linear regression and probit models. Given that the present study was focused on identifying the determinants of the levels of sovereign ratings, not necessarily the probability of a change in those ratings, probit models were inappropriate.

Owing to the fact that the aforementioned lists of potential determinants are continuous variables, and sovereign ratings are routinely translated into a single continuous variable, linear regression was applicable. Given the primary research objective to quantify the determinants of multiple ratings amongst as many EMs as possible at one time, cross-sectional multiple regression was the chosen primary statistical model. This technique has been used by previous researchers of sovereign ratings (Afonso 2002; Cantor & Packer 1996). The general model was specified:

$$y_i = \beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_p x_{ip} + \varepsilon_i \quad (1)$$

where x_{ij} is the i^{th} observation on the j^{th} economic variable and ε_i is the stochastic term. The independent variables are identified in the next section and classified according to one of five different factor categories (economic, monetary, fiscal/debt, external and governance). For example, model 1a, corresponding to hypothesis 1, is specified as:

$$Rating_i = \alpha + \beta_1 \text{GDP per capita} + \beta_2 \text{debt/GDP} + \beta_3 \text{current account /GDP} + \beta_4 \text{regulatory quality} + \varepsilon_i. \quad (2)$$

One potential concern that became immediately evident with the current study's focus on EMs was the availability of data, and as discussed in chapter 4, a total of 84 countries were included in the final dataset. To determine the sufficiency of this dataset in using ordinary least squares regression, some assumptions were made about the effect size, statistical power level and number of independent variables.

First, assumptions were made about the effect size of the proposed study on sovereign ratings. Effect size broadly refers to the size of the expected impact of a variable (or set of variables) on another. Interpretation of effect size depends on the type of research question and context, but for the multiple regression analysis proposed, the effect size f^2 is

$$f^2 = \frac{R^2}{1 - R^2} \quad (3)$$

Given that the existing literature demonstrates R^2 values of approximately 70%, this implies an effect size of ~0.6.

Second, assumptions were made about the implied statistical power of the proposed study. Statistical power refers to the chance that an analysis will detect a phenomenon when there is truly a phenomenon to be detected and is primarily impacted by the effect size and the sample size used in the analysis (Abramowitz 1966). The standard statistical power level desired in social research is ~0.8 (Cohen 1988).

Finally, assumptions were made about the number of potential determinants of sovereign ratings. Because there are only four major factors identified by the CRAs (macroeconomic/governance, monetary, fiscal/debt and external), it was assumed that a logical and parsimonious set of four predictors would be chosen. Given these three assumptions, the minimum sample size was approximately 35 countries, well below the size of the existing dataset.

Given the strength of these assumptions about the requisite size and structure of the data model, the dataset was subsequently constructed, as described in the next section.

3.3 DATA SOURCE AND DEFINITIONS OF VARIABLES

The final list of potential determinants of ratings was constructed using a three-part process, as per table 3.1.

	1) Literature review	+	2) Availability of data	+	3) Economic rationale	→	Selected for study
<u>Economic</u>							
Real GDP	0		0		0		0
Real GDP per capita	0		0		0		0
Real GDP growth	0		0		0		0
IMF indicator of development	0		0				
Underdevelopment index							
Unemployment (%)			0		0		0
Employment (millions)			0				
Population size			0				
Output gap as a % of GDP			0				
Implied PPP conversion rate			0				
<u>Monetary</u>							
Inflation (%)	0		0		0		0
Interest rates			0				
<u>Fiscal/debt dynamics</u>							
Gen. govt balance/GDP	0		0		0		0
Gen. govt primary balance/GDP			0		0		0
Gen. govt structural balance/GDP			0				
Gen. govt gross debt/GDP	0		0		0		0
Gen. govt net debt/GDP			0		0		0
Govt revenue			0				
Govt spending			0				
Debt service/exports	0						
Debt/current acct receivables	0						
<u>External</u>							
Current account/GDP			0		0		0
Savings/GDP			0		0		0
Investment/GDP			0		0		0
External debt/GDP or exports	0						
Export growth							
FX reserves to total imports							
Reserves as % of M2 or GDP	0						
Goods as % of exports	0						
Trade dependency	0						
<u>Governance</u>							
Govt effectiveness	0		0		0		0
Rule of law	0		0		0		0
Voice and accountability			0		0		0
Political stability			0		0		0
Regulatory quality			0		0		0
Corruption			0		0		0

Table 3.1: Process for selecting determinants of credit ratings

In the first step of variable selection, factors were chosen based on their reliability across empirical studies identified in the literature review. From this, there were at least four major categories of variables: economic/governance, monetary, fiscal/debt

dynamics and external. There was also a miscellaneous category of variables that included measures of market stress (*sovereign spreads*), monetary union membership, geography, real effective exchange rate and others. Extant research done from 1995 until 2015 supported the empirical findings within each category of variables, although researchers differed in the operationalisation of some variables (e.g. researchers chose to use at least four different debt ratio denominators: GNP, GDP, exports and current account receivables). Subjectively, from the analysis in the literature review it seems that researchers struggled with operationalising measures of external vulnerability.

In the second step, variables were added for consideration, based on their availability and accessibility in public databases. A broad review of the potential determinants of sovereign ratings available for 180+ countries was conducted. This was a critical process because the research objective is to include as many EM countries as possible, precisely to fill the current gap in the literature. To ensure that the sovereign data were 1) available for as many countries as possible, 2) comparable and 3) reliable, IMF data were used from the World Economic Outlook. CRAs use forecasted projections of economic variables, and for this reason it was also critical that as many of the variables as possible had an associated forecast. The 26 variables that were available in the IMF database are listed in table 3.1 above (IMF 2015).

In the final step of the variable selection process, factors based on the economic rationale were identified and analysed, as per the discussion below.

Real GDP growth. Stronger real economic growth should be associated with better sovereign ratings for a plethora of reasons. *Ceteris paribus*, faster growth enables the country to service existing debt stocks more easily. Moreover, faster growth helps

accommodate a growing labour market which, in turn, can provide a larger tax and non-tax base to bolster revenues to support debt. In general, faster growth increases the development of a country, increases the potential for larger investments in social goods (education, training, etc.) and boosts investment in fixed assets that will, in turn, drive more future growth. Socially, faster growth can reduce the probability of class conflict and disruption (assuming that wealth accumulation is moderately well distributed). Indeed, a five percentage point collapse in growth is associated with an increase in the likelihood of civil conflict by 50% the following year (Miguel, Satyanath & Sergenti 2004).

Obviously the source of growth matters tremendously in evaluating sovereign strength. If it is largely concentrated in one sector or one export, then the country is more vulnerable to banking, trade and balance of payments shocks. For example, Chile, whose copper exports account for at least 9% of GDP alone, would be more vulnerable to commodity price weakness than a country such as Brazil, which has much more diverse export and destination bases (IMF 2014). Moreover, if the growth is attributed to domestic credit expansion, rather than endogenous sources, then it is likely to be less sustainable. A case in point is Ireland, which experienced significant economic growth from 2003 to 2007, but credit growth was almost twice as fast as GDP growth. Despite these nuances, the current research expected a positive relationship between real GDP growth and sovereign foreign and local-currency ratings (where "positive" refers to faster real GDP growth associated with a stronger rating).

GDP level. Larger economies provide commensurately larger tax bases to support revenues during downturns and maintain larger cyclically adjusted primary balances which, in turn, help sovereigns maintain lower debt stocks. Larger countries

tend to be more diversified as well, which can insulate them from some shocks (commodity or banking crises). A positive relationship was expected with ratings.

GDP per capita. At least in purchasing power terms, this measure is an excellent metric of overall economic development. Agencies repeatedly cite this factor as critical in determining sovereign strength. Higher income is correlated with a labour market that is producing high value-added products, although this might not be true in commodity producing countries (Riley et al. 2012). Countries with more economic development may be more integrated with multiple countries in the global economy and, therefore, suffer from more reputational ramifications if they default (Bulow & Rogoff 1989). A positive relationship is expected with ratings.

Unemployment rate. This is a direct measure of the potential taxability of the population and extent of labour utilisation. It is generally correlated with GDP level, as well as GDP growth, both of which impact ratings. It is also a measure of social discontent. A negative relationship is expected with ratings.

Inflation rate. Given that the majority of countries globally, even within EMs, have adopted either an implicit or explicit inflation targeting mandate, the inflation rate is a measure of monetary policy efficacy. There are also direct links between lower and more stable inflation with better economic performance. Stable levels of lower inflation help boost domestic confidence and consumer activity, as well as potentially increase foreign direct investment. Lower levels of inflation instil confidence in local-currency lenders, thereby facilitating the expansion of local credit and bond markets. Although very low levels of inflation are associated with unique problems (suppression of consumption, deterioration in investment, etc.), inflation at very high levels can signal

rising default risk. Countries experiencing hyperinflation are often monetising their fiscal deficits. Lastly, inflation, like unemployment, is a measure of social discontent. High levels of overall inflation, and specifically food inflation, can directly and disproportionately harm lower socioeconomic classes. A negative relationship is expected with ratings.

Fiscal balance. Large and growing fiscal deficits imply increased difficulty managing public spending and revenue generation (or both). Assuming domestic savings and foreign inflows remain constant, rising fiscal deficits cause private investment to decline and, in turn, reduce future GDP growth. Large fiscal imbalances, measured through both the basic fiscal balance and the primary balance, eventually drive larger debt stocks relative to GDP which, in turn, clearly heighten the risk of sovereign default. Larger deficits not only burden current residents, through higher interest payments demanded by the market, but also “future generations of taxpayers” tasked with eventually reducing the debt burden (Hornung et al. 2013:para. 22). A positive relationship is expected with ratings.

Primary balance. Because interest payments on the existing debt stock are already determined by the cumulative effect of previous fiscal deficits, a useful measure of current fiscal efforts is the “primary balance”, which subtracts interest payments from current expenditures. It directly measures the current administration’s ability to manage the budget. Mechanically, larger primary surpluses help reduce the critical debt to GDP ratio, although achieving a primary balance alone, or even a small primary surplus, is not always sufficient. For the primary surplus to indicate relief in the debt stock, nominal

interest rates should be less than nominal GDP growth (IMF 1995). A positive relationship is expected with ratings.

Gross debt. Gross debt is the total amount of liabilities owed by the general government, including central, regional and local governments, and using the IMF definition, debt instruments can include special drawing rights, debt securities, currency and deposits, loans, other accounts payable, and in some cases, insurance, pension and standardised guarantee schemes (IMF 2013). Gross debt includes all government liabilities to both residents and non-residents. Countries avoid double counting by consolidating all accounts within different levels of government. Countries with a larger existing burden of debt, and associated debt payments, are at higher risk of default. Debt burden is a critical measure of risk, indeed, the size of the gross debt stock “is the starting point of [Moody’s assessment of] fiscal strength...” (Hornung et al. 2013:15).

CRAAs not only look at the size of the debt stock, but also examine at least three other debt-related factors. First, all three agencies examine the trend in the debt burden. Some EM countries, such as Turkey, Indonesia and the Philippines, have relatively high levels of debt as a percentage of GDP, but deceleration in the size of the growth stock has driven recent rating upgrades (Hornung et al. 2013).

Second, agencies examine the composition of government debt. As discussed in the literature review, foreign-currency debt is intrinsically more volatile to service because of uncertainty about future FX movements. Although domestic currencies can appreciate and lower the foreign-currency debt burden, currency crises frequently occur at the same time as sovereign debt crises, and the former exacerbate the latter through concomitant depreciation of the local currency. High levels of foreign-currency

denominated debt drove the defaults in Moldova and Uruguay in 2002 and 2003, respectively (Hornung et al. 2013).

Finally, agencies examine the contingent liabilities that are not directly calculated as gross debt. For example, large liabilities in quasi-sovereign corporations or public pension systems, are often considered during the debt analysis. Moreover, there are assets related to the service of debt payments that agencies consider, for example, sovereign wealth funds. Some countries, such as Chile, Saudi Arabia, the United Arab Emirates, Qatar and Kuwait have significant public sector financial assets that could be used if necessary during times of acute fiscal stress.

As with all of the aforementioned factors, this factor is not a sufficient and comprehensive measure of the inevitability of sovereign default. Many developed and emerging economies have high debt stocks, but they are considered manageable due to very low, and sometimes negative, associated real interest rates. For example, as of November 2015, Japan had a debt stock of 245% of GDP, more than \$11 trillion. However, the interest rate on 10-year government bonds in Japan was only 0.29% at that time (versus 2.3% in the US). Nevertheless, as a result of the enormous debt stock and slow growth, S&P downgraded Japan's sovereign debt rating in September 2015, following earlier downgrades by Moody's and Fitch (Mehta 2015). Even countries with stellar measures of governance and institutional strength can be downgraded on debt concerns. A negative relationship is expected with ratings.

Net debt. Although gross debt is one of the metrics used by the agencies, an adjusted measure of debt stock, namely net debt, is also likely to be predictive of sovereign stress because it subtracts the potential assets associated with gross debt

issued by the central, regional and local governments of a country. Net debt is defined as the previously discussed measure of gross debt, less financial assets corresponding to debt instruments (IMF 2013). Financial assets would include monetary gold, currency and deposits, and other accounts receivable. As with the calculation of gross debt, net debt is based on consolidated accounts to eliminate assets and liabilities among different levels of the general government.

Net debt is a more reliable measure of true accumulated fiscal burdens because gross debt includes intra-government debts, often implicitly. The US Congressional Budget Office (Elmendorf 2009:14) explains this as follows:

Gross federal debt comprises both debt held by the public and debt issued to various accounts of the federal government, including the major trust funds in the budget (such as those for Social Security). Because the debt issued to those accounts is intra-governmental, it has no direct, immediate impact on the economy. Instead, it simply represents credits to the various government accounts that can be redeemed as necessary to authorize payments for benefits or other expenses.

Net debt is thus often seen as being more impactful in debt burden analysis. Brazil is an example amongst EM countries where the difference between gross and net debt is significant and must be analysed thoroughly during debt sustainability analysis. Net debt is generally considered an incomplete picture of debt stock in Brazil (unlike in Chile or Colombia) because it does not capture Brazilian Development Bank (BNDES) lending. Net debt does not change when the treasury issues loans to BNDES and funds it through public bond issuance. This is one factor that drives the growing disparity between the two measures of debt, as shown in figure 3.1.

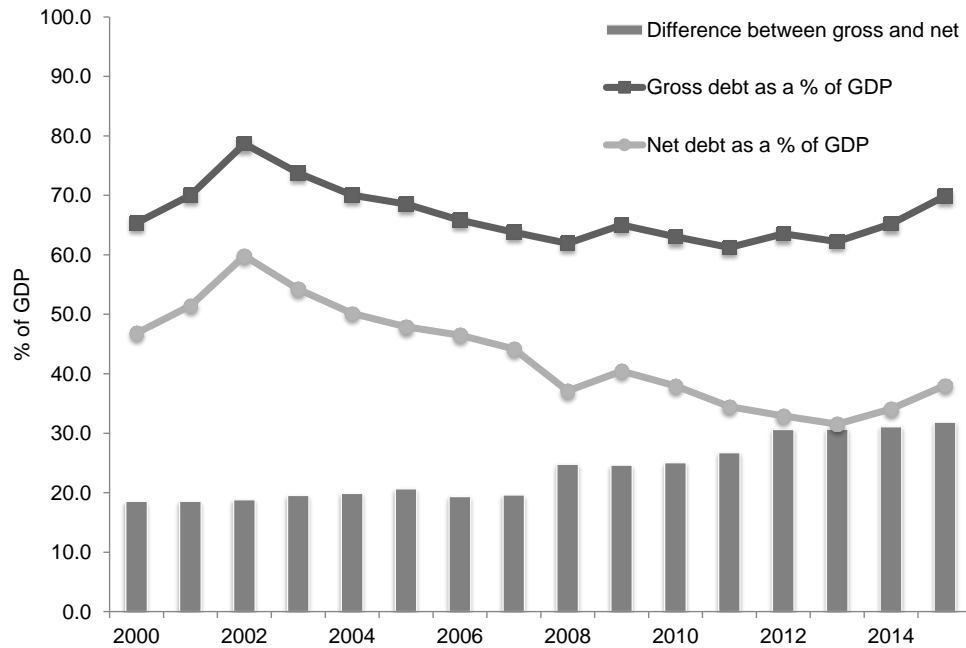


Figure 3.1: Brazil debt dynamics, 2000–2015 (IMF 2014)

A negative relationship is expected with ratings.

Investment. More fixed asset investment is associated with stronger future GDP expansion which, in turn, should drive better sovereign ratings. Higher levels of both public and private investment drive stronger economic growth through several channels. First, investment in fixed assets immediately raises domestic expenditures. Second, by modernising the means of production, investment can increase the overall capacity of an economy. Finally, investment provides leverage to the labour market and potentially increases productivity. Some examples of recent impactful investment programmes include Colombia’s 5 000 km highway infrastructure programme, Panama’s expansion of the Canal that will immediately allow for more taxation on even larger vessels, and Brazil’s proposed much-needed port infrastructure programme that will support its broad

export base. In Brazil, in 2013, trucks were gridlocked for 31 miles outside of one of the largest agricultural ports (Gomes 2014). A positive relationship is expected with ratings.

Savings. Lower national savings rates, which include government savings, are directly impacted by the level of surplus or deficit run by the general government. Countries running increasingly large fiscal deficits will appear, *ceteris paribus*, to have lower savings rates unless there is a commensurate increase in private savings. If aggregate savings fall, then investment and future GDP may fall as well, which would be consistent with lower sovereign ratings. A positive relationship is expected with ratings.

Current account. The current account deficit, as a measure of the difference between savings and investment, is an important measure of external vulnerability. When in deficit, the current account gives an approximation of the extent of capital imported from foreign sources. Countries that have a current account deficit are necessarily increasing their liabilities to other countries and these liabilities are, in turn, financed by financial account flows that will need to be repaid at some point. Often, countries that do not generate sufficient hard currency inflows because of a large current account deficit can experience a shortage of foreign currency necessary to service debt (Hornung et al. 2013). Indeed, in 1995, Mexico had major reversals in current account deficits when financial account flows dried up during its crisis.

Although the size of the current account deficit is important in sovereign rating analysis, the source of funding is a major consideration as well. Current account deficits that are funded through more crisis-resistant foreign direct investment are far less vulnerable than deficits funded through portfolio inflows, which can quickly reverse

during sovereign stress. Agencies will routinely analyse the composition of the financial account inflows, and countries with larger and more volatile short-term financing, such as fixed income or equity flows, can be penalised in their sovereign rating.

As with most economic statistics, the interpretation of the size, trend and composition of the current account deficit requires discretion. A large current account deficit implies by definition that there is a current abundance of investment relative to savings, which is often associated with economic growth. At other times, a large deficit can be attributed to a weak export base, which may be related to an overvalued currency or other unidentified competitiveness issue. A positive relationship with ratings is expected.

Governance measures. For the purposes of this study, World Bank measures of global governance are used. Specifically, the World Bank produces six measures of governance, namely *government effectiveness, voice and accountability, political stability and absence of violence, regulatory quality, rule of law and control of corruption*. According to the World Bank (Worldwide Governance Indicators 2015:para. 1), in the aggregate, these six concepts measure the quality and scope of governance across 200 countries:

Governance consists of the traditions and institutions by which authority in a country is exercised. This includes the process by which governments are selected, monitored and replaced; the capacity of the government to effectively formulate and implement sound policies; and the respect of citizens and the state for the institutions that govern economic and social interactions among them.

The governance indicators draw on over 30 data sources that include household surveys, business surveys and NGO datasets (see table 3.2).

African Development Bank Country Policy and Institutional Assessments (ADB)
 African Electoral Index (IRP)
 Afrobarometer (AFR)
 Asian Development Bank Country Policy and Institutional Assessments (ASD)
 Business Enterprise Environment Survey (BPS)
 Bertelsmann Transformation Index (BTI)
 Cingranelli Richards Human Rights Database (HUM)
 European Bank for Reconstruction and Development Transition Report (EBR)
 Economist Intelligence Unit (EIU)
 Freedom House (FRH)
 Freedom House -- Countries at the Crossroads (CCR)
 Global Corruption Barometer Survey (GCB)
 Global Competitiveness Report (GCS)
 Global Insight Business Condition and Risk Indicators (WMO)
 Global Integrity Index (GII)
 Gallup World Poll (GWP)
 Heritage Foundation Index of Economic Freedom (HER)
 IFAD Rural Sector Performance Assessments (IFD)
 iJET Country Security Risk Ratings (IJT)
 Institute for Management & Development World Competitiveness Yearbook (WCY)
 Institutional Profiles Database (IPD)
 International Research & Exchanges Board Media Sustainability Index (MSI)
 International Budget Project Open Budget Index (OBI)
 Latinobarometro (LBO)
 Political Economic Risk Consultancy (PRC)
 Political Risk Services International Country Risk Guide (PRS)
 Political Terror Scale (PTS)
 Reporters Without Borders Press Freedom Index (RSF)
 US State Department Trafficking in People Report (TPR)
 Vanderbilt University's Americas Barometer (VAB)
 World Bank Country Policy and Institutional Assessments (PIA)
 World Justice Project Rule of Law Index (WJP)

Table 3.2: Sources for the construction of the World Bank governance indicators

(Worldwide Governance Indicators 2015)

Each of the World Bank governance indicators is created by a multistep process. First, individual responses from the underlying data surveys are split into each of the six different conceptual topics. For example, a question from the global integrity survey related to bribes would be included in the calculation of the control of corruption measure. Importantly, because the 30+ data sources do not always cover each country,

the calculation of each measure for each country will often use different underlying data. South Africa's government effectiveness measure includes data from the Afrobarometer survey, unlike Brazil or any other Latin American countries, of course.

In the second step of creating the indicators, the individual source data are rescaled from 0 to 1. In the final step, the World Bank uses an unobserved components model to build a weighted average of the individual indicators. This model assigns higher weights to data sources that are more strongly correlated with each other (Kaufmann, Kraay & Mastruzzi 2011).

Government effectiveness. Although this metric includes factors relating to the quality of public services, it is primarily focused on the quality of public and fiscal policy overall. Given the previous discussion on the potential for fiscal factors to determine sovereign ratings, as well as inflation, this factor is a prime candidate itself. It measures the extent of government budget management, revenue mobilisation and public administration. In terms of monetary factors, it measures the extent to which political factors influence monetary policy. Lastly, it incorporates how governments are able to react to crises. Namely, it reflects the speed with which government economic policies adapt to changes in the economy. A positive relationship for this measure, as well as the other five governance measures discussed below, is expected with ratings.

Voice and accountability. CRAs rely on transparent, timely and accurate sovereign economic and financial statistics, and this factor attempts to gauge these factors. Moreover, it includes factors relating to the degree of transparency in policymaking, freedom of the press, effectiveness of legislation, confidence in policymakers and freedom of entry for foreigners.

Political stability and absence of violence. At the extreme, high levels of terrorism, protests and other conflicts can cause significant economic and financial disruptions. In even moderate levels, social conflict can erode domestic investment and confidence in the economy. This measure captures the social tensions within a country, as well as across regional geographies.

Regulatory quality. CRAs examine the extent of distortionary economic policies, such as price controls and discriminatory tariffs. This measure aggregates several factors: government regulation burdens, ease of starting a new business, ease of investment; efficiency of competition, and the extent of regulatory burdens in a country.

Rule of Law. Countries with a stronger, more transparent rule of law tend to attract greater investment and instill more confidence, driving a stronger sovereign credit rating. This measure includes “*quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence*” (Worldwide Governance Indicators 2015:para. 3). It specifically measures property rights, confidence in the judicial system, the timeliness of judicial decisions, the degree of enforcement of court orders, intellectual property rights protection and general private property protection and risk of government expropriation.

Corruption. Countries with lower levels of corruption have higher levels of trust in the business and economic environments which, in turn, influences foreign and domestic investment in the country and the subsequent sovereign rating. Corruption is an amorphous concept of risk that domestic economic participants, including individuals and companies, as well as foreign investors will encounter “public power being exercised for private gain” (Worldwide Governance Indicators 2015:para. 3). This

includes corruption among public officials, public trust in politicians, diversion of public funds, irregular payments in tax collection, petty corruption between local officials and citizens and the level of corruption between domestic and foreign companies.

Sovereign ratings. Given the choice of statistical modelling technique (multiple linear regression), sovereign ratings were translated from their letter rating into numerical codes according to a linear transformation. As discussed in the literature review, agencies not only assign a letter rating, for example, “BBB+” or “BB-“, but also a rating “outlook” that describes the subtle posture of the agency towards the sovereign rating. These outlooks are “positive”, “stable” or “negative” and are critical in understanding the differences between credits that are given the same letter rating. For example, both Romania and Russia are assigned a BBB- rating by S&P as of 2014, but Russia receives a negative outlook based on heightened political risk and vulnerability to oil prices versus Romania, which has a stable outlook. In another example, South Africa and Spain are both BBB+ rated countries by Fitch as of 2014, but have negative and stable outlooks, respectively. South Africa is given a negative outlook owing to vulnerabilities in the electrical grid, and weakness in major commodity export prices such as gold and platinum. To the author’s knowledge, the present study is the only one that captures these subtle but vitally important differences in ratings outlooks.

In total, eight sovereign rating variables were constructed. Each of the three CRAs assigns long-term foreign and local-currency ratings and all six of these were transformed, according to figure 3.2.

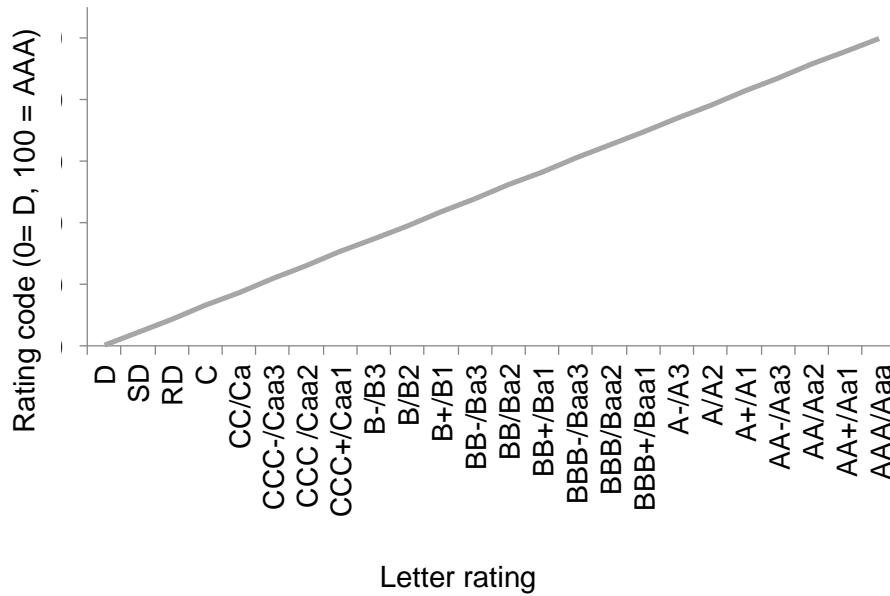


Figure 3.2: Transformation scheme for letter ratings

The current study, unlike the extant research, accounts for subtle differences in letter ratings, so-called "outlooks." These outlooks are critical because they are often the first indicator of an imminent change in the letter rating. To include the rating outlook as part of the final score, the letter rating is adjusted according to the transformation scheme described in figure 3.3. For example, if a country is rated "BB negative" by S&P, it would receive a score of 52.2 for its "BB" rating less an adjustment of 2.2 for its negative outlook.

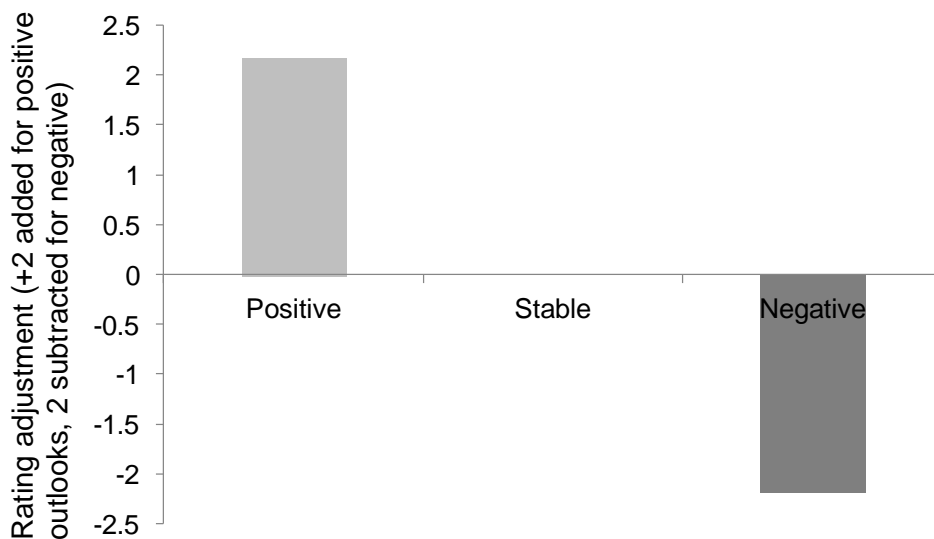


Figure 3.3: Transformation scheme for outlooks

Two aggregate measures were created. The first averaged long-term foreign-currency ratings and outlooks of the three agencies, while the second averaged the local-currency ratings and outlooks of the agencies. As an example, consider the calculation of the average long-term foreign-currency score for Guatemala in table 3.3.

Guatemala		
	Rating/outlook	Transformation
S&P rating	BB	52.2
S&P outlook	Negative	-2.2
S&P total		50.0
Fitch rating	BB+	56.5
Fitch outlook	Stable	0.0
Fitch total		56.5
Moody's rating	Ba1	56.5
Moody's outlook	Stable	0.0
Moody's total		56.5
Final rating score		54.4

Table 3.3: Example of calculation of average long-term foreign-currency score for

Guatemala

3.4 RESEARCH HYPOTHESES

Based on the literature review, agency methodology reports and economic intuition that identify potential predictors of sovereign ratings, three primary hypotheses were formulated:

Hypothesis 1. Measures of wealth, economic growth, monetary stability, fiscal prudence, balance of payments vulnerability and governance predict both EM local and foreign-currency credit ratings.

The proposed pairwise correlations are expected to be as follows in table 3.4.

Expected correlation (+ = associated with stronger sovereign ratings)	
GDP growth	+
GDP level	+
GDP per capita	+
Unemployment rate	-
Inflation	-
Current account	+
Investment	+
Savings	+
Fiscal balance	+
Primary balance	+
Gross debt	-
Net debt	-
Government effectiveness	+
Voice and accountability	+
Political stability	+
Regulatory quality	+
Rule of law	+
Control of corruption	+

Table 3.4. Expected pairwise correlations between factors and sovereign ratings

Even if each of these individual relationships holds, it may be difficult to anticipate the precise multivariate model that will eventually be specified, given the mediating and moderating impacts of independent variables on one another. However, given that there are approximately four broad factors that are reliably identified in both the literature review and rating agency methodological papers, the current study chose one factor from each of these categories for the final model.

Hypothesis 2. Measures of policy strength, political stability and institutional frameworks predict both EM local and foreign-currency ratings.

Given hypotheses 1 and 2, in which stronger economic measures and better governance were proposed to positively impact sovereign ratings, it was compelling to examine potential moderating factors amongst these variables – that is, if more economic development and better governance predict stronger sovereign ratings, then how do different levels of economic development influence the extent to which governance, in turn, impacts ratings? Hypothesis 3 sought to answer this question.

Even within EMs, there is significant variability in economic strength. Countries such as Uruguay, Greece and Argentina have GDP per capita levels that are 5-10X those of more “frontier markets” such as Uganda, Mozambique, India and Honduras. In frontier markets in which economic development is in its earliest stages, CRAs may rely even more on subjective measures of governance to determine sovereign strength. Moreover, in countries that have relatively weaker economic fundamentals, agencies may rely disproportionately on measures of the extent to which current distortionary

monetary and fiscal policies may impact future growth and, in turn, sovereign ratings. This rationale implies a positive interaction between the development of a country and measures of governance.

Hypothesis 3. The lower the development of a country, the more important the six measures of governance become in predicting both EM local and foreign-currency ratings.

CHAPTER 4: ANALYSIS AND EMPIRICAL FINDINGS

This chapter starts with a discussion of the dataset used, as well as associated descriptive statistics. The chapter then focuses on correlation analyses amongst the agency ratings, and the proposed determinants of those ratings, continuing with inferential statistical analyses for each of the three primary hypotheses. It concludes with an analysis of the predictive power of the sovereign rating models, as well as a broader discussion of the results.

4.1 DESCRIPTIVE STATISTICS

A total of 89 EM countries were included in the final dataset. The dataset was not perfectly “balanced” and for some of the more frontier markets, such as Cuba and Andorra, reliable data were not available at all. Nevertheless, the final multiple regressions included 84 countries, well over the average of only 40 EM countries from papers described in the literature review.

Based on the descriptive statistics in tables 4.1, 4.2 and 4.3, in which the set of EM countries is divided into approximately equal thirds based on rating, several clear patterns emerged. First, as expected, stronger rated countries tend to be wealthier (*GDP per capita*), with lower *inflation*, stronger external accounts (*current account*), better *fiscal balances*, lower *debt* burdens and better *governance* versus lower rated countries. Each of the agencies assigns ratings based on forecasted strength across economic and governance factors. One-year forward forecasts of each of the economic variables were therefore used whenever possible.

	Average LC rating	Average FC rating	GDP growth	GDP level	GDP per capita	Unemployment rate	Inflation	Current account	Investment	Savings	Fiscal balance	Primary balance	Gross debt	Net debt	Government effectiveness	Voice and accountability	Political stability	Regulatory quality	Rule of law	Control of corruption
Mean	72.4	70.8	3.5	490.5	10201.1	7.4	3.1	-2.2	25.4	23.0	-2.6	-1.3	40.1	25.4	66.3	55.5	50.4	69.4	62.7	56.8
Median	73.2	70.3	3.2	181.9	9646.9	7.0	2.4	-1.6	24.4	21.8	-2.4	-0.8	42.1	26.0	65.5	60.5	50.5	70.5	63.5	54.0
Maximum	88.4	85.5	7.1	4777.9	18453.0	19.6	8.6	5.4	36.6	37.7	0.4	1.6	65.3	63.4	84.0	85.0	85.0	93.0	88.0	91.0
Minimum	60.9	58.0	1.3	12.1	1820.8	0.8	-0.2	-18.1	18.8	5.6	-11.2	-9.7	10.8	-25.5	44.0	5.0	11.0	35.0	33.0	26.0
Std. Dev.	8.4	8.6	1.5	1004.7	4878.0	3.8	2.3	4.6	4.6	6.8	2.3	2.3	16.3	23.9	12.2	22.8	25.1	14.6	16.9	18.2
Skewness	0.3	0.3	1.2	3.4	0.1	1.2	1.0	-1.5	0.8	-0.1	-2.1	-2.5	-0.4	-0.4	-0.2	-0.6	-0.2	-0.5	-0.3	0.2
Kurtosis	2.0	1.9	3.5	14.3	1.9	5.9	3.3	6.9	2.9	3.4	8.4	9.1	2.2	2.4	2.0	2.4	1.6	2.8	1.9	2.4
N	26	26	26	26	26	23	26	26	26	26	26	26	26	16	26	26	26	26	26	26

Table 4.1: Descriptive statistics for BBB- or better countries

	Average LC rating	Average FC rating	GDP growth	GDP level	GDP per capita	Unemployment rate	Inflation	Current account	Investment	Savings	Fiscal balance	Primary balance	Gross debt	Net debt	Government effectiveness	Voice and accountability	Political stability	Regulatory quality	Rule of law	Control of corruption
Mean	49.8	49.6	3.6	188.3	5772.9	8.0	4.2	-3.8	21.7	18.6	-4.1	-1.8	52.3	57.8	47.4	43.9	41.0	48.0	45.0	42.4
Median	47.8	47.8	3.7	50.0	4217.1	6.5	3.4	-3.9	20.6	16.2	-3.8	-1.7	47.9	50.1	49.0	47.0	40.0	49.0	45.0	43.0
Maximum	60.1	62.0	7.0	1672.9	19611.3	19.6	14.2	5.4	34.5	32.3	-1.3	1.8	125.0	118.0	80.0	84.0	73.0	79.0	84.0	79.0
Minimum	43.5	42.0	-1.0	4.3	789.3	0.0	1.1	-18.1	11.3	5.8	-10.1	-7.7	13.7	27.4	12.6	8.0	5.0	17.0	11.0	3.0
Std. Dev.	5.9	5.9	2.1	378.3	4028.6	5.9	2.8	4.6	6.2	7.0	1.9	2.0	24.6	25.2	18.2	19.7	18.1	17.3	19.2	21.7
Skewness	0.5	0.7	-0.2	2.8	1.5	0.6	1.8	-0.6	0.4	0.3	-1.1	-0.8	0.8	1.1	-0.3	0.0	-0.1	-0.1	-0.1	0.0
Kurtosis	1.8	2.1	2.6	10.2	5.7	2.5	7.0	4.5	2.3	2.2	4.4	4.0	3.7	3.7	2.3	2.4	2.2	2.2	2.3	1.9
N	32	32	31	31	31	23	31	31	29	29	31	31	31	12	31	31	31	31	31	31

Table 4.2: Descriptive statistics for B+ to BBB- countries

	Average LC rating	Average FC rating	GDP growth	GDP level	GDP per capita	Unemployment rate	Inflation	Current account	Investment	Savings	Fiscal balance	Primary balance	Gross debt	Net debt	Government effectiveness	Voice and accountability	Political stability	Regulatory quality	Rule of law	Control of corruption
Mean	35.4	35.3	3.0	77.9	4801.9	10.6	7.1	-6.3	21.6	15.6	-4.2	-1.2	66.9	83.5	38.0	45.3	38.8	39.3	35.8	34.3
Median	37.0	37.0	3.2	20.5	3287.8	10.3	5.4	-6.4	20.7	14.8	-3.7	-1.1	55.1	76.1	36.0	43.0	44.0	39.0	29.0	32.0
Maximum	42.4	42.4	7.1	578.7	17702.9	19.6	42.2	7.3	36.6	35.0	0.1	6.4	130.3	178.8	87.0	92.0	98.0	65.0	82.0	82.0
Minimum	21.7	21.7	-1.0	0.8	648.2	0.5	0.0	-18.1	8.9	2.9	-11.2	-9.7	31.5	35.1	12.6	7.0	3.0	12.7	6.8	5.0
Std. Dev.	5.2	5.2	2.4	129.5	4751.3	5.7	8.9	5.9	8.2	7.8	2.5	2.7	32.9	40.4	17.2	21.9	22.7	16.3	20.4	21.3
Skewness	-1.0	-1.0	-0.2	2.6	1.5	0.2	2.7	-0.4	0.4	0.6	-1.0	-0.4	0.7	0.9	1.0	0.4	0.4	-0.1	0.8	0.8
Kurtosis	3.4	3.5	2.3	9.7	4.3	2.0	10.5	3.4	2.1	3.0	4.2	6.5	2.2	3.4	3.8	2.5	3.1	2.0	2.6	2.8
N	27	27	27	27	27	17	27	27	26	27	27	27	27	13	27	27	27	27	27	27

Table 4.3: Descriptive statistics for B and below countries

Second, there was a high degree of intercorrelation amongst not only the three major agency ratings, but also within each agency's foreign-currency (FC) and local-currency (LC) ratings. All of the correlations amongst the six types of individual agency

ratings, as well as the two aggregate ratings, were statistically significant ($p < 0.01$) as per table 4.4.

	S&P LC rating	Fitch LC rating	Moody's LC rating	Average LC rating	S&P FC rating	Fitch FC rating	Moody's FC rating
S&P LC rating	-						
Fitch LC rating	0.975***	-					
Moody's LC rating	0.960***	0.972***	-				
Average LC rating	0.987***	0.992***	0.991***	-			
S&P FC rating	0.993***	0.972***	0.961***	0.985***	-		
Fitch FC rating	0.976***	0.991***	0.975***	0.988***	0.980***	-	
Moody's FC rating	0.960***	0.971***	1.000***	0.990***	0.961***	0.975***	-
Average FC rating	0.983***	0.986***	0.992***	0.998***	0.988***	0.993***	0.992***

Note. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4.4: Correlations amongst rating measures

4.2 HYPOTHESIS 1

Pairwise correlations between the 18 independent variables and the eight dependent variables (ratings) confirmed many, but not all, of the proposed relationships. In other words, stronger ratings are associated with larger economies (*GDP level*), wealthier citizens (*GDP per capita*), lower *unemployment*, lower *inflation*, higher *current account balances*, more *savings*, higher *fiscal balance*, lower *debt* and better *governance* (as measured using the aforementioned six World Bank metrics). The proposed positive relationship between *GDP growth* and ratings, as well as *primary balance* and ratings, was not observed across any of the eight ratings variables as indicated in table 4.5.

	S&P LC rating	Fitch LC rating	Moody's LC rating	Average LC rating	S&P FC rating	Fitch FC rating	Moody's FC rating	Average FC rating
GDP growth	-0.052	-0.193	0.138	0.08	-0.022	-0.134	0.151	0.095
GDP level	0.346***	0.312***	0.322***	0.326***	0.339***	0.341***	0.322***	0.327***
GDP per capita	0.540***	0.649***	0.461***	0.507***	0.553***	0.660***	0.469***	0.511***
Unemployment rate	-0.232	-0.222	-0.301**	-0.271**	-0.245*	-0.198	-0.276**	-0.276**
Inflation	-0.271***	-0.355***	-0.391***	-0.356***	-0.287***	-0.352***	-0.375***	-0.363***
Current account	0.374***	0.497***	0.314***	0.345***	0.371***	0.484***	0.289***	0.336***
Investment	0.204*	0.114	0.343***	0.282**	0.230**	0.126	0.326***	0.294***
Savings	0.400***	0.409***	0.485***	0.445***	0.420***	0.412***	0.462***	0.448***
Fiscal balance	0.326***	0.506***	0.301***	0.326***	0.329***	0.492***	0.300***	0.321***
Primary balance	-0.062	0.101	-0.089	0.003	-0.081	0.093	-0.067	-0.010
Gross debt	-0.441	-0.391***	-0.488***	-0.425***	-0.445***	-0.380	-0.482***	-0.427***
Net debt	-0.638***	-0.636***	-0.691***	-0.668***	-0.649***	-0.624***	-0.691***	-0.668***
Govt effectiveness	0.601***	0.663***	0.583***	0.607***	0.607***	0.668***	0.569***	0.597***
Voice and accountability	0.258***	0.329***	0.201*	0.232**	0.262**	0.333***	0.241**	0.261***
Political stability	0.319***	0.369***	0.298***	0.296***	0.353***	0.386***	0.270***	0.289***
Regulatory quality	0.645***	0.649***	0.649***	0.654***	0.646***	0.654***	0.663***	0.668***
Rule of law	0.508***	0.522***	0.529***	0.526***	0.524***	0.538***	0.536***	0.537***
Control of corruption	0.408***	0.439***	0.441***	0.424***	0.426***	0.455***	0.421***	0.412***

Note: *p < 0.10, **p < 0.05, ***p < 0.01

Table 4.5: Correlations amongst rating measures and explanatory variables

Given the tight intercorrelations amongst all eight ratings variables, there was an extremely high degree of concordance regarding the direction of the relationship with the independent variables and the agency-specific ratings variables. As indicated in table 4.6, the majority of the proposed relationships were in the predicted direction.

		Expected correlation (+ = associated with stronger sovereign ratings)				Actual correlations			
		S&P LC rating	Fitch LC rating	Moody's LC rating	Average LC rating	S&P FC rating	Fitch FC rating	Moody's FC rating	Average FC rating
GDP growth	+	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
GDP level	+	+	+	+	+	+	+	+	+
GDP per capita	+	+	+	+	+	+	+	+	+
Unemployment rate	-	n.s.	n.s.	-	-	-	n.s.	-	-
Inflation	-	-	-	-	-	-	-	-	-
Current account	+	+	+	+	+	+	+	+	+
Investment	+	+	n.s.	+	+	+	n.s.	+	+
Savings	+	+	+	+	+	+	+	+	+
Fiscal balance	+	+	+	+	+	+	+	+	+
Primary balance	+	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Gross debt	-	n.s.	-	-	-	-	n.s.	-	-
Net debt	-	-	-	-	-	-	-	-	-
Government effectiveness	+	+	+	+	+	+	+	+	+
Voice and accountability	+	+	+	+	+	+	+	+	+
Political stability	+	+	+	+	+	+	+	+	+
Regulatory quality	+	+	+	+	+	+	+	+	+
Rule of law	+	+	+	+	+	+	+	+	+
Control of corruption	+	+	+	+	+	+	+	+	+

Table 4.6: Expected and actual signs of correlations between predictors and sovereign ratings (+ = sig. positive relationship, - = sig. negative relationship, n.s. = not significant)

With nearly all of the pairwise relationships in the predicted direction, one variable from each category was chosen based on 1) the strength of the linear relationship, and 2) the economic rationale. In the first iteration, multiple regression analysis was used to test the joint impact of *GDP per capita*, *net debt*, *current account deficit* and *regulatory quality*. The results of the regression indicated that the four predictors explained 83.1% of the variance in the average foreign-currency rating ($R^2 = .831$, $F(4, 40) = 44.162$, $p < 0.01$), and 81.9% of the variance in the average local-currency rating ($R^2 = .819$, $F(4, 40) = 40.710$, $p < 0.01$). Each of the variables was significant and in the predicted direction, as per table 4.7.

	Model 1a: Average FC rating			Model 1b: Average LC rating		
	B	SE of B	β	B	SE of B	β
C	41.955***	4.560		42.225***	4.935	
Regulatory quality	0.354***	0.088	0.441	0.384***	0.096	0.457
GDP per capita	0.001*	0.000	0.184	0.000	0.000	0.154
Net debt	-0.225***	0.031	-0.544	-0.233***	0.033	-0.539
Current account	0.435*	0.254	0.124	0.474*	0.274	0.129
Countries	41			41		
R ²	0.831			0.819		
Adj-R ²	0.812			0.799		
SE	6.914			7.482		
Durbin-Watson	2.438			2.465		
F-statistic	44.162***			40.710***		

Note. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4.7: Results of regression predicting average agency foreign and local-currency ratings

Even though the correlation amongst all of the agency ratings is quite high, there is still some risk of “aggregation error” when combining several variables into one (Van de Vijver & Poortinga 2002). These four variables were thus regressed against each of the six individual measures of sovereign ratings. Interestingly, there is indeed some evidence of this aggregation error: for example, *GDP per capita* and *current account* did not reach statistical significance in the prediction of Moody’s foreign-currency rating, and *current account* was not significant in any of the individual regressions, although it was in the predicted direction, as shown in tables 4.8 and 4.9.

	Model 1c: S&P FC rating			Model 1d: Moody's FC rating			Model 1e: Fitch FC rating		
	B	SE of B	β	B	SE of B	β	B	SE of B	β
C	42.559***	4.682		39.187***	5.549		42.96***	4.720	
Regulatory quality	0.313***	0.090	0.416	0.415***	0.108	0.457	0.304***	0.090	0.451
GDP per capita	0.001*	0.000	0.226	0.001	0.000	0.163	0.001*	0.000	0.247
Net debt	-0.204***	0.030	-0.533	-0.258***	0.037	-0.560	-0.181***	0.035	-0.443
Current account	0.377	0.283	0.102	0.287	0.283	0.076	0.251	0.313	0.070
Countries	39			38			32		
R ²	0.821			0.833			0.824		
Adj-R ²	0.800			0.813			0.798		
SE	6.747			7.7			6.256		
Durbin-Watson	2.481			2.731			1.892		
F-statistic	38.901***			41.097***			31.660***		

Note. *p < 0.10, **p < 0.05, ***p < 0.01

Table 4.8: Results of regression predicting the S&P, Moody's and Fitch foreign-currency ratings

	Model 1f: S&P LC rating			Model 1g: Moody's LC rating			Model 1h: Fitch LC rating		
	B	SE of B	β	B	SE of B	β	B	SE of B	β
C	41.828***	5.536		39.090***	5.568		43.643***	5.349	
Regulatory quality	0.374***	0.106	0.459	0.425***	0.109	0.471	0.357***	0.102	0.491
GDP per capita	0.000	0.000	0.163	0.000	0.000	0.140	0.000	0.000	0.178
Net debt	-0.211***	0.036	-0.511	-0.254***	0.037	-0.555	-0.199***	0.040	-0.454
Current account	0.393	0.335	0.099	0.35	0.292	0.092	0.257	0.354	0.066
Countries	39			37			32		
R ²	0.785			0.835			0.807		
Adj-R ²	0.759			0.814			0.778		
SE	7.977			7.726			7.091		
Durbin-Watson	2.478			2.726			1.643		
F-statistic	30.984***			40.376***			28.181***		

Note. *p < 0.10, **p < 0.05, ***p < 0.01

Table 4.9: Results of regression predicting the S&P, Moody's and Fitch local-currency ratings

Although the previous regression has excellent predictive power relative to models published in other research (Afonso 2003; Afonso et al. 2011; Butler & Fauver 2006; Mellios & Paget-Blanc 2006; Rowland 2004; Rowland & Torres 2005), it has a disappointing sample size of only 41 countries because few countries report *net debt*. Even though *net debt* would be the preferred measure of sovereign weakness indicated by both economic intuition and the bivariate correlations in table 4.5 there is still a

strong correlation between *net debt* and *gross debt* ($r = 0.94$, $p < 0.01$) and there is a similarly strong correlation between *gross debt* and sovereign ratings ($r = -0.31$ to -0.38 depending on the ratings specification, $p < 0.05$).

Hence consistent with the primary research objective of identifying the determinants of ratings amongst as many EMs as possible, the decision was made to respecify the regression using *gross debt* instead of *net debt*. When the regressions were rerun, the sample size doubled to 84 countries and the four predictors explained 70.1% of the variance in the average foreign-currency rating ($R^2 = .701$, $F(4, 84) = 46.358$, $p < 0.01$) and 69.9% of the variance in the average local-currency rating ($R^2 = .699$, $F(4, 84) = 45.795$, $p < 0.01$), as per table 4.10.

	Model 2a: Average FC rating			Model 2b: Average LC rating		
	B	SE of B	β	B	SE of B	β
C	41.760***	3.326		42.109***	3.465	
Regulatory quality	0.387***	0.060	0.500	0.403***	0.062	0.502
GDP per capita	0.001***	0.000	0.243	0.001***	0.000	0.234
Gross debt	-0.249***	0.036	-0.437	-0.256***	0.038	-0.432
Current account	0.555***	0.190	0.187	0.610***	0.197	0.198
Countries	84			84		
R ²	0.701			0.699		
Adj-R ²	0.686			0.683		
SE	8.779			9.147		
Durbin-Watson	1.578			1.568		
F-statistic	46.358***			45.795***		

Note. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4.10: Results of regression predicting average agency foreign and local-currency ratings

The regressions using individual measures from each agency showed remarkable robustness, and across all six measures, the determinants of ratings were significant and in the predicted direction, as shown in tables 4.11 and 4.12.

	Model 2c: S&P FC rating			Model 2d: Moody's FC rating			Model 2e: Fitch FC rating		
	B	SE of B	β	B	SE of B	β	B	SE of B	β
C	44.603***	3.468		43.006***	3.712		47.28***	3.337	
Regulatory quality	0.316***	0.065	0.417	0.423***	0.066	0.510	0.234***	0.062	0.353
GDP per capita	0.001***	0.000	0.301	0.001***	0.000	0.209	0.001***	0.000	0.382
Gross debt	-0.233***	0.035	-0.443	-0.307***	0.041	-0.487	-0.182***	0.037	-0.355
Current account	0.599***	0.191	0.208	0.435**	0.205	0.138	0.675***	0.220	0.230
Countries	75			85			61		
R ²	0.710			0.705			0.729		
Adj-R ²	0.694			0.689			0.710		
SE	8.335			9.444			7.312		
Durbin-Watson	1.640			1.751			1.766		
F-statistic	42.896***			44.224***			37.678***		

Note: *p < 0.10, **p < 0.05, ***p < 0.01

Table 4.11: Results of regression predicting the S&P, Moody's and Fitch foreign-currency ratings

	Model 2f: S&P LC rating			Model 2g: Moody's LC rating			Model 2h: Fitch LC rating		
	B	SE of B	β	B	SE of B	β	B	SE of B	β
C	44.671***	3.752		43.631***	3.952		48.954***	3.774	
Regulatory quality	0.348***	0.070	0.432	0.418***	0.071	0.497	0.247***	0.071	0.342
GDP per capita	0.001***	0.000	0.276	0.001**	0.000	0.204	0.001***	0.000	0.369
Gross debt	-0.242***	0.038	-0.434	-0.307***	0.043	-0.488	-0.194***	0.040	-0.356
Current account	0.656***	0.206	0.215	0.492**	0.225	0.150	0.763***	0.238	0.245
Countries	75			74			60		
R ²	0.699			0.702			0.722		
Adj-R ²	0.682			0.684			0.702		
SE	9.020			9.703			7.919		
Durbin-Watson	1.676			1.790			1.372		
F-statistic	40.709***			40.545***			35.689***		

Note: *p < 0.10, **p < 0.05, ***p < 0.01

Table 4.12: Results of regression predicting the S&P, Moody's and Fitch local-currency ratings

4.3 HYPOTHESIS 2

As indicated in table 4.5 there are extremely strong correlations 1) amongst each of the six governance measures, and 2) between each governance measure and sovereign ratings. It was thus expected that hypothesis 2 would also be evidenced in regression analyses.

To test the joint impact of all six measures of governance against local and foreign-currency average ratings, a multiple regression analysis was performed. The results of the regression in table 4.13 indicated that the six predictors explained 52.0% of the variance in the average foreign-currency rating ($R^2 = .520$, $F(6, 80) = 13.165$, $p < 0.01$), and 51.1% of the variance in the average local-currency rating ($R^2 = .511$, $F(6, 79) = 12.542$, $p < 0.01$). When controlling for the cumulative effects of all other variables, *government effectiveness* and *regulatory quality* were significant and in the predicted direction. In Model 3a, *control of corruption* and *voice and accountability* have coefficients opposite to the predicted directions and that are significant at the 5% and 10% level, respectively. In Model 3b, *government effectiveness* and *regulatory quality* continued to be significant and in the predicted direction, while *voice and accountability* was significant at the 5% level, but in the opposite direction that was predicted.

	Model 3a: Agency FC Average Total			Model 3b: Agency LC Average Total		
	B	SE of B	β	B	SE of B	β
C	24.987***	3.773		25.194***	3.969	
Voice and accountability	-0.133*	0.083	-0.189	-0.150**	0.089	-0.202
Political Stability	-0.003	0.082	-0.004	-0.009	0.087	-0.013
Government effectiveness	0.316***	0.140	0.398	0.372***	0.150	0.457
Regulatory quality	0.458***	0.119	0.603	0.447***	0.128	0.560
Rule of law	0.056	0.164	0.077	0.024	0.173	0.032
Control of corruption	-0.209**	0.124	-0.297	-0.188	0.132	-0.259
Countries	80			79		
R ²	0.520			0.511		
Adj-R ²	0.480			0.470		
SE	10.996			11.462		
Durbin-Watson	2.000			1.931		
F-statistic	13.165***			12.542***		

Note. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4.13: Results of regression predicting average agency foreign and local-currency ratings

Even with the two variables removed that were not significant in model 3a, namely *political stability* and *rule of law*, the subsequent regressions in models 4a and 4b continued to show counterintuitive relationships between *voice and accountability*, as well as *control of corruption*, and sovereign ratings as per table 4.14.

	Model 4a: Average FC rating			Model 4b: Average LC rating		
	B	SE of B	β	B	SE of B	β
C	24.742***	3.617		25.058***	3.837	
Voice and accountability	-0.129**	0.075	-0.183	-0.152**	0.080	-0.204
Government effectiveness	0.333***	0.129	0.419	0.379***	0.136	0.465
Regulatory quality	0.473***	0.109	0.623	0.453***	0.120	0.569
Control of corruption	-0.188***	0.096	-0.267	-0.182**	0.102	-0.251
Countries	80			79		
R ²	0.519			0.511		
Adj-R ²	0.493			0.484		
SE	10.858			11.308		
Durbin-Watson	2.021			1.932		
F-statistic	20.225***			19.321***		

Note. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4.14: Results of regression predicting average agency foreign and local-currency ratings

4.4 HYPOTHESIS 3

Analyses for hypotheses 1 and 2 quantified the relative impact of stronger economic and governance measures on sovereign ratings. To test the final hypothesis that different levels of economic development impact the extent to which governance measures influence ratings, multiple regression analyses were used with interaction effects. The results across models 6 to 11, in the appendix, indicate the absence of interaction effects. Levels of economic development and governance do not measurably impact the other's effect on sovereign ratings, at least in the current dataset.

4.5 ACCURACY ANALYSES

Given the high R^2 of models 1a, 1b, 2a and 2b, further analyses were conducted to examine the in-sample accuracy. These residual analyses were done in three steps, proceeding from an aggregate level of data analysis down to a country-specific level. First, the models were examined for their ability to anticipate existing ratings. Second, residuals were analysed for their behaviour across different rating categories. Finally, six countries whose ratings were most poorly predicted were examined for potential reasons for the disparity between actual and fitted ratings.

Models 1a and 1b, specified using *regulatory quality*, *GDP per capita*, *net debt* and *current account* to predict the variation in foreign and local-currency sovereign ratings, respectively, performed well in accuracy tests. Models 1a and 1b have fitted ratings that are within two notches of the actual rating in 82.9% and 78.0% of the sample, respectively. Models 2a and 2b have fitted ratings that are within two notches of the actual rating in 73.8% and 69.0% of the sample, respectively, as described in table 4.15 and figure 4.1.

Difference between fitted rating vs actual rating	Model 1a	Model 1b	Model 2a	Model 2b
Less than 1 notch	34.1%	36.6%	34.5%	40.5%
Between 1-2 notches	48.8%	41.5%	39.3%	28.6%
More than 2+ notches	17.1%	22.0%	26.2%	31.0%
Countries	41	41	84	84

Table 4.15: Accuracy of regression models in predicting actual ratings

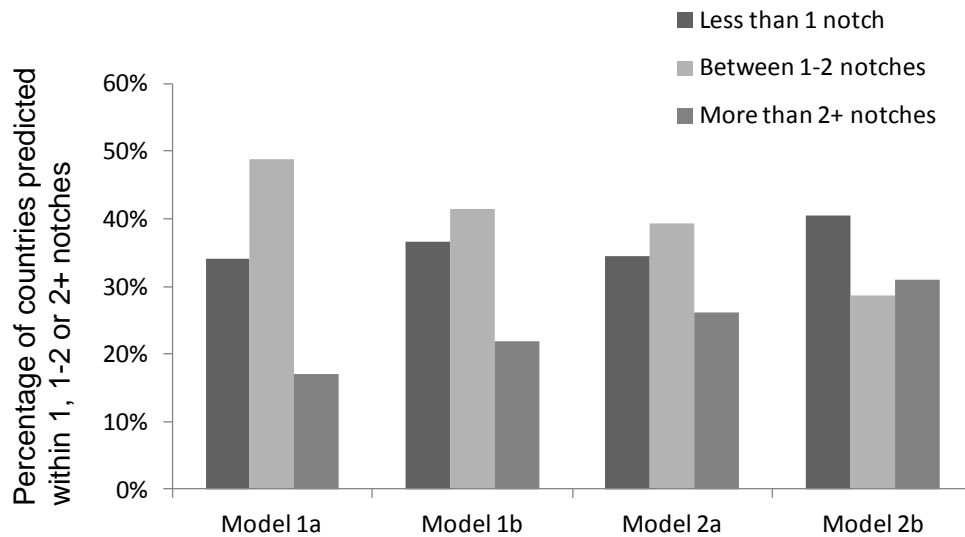


Figure 4.1: Relative accuracy of regression models in predicting actual ratings

Overall, the average absolute values of the residuals for models 1a, 1b, 2a and 2b were 5.5, 5.9, 6.7 and 7.1 respectively (on a scale of 0-100; see figure 3.2). Given the linear transformation that specifies that a one-notch difference is equivalent to “4.3” in the transformed rating scale, the models performed exceptionally well. With the normal caveats of aggregation errors, the models were usually within 1-2 rating notches.

Disaggregating the results further, there is a positive correlation between model 1a residuals and actual foreign-currency rating ($r = 0.42$, $p < 0.01$) as well as model 1b residuals and actual local-currency rating ($r = 0.34$, $p < 0.05$), noted in table 4.16.

	Model 1a residual	Model 1b residual	Average foreign-currency rating
Model 1a residual	-		
Model 1b residual	0.995***	-	
Average foreign-currency rating	0.411***	0.331**	-
Average local-currency rating	0.421***	0.341**	0.998***

Note. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4.16: Correlation amongst model residuals and actual ratings

Optically, models 1a and 1b seem to perform best for EM countries that are moderately rated (see figure 4.2).

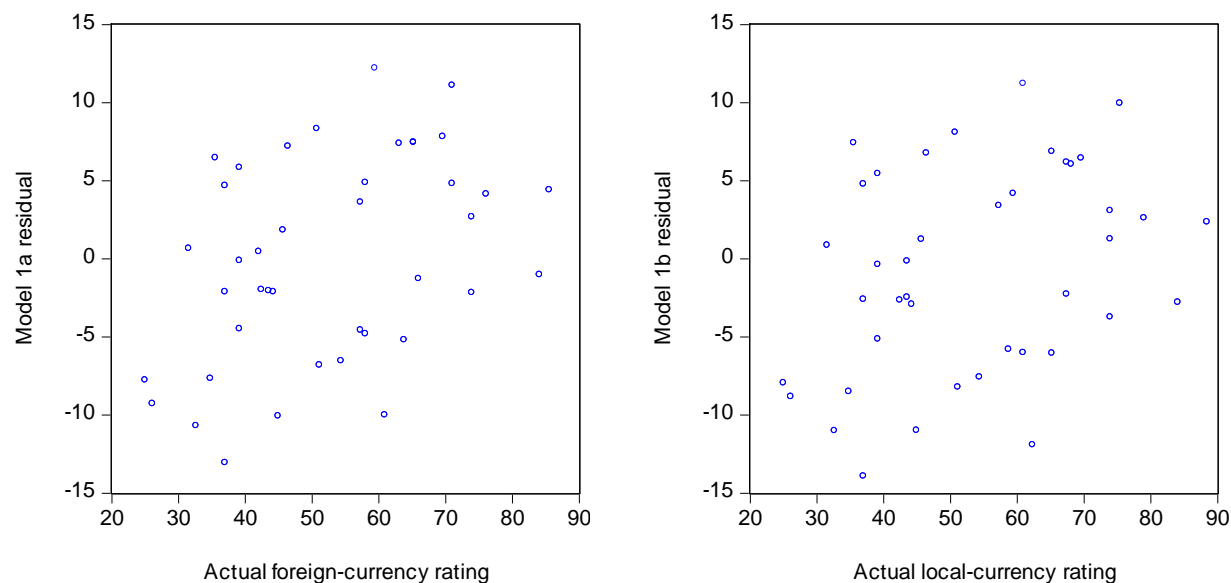


Figure 4.2: Model residuals versus actual foreign and local-currency ratings

Similarly, there is a positive correlation between model 2a residuals and actual foreign-currency rating ($r = 0.546$, $p < 0.01$) as well as model 2b residuals and actual local-currency rating ($r = 0.548$, $p < 0.01$), shown in table 4.17.

	Model 2a residual	Model 2b residual	Average foreign-currency rating
Model 2a residual	-		
Model 2b residual	0.994***	-	
Average foreign-currency rating	0.547***	0.543***	-
Average local-currency rating	0.546***	0.549***	0.998***

Note. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4.17: Correlation amongst model residuals and actual ratings

Models 2a and 2b also seem to perform best in moderately rated EM countries as per figure 4.3.

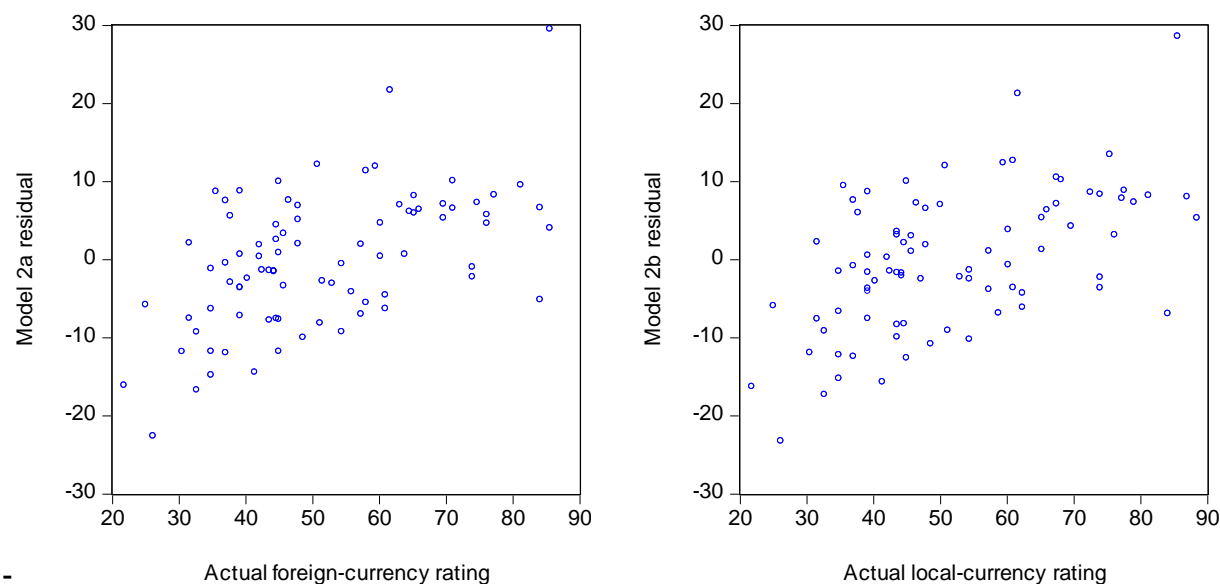


Figure 4.3: Model residuals versus actual foreign and local-currency ratings

As shown in table 4.18, in which countries are sorted from the largest to smallest absolute value of residuals of model 1a, several countries are identified with exceedingly large residuals. Bosnia-Herzegovina, for example, is overrated (model

rating is stronger than actual rating) by three notches. According to the model, Bosnia-Herzegovina is rated to be approximately a BB sovereign (a rating code of ~50), but it is rated much lower, near B- (a rating code of ~37). Morocco and Mexico are both underrated by over two notches, St. Vincent and the Grenadines, as well as the Dominican Republic, were both overrated by nearly 2.5 notches as well. Actual ratings, fitted ratings and residuals by country for models 1a and 1b are provided in table 4.17, while model 1a and 1b residuals are summarized in figures 4.4 and 4.5.

	Actual foreign-currency rating	Actual local-currency rating	Model 1a fitted rating	Model 1b fitted rating	Absolute value, Model 1a residual	Absolute value, Model 1b residual
Bosnia-Herzegovina	36.961	36.961	50.011	50.865	13.050	13.904
Morocco	59.423	60.873	47.204	48.206	12.220	12.667
Mexico	71.017	75.364	59.911	61.047	11.106	14.317
St. Vincent	32.614	32.614	43.296	43.614	10.683	11.001
Dominican Republic	44.932	44.932	54.979	55.904	10.048	10.973
Bulgaria	60.873	62.322	70.864	72.783	9.991	10.462
Greece	26.093	26.093	35.357	34.904	9.265	8.812
Bolivia	50.728	50.728	42.392	42.631	8.336	8.097
Mauritius	69.568	69.568	61.742	63.124	7.826	6.444
Ukraine	25.006	25.006	32.761	32.937	7.756	7.931
Ghana	34.788	34.788	42.444	43.284	7.657	8.496
Panama	65.220	65.220	57.754	58.348	7.466	6.872
Colombia	65.220	68.118	57.766	59.154	7.454	8.964
South Africa	63.046	67.394	55.651	56.869	7.395	10.524
Vietnam	46.381	46.381	39.174	39.612	7.207	6.769
Macedonia	51.091	51.091	57.883	59.306	6.793	8.215
Costa Rica	54.351	54.351	60.877	61.921	6.526	7.569
Lebanon	35.512	35.512	29.042	28.095	6.471	7.417
Cape Verde	39.135	39.135	33.295	33.683	5.840	5.452
Uruguay	63.771	65.220	68.955	69.813	5.184	4.593
Brazil	57.974	59.423	53.090	53.793	4.884	5.630
Peru	71.017	73.915	66.200	67.937	4.817	5.978
Turkey	57.974	60.873	62.764	63.977	4.790	3.104
Egypt	36.961	36.961	32.266	32.170	4.695	4.791
Hungary	57.250	58.699	61.812	63.031	4.562	4.332
Zambia	39.135	39.135	43.602	44.268	4.467	5.133
Chile	85.508	88.407	81.102	83.137	4.406	5.270
Poland	76.089	78.987	71.945	73.470	4.144	5.517
Portugal	57.250	57.250	53.623	53.846	3.627	3.404
Latvia	73.915	73.915	71.233	72.644	2.682	1.271
Lithuania	73.915	73.915	76.082	77.637	2.167	3.722
Pakistan	36.961	36.961	39.065	39.547	2.104	2.586
Serbia	44.207	44.207	46.311	47.115	2.104	2.908
Fiji	43.483	43.483	45.533	45.944	2.050	2.462
Albania	42.396	42.396	44.364	45.039	1.968	2.643
Jordan	45.656	45.656	43.822	44.406	1.834	1.251
Kazakhstan	65.945	67.394	67.210	68.211	1.265	0.818
Estonia	84.059	84.059	85.069	86.839	1.009	2.780
Belize	31.527	31.527	30.854	30.656	0.673	0.871
Kenya	42.033	43.483	41.571	42.185	0.463	1.298
Cameroon	39.135	39.135	39.241	39.494	0.106	0.359

Table 4.18: Actual ratings, fitted ratings and residuals by country for models 1a and 1b

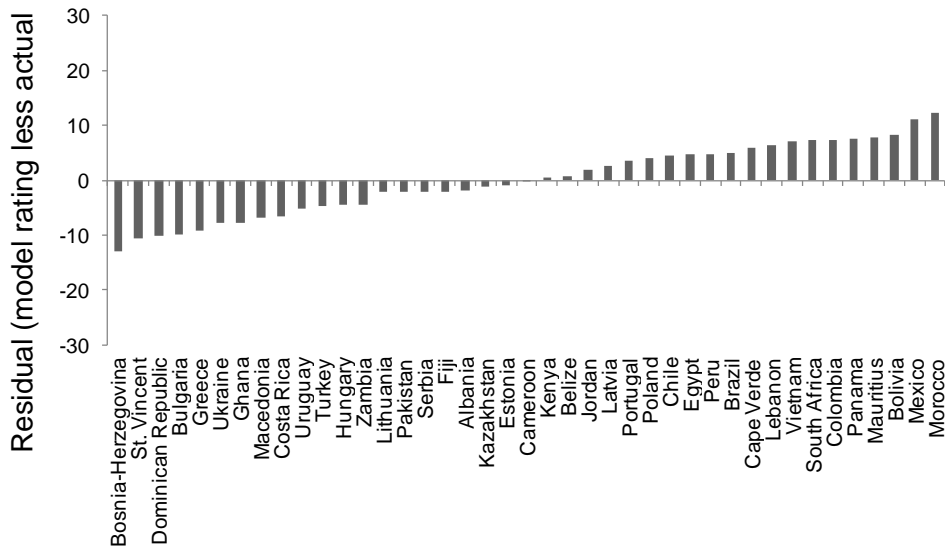


Figure 4.4: Model 1a residuals

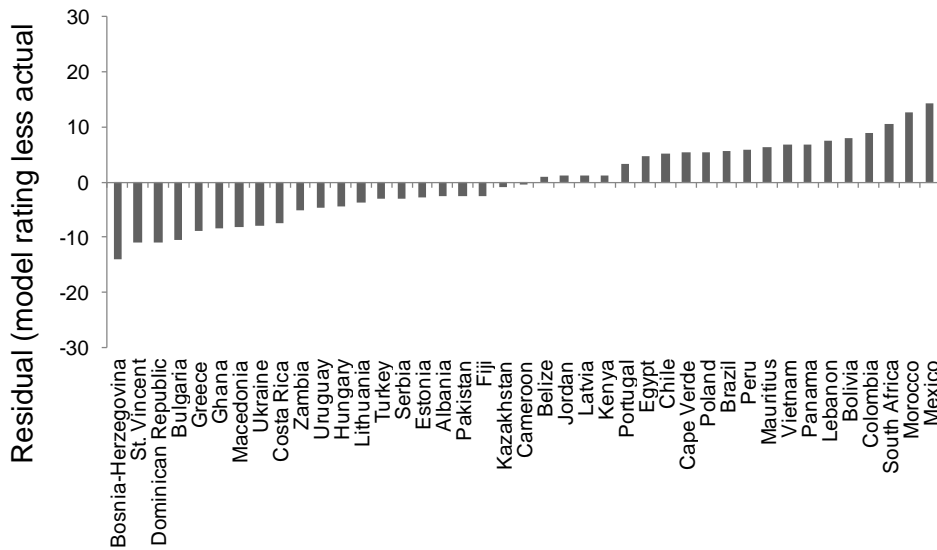


Figure 4.5: Model 1b residuals

As per table 4.19, in which countries are sorted from the largest to smallest absolute value of residuals of model 2a, China, India, Moldova, Venezuela and Barbados emerge as the most misrated countries. Model 1a and 1b residuals are summarized in figures 4.6 and 4.7.

	Actual foreign-currency rating	Actual local-currency rating	Model 2a fitted rating	Model 2b fitted rating	Absolute value, Model 2a residual	Absolute value, Model 2b residual
China	85.508	85.508	55.959	56.902	29.550	28.607
Greece	26.093	26.093	48.643	49.299	22.551	23.206
India	61.597	61.597	39.880	40.307	21.717	21.290
Moldova	32.614	32.614	49.295	49.885	16.681	17.271
Venezuela	21.745	21.745	37.830	37.997	16.085	16.252
Barbados	34.788	34.788	49.549	49.989	14.761	15.201
Papua New Guinea	41.309	41.309	55.718	56.955	14.409	15.647
Bolivia	50.728	50.728	38.555	38.684	12.173	12.045
Morocco	59.423	60.873	47.480	48.180	11.944	12.693
Bosnia-Herzegovina	36.961	36.961	48.887	49.343	11.926	12.382
Argentina	30.440	30.440	42.220	42.332	11.780	11.892
Burkina Faso	34.788	34.788	46.548	46.962	11.760	12.174
Dominican Republic	44.932	44.932	56.675	57.492	11.743	12.560
Brazil	57.974	59.423	46.569	47.045	11.406	12.378
Mexico	71.017	75.364	60.890	61.884	10.127	13.481
Angola	44.932	44.932	34.899	34.874	10.032	10.058
Georgia	48.555	48.555	58.533	59.349	9.979	10.795
Slovakia	81.161	81.161	71.616	72.910	9.545	8.250
St. Vincent	32.614	32.614	41.878	41.739	9.264	9.126
Costa Rica	54.351	54.351	63.592	64.563	9.240	10.212
Cape Verde	39.135	39.135	30.352	30.416	8.783	8.719
Lebanon	35.512	35.512	26.767	26.033	8.745	9.479
Oman	77.176	77.176	68.867	69.325	8.309	7.850
Colombia	65.220	68.118	57.043	57.898	8.177	10.221
Macedonia	51.091	51.091	59.206	60.150	8.115	9.059
Rwanda	43.483	43.483	51.216	51.777	7.733	8.295
Vietnam	46.381	46.381	38.748	39.132	7.633	7.248
El Salvador	44.932	43.483	52.562	53.400	7.630	9.917
Egypt	36.961	36.961	29.388	29.326	7.573	7.635
Armenia	44.569	44.569	52.104	52.771	7.535	8.202
Belarus	31.527	31.527	39.047	39.097	7.520	7.570
Malaysia	74.640	77.538	67.333	68.694	7.307	8.844
Nicaragua	39.135	39.135	46.284	46.661	7.149	7.526
Thailand	69.568	72.466	62.451	63.845	7.116	8.621
South Africa	63.046	67.394	56.032	56.856	7.014	10.538
Hungary	57.250	58.699	64.195	65.531	6.945	6.833
Bangladesh	47.830	47.830	40.910	41.282	6.920	6.548
Czech Republic	84.059	86.958	77.407	78.882	6.652	8.075
Peru	71.017	73.915	64.441	65.549	6.576	8.366
Kazakhstan	65.945	67.394	59.512	60.241	6.433	7.152
Ghana	34.788	34.788	41.081	41.414	6.294	6.627
Bulgaria	60.873	62.322	67.114	68.443	6.241	6.122
Philippines	64.495	65.945	58.337	59.572	6.158	6.373
Panama	65.220	65.220	59.265	59.830	5.955	5.390
Ukraine	25.006	25.006	30.768	30.912	5.762	5.907
Poland	76.089	78.987	70.334	71.637	5.754	7.350
Mozambique	37.686	37.686	32.072	31.652	5.614	6.034
Turkey	57.974	60.873	63.473	64.424	5.499	3.551
Mauritius	69.568	69.568	64.217	65.274	5.351	4.293
Tunisia	47.830	50.004	42.681	42.948	5.149	7.056
Estonia	84.059	84.059	89.160	90.965	5.101	6.906
Indonesia	60.148	60.148	55.428	56.288	4.720	3.860
Botswana	76.089	76.089	71.439	72.899	4.650	3.190
Romania	60.873	62.322	65.403	66.575	4.531	4.253
Montenegro	44.569	43.483	40.105	39.884	4.465	3.599
Russia	55.800	57.250	59.920	61.037	4.119	3.787
Chile	85.508	88.407	81.441	83.068	4.068	5.339
Zambia	39.135	39.135	42.721	43.165	3.586	4.030
Cambodia	39.135	39.135	42.670	42.818	3.535	3.683
Jordan	45.656	45.656	42.291	42.624	3.365	3.032
Nigeria	45.656	47.105	48.976	49.564	3.320	2.458
Guatemala	52.902	54.351	55.953	56.820	3.051	2.468
Ecuador	37.686	39.135	40.567	40.742	2.881	1.607
Croatia	51.453	52.902	54.169	55.090	2.716	2.188
Senegal	44.569	44.569	41.984	42.403	2.585	2.166
Honduras	40.222	40.222	42.621	42.933	2.399	2.711
Lithuania	73.915	73.915	76.115	77.500	2.200	3.585
Belize	31.527	31.527	29.401	29.252	2.126	2.274
Suriname	47.830	47.830	45.796	45.932	2.034	1.898
Portugal	57.250	57.250	55.286	56.140	1.963	1.110
Kenya	42.033	43.483	40.120	40.287	1.914	3.196
Serbia	44.207	44.207	45.723	46.272	1.516	2.064
Gabon	44.207	44.207	45.674	45.939	1.467	1.732
Fiji	43.483	43.483	44.869	45.162	1.386	1.679
Albania	42.396	42.396	43.713	43.856	1.317	1.460
Jamaica	34.788	34.788	35.931	36.282	1.144	1.494
Latvia	73.915	73.915	74.837	76.178	0.922	2.263
Sri Lanka	44.932	45.656	44.033	44.600	0.899	1.057
Cameroon	39.135	39.135	38.439	38.582	0.696	0.553
Uruguay	63.771	65.220	63.078	63.936	0.693	1.284
Paraguay	54.351	54.351	54.868	55.672	0.517	1.321
Azerbaijan	60.148	60.148	59.706	60.779	0.442	0.631
Pakistan	36.961	36.961	37.378	37.746	0.417	0.785
Uganda	42.033	42.033	41.638	41.755	0.396	0.278

Table 4.19: Actual ratings, fitted ratings and residuals by country for models 2a and 2b

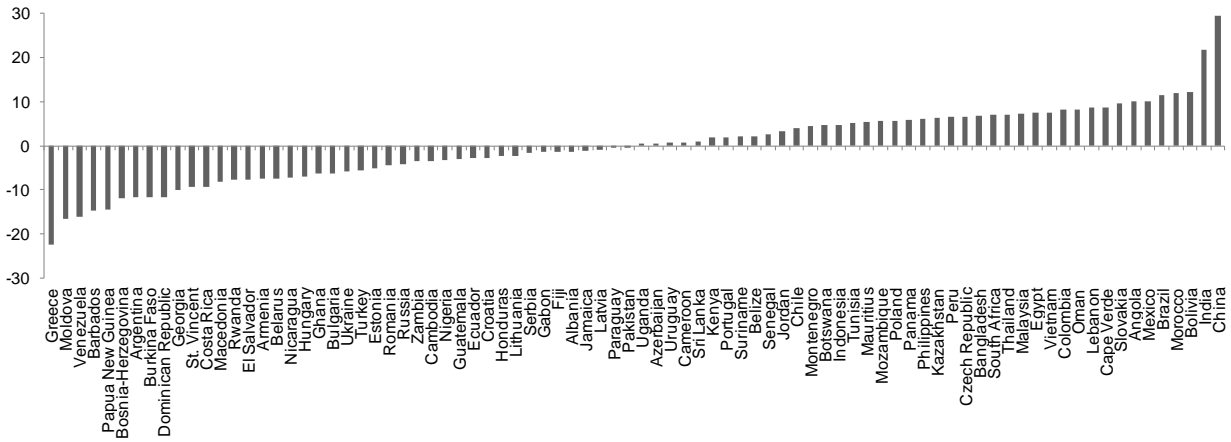


Figure 4.6: Model 2a residuals

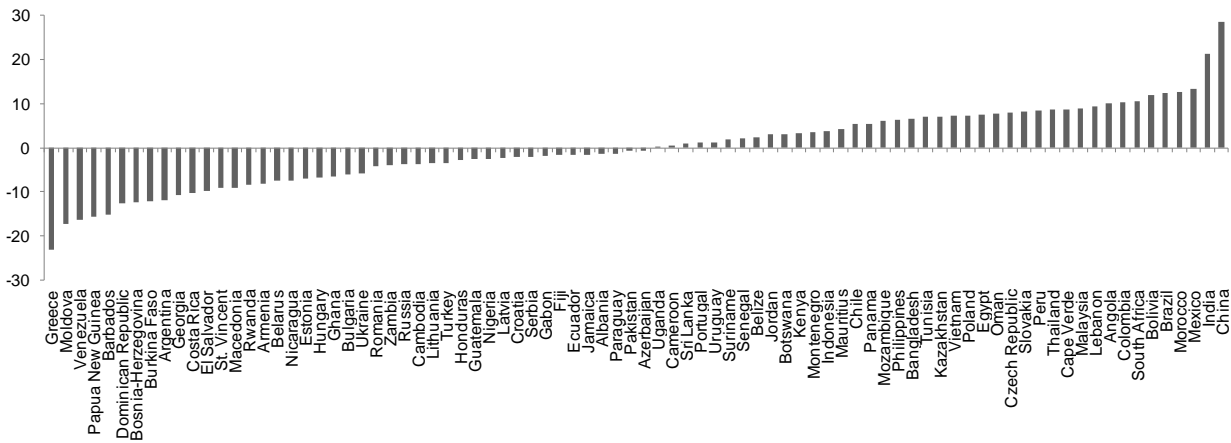


Figure 4.7: Model 2b residuals

Given these outliers in the regressions, three countries with large misratings from model 1a and three countries with large misratings from model 2a were chosen, and recent reports from each agency on these countries were examined to understand how the fitted ratings differed from the actual ratings. Recall that the two primary differences between models 1a and 2a were that the former uses *net debt* and has 41 countries under coverage, while the latter uses *gross debt* and thereby expands the dataset to 84 countries. Both models use *regulatory quality*, *GDP per capita* and *current account*.

Bosnia-Herzegovina. This country is overrated by three notches in model 1a.

S&P (Dimitrievska 2015) describes its rationale in the first paragraph of its latest update:

The ratings on Bosnia-Herzegovina are constrained by our view of its fragile, overlapping government institutions, its weak fiscal management framework, and its vulnerable external position arising from persistent current account deficits. The ratings are supported by our expectation of continued and significant international support.

The parallel between the first paragraph of the rating rationale and model 1a specification is remarkable. The model precisely specifies the first three factors explicitly mentioned by S&P, these being government institutional strength, fiscal/debt management and external vulnerabilities.

However, the model clearly does not account for the “continued and significant international support”, which is a reference to a standby arrangement provided by the IMF in 2012 (Bosnia and Herzegovina... 2012). Another possible reason for the large overrating by the model is that even though it includes a measure of the level of wealth (*GDP per capita*), it excludes GDP growth, which has been depressed in the country since floods destroyed infrastructure worth at least 15% of GDP (Bosnia and Herzegovina... 2012). Clearly these idiosyncratic characteristics contributed to the substantial overestimation of sovereign strength.

Morocco. This country is underrated by over two notches in model 1a. In the 2014 assessment, S&P describes Morocco’s vulnerabilities related to “disappointing economic growth” and large fiscal and current account deficits. Although model 1a would capture some measures of cumulative fiscal restraint over time (net debt), it

would not capture the specific snapshot of budget management. However, the agency expects both fiscal and current account deficits to narrow. Even though the model uses forecasted one-year ahead values provided by the IMF, the agency is more constructive on these accounts and this likely results in the model underestimating sovereign strength (S&P says ratings... 2014).

Mexico. This country is underrated by over two notches in model 1a. There are at least two possibilities for the underestimation of sovereign rating for Mexico. First, by examining the S&P report in December 2013, it is evident that the analysts emphasised energy reform. For the first time in 75 years, Mexico began to permit private investment into its oil and gas infrastructure and S&P described this as “a watershed moment” (Bases & Alper 2013:para. 3). This key piece of legislation was perceived to be critical in catalysing long-term growth, supporting fiscal accounts and helping the country build more international reserves. Only days after the approval of the energy bill, S&P upgraded Mexico by one full notch.

A second potential reason for the underestimation is described in Moody's report of February 2014, in which Mexico was upgraded one full notch from Baa1 to A3. In this case, the agencies expected comprehensive reforms beyond the energy sector. Moody's contended that “the approval of a comprehensive package of reforms significantly increases the probability that the Mexican government will achieve a material improvement in economic and fiscal prospects over the medium to long term, providing additional impetus to the so-called 'Mexico's momentum' in the near to medium term” (Leos-Lopez 2014:para. 5). Although the models capture the quality of governance, they likely underestimate the perceived potential for reforms to impact

growth, fiscal accounts and debt sustainability for Mexico and therefore underestimate sovereign strength.

China. This country is underrated by over six notches in model 2a. Remarkably, China was rated a BBB- country by the model, when it is actually rated AA-, A+ and Aa3 by S&P, Fitch and Moody's, respectively. This was the largest mis-rating across all models and there are several immediately evident causes. First, even though China has a relatively low GDP per capita, it has phenomenally strong growth (IMF forecasting GDP growth at 6.8% in 2015 and 6.3% in 2016), which the model omits (Milhenc 2015). Second, it has many sovereign strengths other than GDP growth in parameters that were not included in the models: GDP level (\$8.2 trillion, largest amongst EMs); very low unemployment rate (4%); and high investment rate (36% of GDP, largest amongst EMs). Clearly if these variables were included in the models, China would be ranked much stronger.

Greece. Overrated by five notches in model 2a. Greece is not overrated on account of its strength in its economic metrics, many of which are relatively weak (highest gross debt and net debt measures in the sample). However, the model does not anticipate the extent of political tension in the country. In January 2015, a populist government was elected on the premise of renegotiating the existing IMF/World Bank/ECB bailout programme and associated debt. The election, and subsequent behaviour of the primary policymakers, Alexis Tsipras and Yanis Varoufakis, forced CRAs (and financial markets) to seriously question the "willingness to pay" of the new government (Ball, Zampano, & Moloney 2015; Fidler 2015). This, in turn, precipitated a wave of five downgrades over 12 months (Pitas 2015).

India. This country is underrated by five notches in model 2a. As with Greece, the primary driver of misrating is a set of qualitative reasons pertaining to governance, In 2014, newly elected Prime Minister Narendra Modi detailed an aggressive set of fiscal and economic reforms to boost investment, private sector involvement and growth. Modi's agenda included promises to invest heavily in infrastructure projects and privatise state-run companies, such as Coal India, as well as continue to permit the Reserve Bank of India relative autonomy (Nam 2014). In issuing India's credit rating, Nam (2014:para. 1) from S&P described the basic rationale:

Crucial factors include higher growth in real GDP per capita, stronger fiscal and debt metrics and a stronger external position or improved monetary policy setting, and the government's ability to fulfil its promises on key reforms will be critical to the country's success.

CHAPTER 5: DISCUSSION, CONCLUSIONS AND IMPLICATIONS

The aim of this chapter is to review the overall research objective and the extent to which the general findings achieved that objective. The chapter then explains how the findings of the current study could impact both policymakers and academic researchers. Suggestions are also made for possible future research.

5.1 RESEARCH PROBLEM, OBJECTIVES AND FINDINGS

The literature review in chapter 2 demonstrated that extant studies lack empirical attention to emerging-market sovereign ratings. This is indeed an unusual gap in the literature, given the profound importance of sovereign ratings in global financial markets.

Simply having a sovereign rating increases foreign investment by 2% per annum (Minto 2013). Indeed, in 2002, the US government agreed to fund new sovereign ratings for 20 sub-Saharan African countries and after a competitive bidding process, the contract was awarded to Fitch. The US Secretary of State remarked that “by attaining a sovereign credit rating, your country will help reduce risk and encourage investment. Sovereign credit rating gives courage to capital” (Bhatia 2002:52).

Stronger sovereign ratings impact both the “real economy” and financial markets. Carrying an investment-grade rating reduces sovereign bond spreads by 35% (Jaramillo & Tejada 2011). Rating downgrades can immediately drive up the cost of funding for a country. As a simple example, consider the S&P downgrade of Brazil in September 2015. This was associated with a rise in the 10-year bond of over 0.8%, which if

sustained, translates into billions of dollars in extra interest on Brazil's existing federal public debt stock of \$116 billion. Sovereign downgrades often lead to corporate and banking sector downgrades which, in turn, can paralyse domestic capital markets. Lastly, because many international bond investors can only hold sovereign debt that is rated at a certain level, they are often forced to sell their holdings for no other reason than merely a change in rating.

Even though the paramount importance of emerging-market ratings is evident, the dearth of empirical studies on the topic was equally evident. The primary research objective of the current research was to establish the determinants of credit ratings in EMs, and this objective was largely achieved.

Overall, there was strong suggestive evidence supporting the first two hypotheses. For hypothesis 1, it was proposed that there would be significant correlations amongst 18 independent variables and sovereign ratings. These correlations were in the proposed directions for all variables, except for GDP growth and primary balance, which did not reach statistical significance.

It was surprising that GDP growth did not significantly predict sovereign ratings, given that it is repeatedly mentioned in all of the rating agency methodology papers. One potential explanation is that larger, more established emerging-market countries such as Brazil and China have often "taken advantage of most of the easiest steps on the ladder to prosperity" (*When giants...* 2013). After some initial, early point of very strong growth, countries begin to experience diminishing marginal returns even with further investment. Moreover, as countries grow faster and reach a certain point of

development, they often begin to increase investment in an effort to build long-term future growth, perhaps at the expense of current growth.

Another surprise was that there was no significant relationship between primary balance as a percentage of GDP and sovereign ratings. To the extent that primary balances measure the degree of fiscal responsibility in a country, they should be correlated with measures of institutional governance. Indeed, there is a strong, positive correlation between primary balance and regulatory quality ($r = 0.21$, $p < 0.05$). As discussed previously, one potential possibility for the lack of relationship between this intuitively appealing factor and sovereign ratings is endogeneity. Countries with large primary balances are often those in IMF programmes and they are forced to run large primary deficits precisely because of the conditionality of those programmes. Some recent examples are Greece, Granada and Ghana.

Despite GDP growth and primary balance not having the predicted bivariate relationship to sovereign ratings, the majority of the proposed variables did. Based on both the strength of the linear relationships observed amongst the independent variables, as well as economic rationale and discretion, two primary models were specified to test for the joint impact of economic and governance variables on sovereign ratings. The resulting models had R^2 values that were comparable to established literature (70–83%), but most importantly, used an extremely broad set of up to 84 emerging-market countries. Even though the explanatory value was lower than some other researchers, this is understandable because this dataset includes more sovereign countries than any other in the existing literature. It is difficult to compare the predictive

power of these models against other researchers' specifications because the datasets, time frames and statistical techniques differ.

Evidence strongly supported hypothesis 2 and every measure of governance positively and significantly correlated with all six individual specifications of sovereign ratings (S&P, Fitch and Moody's local and foreign-currency ratings), as well as the aggregate measures of these individual ratings. Given the amount of attention the agencies place on understanding the institutional strengths of the country, it was not surprising that these measures accounted for much of the variation in sovereign ratings. Lastly, hypothesis 3 was not supported. It was anticipated that CRAs would rely on measures of governance even more heavily in countries with less economic development, but this did not seem to be supported by the interaction regression analysis.

Residual analysis was conducted to identify the instances in which the models performed well and poorly. Given the positive correlation between the regression models' residuals and the actual sovereign ratings, it seemed that at the very least, the models operated best for countries that are mid-range in EMs (BB- to BBB). For countries that are rated in the top or bottom quartile, the accuracy of the models is challenged.

Upon closer inspection of the six countries with the largest misratings, some interesting patterns emerged. First, countries were often misrated as a result of political volatility around recent elections. India's new government in 2014 was seen as much more market-friendly and constructive for economic growth than the previous administration, and the model failed to detect this optimism embedded in the sovereign

rating. Conversely, Greece's new government in 2015 was seen as explicitly threatening to creditors, and the model failed to detect this pessimism.

Second, the models did not function well in idiosyncratic cases with risks that are neither easily anticipated nor quantifiable. For example, Bosnia-Herzegovina experienced a massive flood that devastated economic activity and production, depressed investment and caused unemployment to spike. Although some of these consequences would be symptomatically detected in the model variables (GDP per capita and perhaps regulatory quality), their true impact would be missed. As a final example, Mexico experienced credit upgrades as a result of passing monumental legislation to allow for private sector development of its oil and gas fields. Although Mexico did indeed experience an increase in its measure of regulatory quality, the measure (and by extension the models) probably underestimated the true extent of the potential impact of these energy reforms. Overall, the models provide a parsimonious method to analyse normative determinants of sovereign ratings across many countries, but fail to detect idiosyncratic developments that defy quantification.

5.2 CONTRIBUTIONS OF THE STUDY

The primary findings identified and quantified the impact of 18 potential variables that were chosen through an analysis of economic determinants, a study of rating agency methodologies and a review of empirical literature. The proposed models confirmed the joint impact of several variables that are associated with emerging-market ratings, as well as some that are not (GDP growth and primary balance).

The current research made three methodological advances. First, the study used the largest known dataset of EM ratings. By focusing only on EMs, the current research did not confound its findings with developed countries. Unlike other research that mixes countries that are vastly economically different such as Ecuador and the USA (Mellios & Paget-Blanc 2006), the current research focused on only developing countries. Second, the research incorporated rating “outlooks” into the analyses, which allowed for more variability in the dependent variable and, in turn, raised the probability of detecting how subtle changes in the explanatory variables truly impact ratings. Also, research was conducted across both foreign and local-ratings, unlike previous studies. Finally, the research used forecasts of future economic activity across all countries, rather than past economic data, consistent with rating agency methodologies and economic intuition. No other known research has done the same.

5.3 POLICY IMPLICATIONS

Sovereign ratings are often a critical point of public debate and policymaking amongst countries and are discussed at length by presidents, finance ministers, economic ministers and legislators. Hence any improvement in the comprehension of how agencies construct ratings is important. A significant amount of policy attention is placed on how to maintain, if not improve, ratings. Table 5.1 shows a sample of germane comments from emerging-market policymakers.

"Up to now, there is no indication that there will be a reduction of the [ratings] investment grade in the immediate future..." (Brandimarte 2014:para 1). [Brazil lost its investment-grade ratings status 11 months later.]

Dilma Rousseff, President of Brazil,
October 26, 2014

Asked whether Moody's was poised to cut Brazil's sovereign rating, Levy said that "in the absence of an adjustment, that possibility increases". Basically "it depends on how much adjustment we do," he added. (Parra-Bernal 2015:para. 9).

Joaquim Levy, Finance Minister of
Brazil, July 20, 2015

When S&P upgraded Colombia to investment-grade in March 2011, President Santos called the upgrade a "certificate of good behaviour." (Colombia gains.. 2011:para. 1).

Juan Manuel Santos, President of
Colombia, March 16, 2011

"We have a goal that is not easy, but that will guide us. To improve our credit rating from BBB to BBB+...that means adopting best practices in every area of public policy" (Moss 2015:para. 4).

Mauricio Cardenas, Finance Minister of
Colombia, July 31, 2015

"I consider the evaluation of Moody's not simply extremely negative, but based on extremely pessimistic forecasts that have no analogies to today...I suppose that in taking the decision about lowering the rating, the agency was led first of all by factors of a political character" (Korsunskaya 2015:para. 3).

Anton Siluanov, Finance Minister of
Russia, January 15, 2015

Table 5.1: Sample comments from policymakers about sovereign ratings

Sovereign downgrades are often used by political opponents as ammunition against incumbent administrations.

Given the amount of attention on sovereign ratings by politicians, it makes sense for policymakers to best understand the *causes* of these ratings—the current research should contribute to this understanding. The current study identified the most likely combination of parsimonious variables that explain local and foreign-currency ratings. These variables tend to operate consistently across all major agencies, which removes the uncertainty that policymakers may have about factors each specific agency is using

in its assessments. Policymakers should find some comfort in knowing that agencies look at similar factors.

Although considerations for ratings will never be a primary focus for any policymaker, nor should they be, there are certain pragmatic steps that can be taken to increase the probability of a more accurate rating. Since each of the agencies places a premium on reliable, transparent and timely economic data, it would behoove sovereign statistical agencies to meet these criteria. This is relatively low-hanging fruit for most countries and could immediately influence the perception that agencies have of a country. There are wide variations in statistical and economic reporting, Brazil, for instance reports some of its inflation estimates weekly, while Venezuela as of 2014 had not published its inflation estimates for a full year.

Transparency in the ratings process works both ways, and countries wishing to be fairly assessed should provide timely data. However, CRAs also have an opportunity to provide more guidance. The current research identified and quantified the factors agencies use to rate emerging countries, but the agencies themselves could communicate their own assessment models to policymakers. One immediate improvement that the CRAs could make is related to their measures of governance. Most agencies use World Bank governance indicators, which were used in the current study, but these are only annual indicators. Agency analysts might be encouraged to use more timely metrics themselves that could more accurately reflect the current and near-term political and institutional trajectories.

5.4 CONCLUSIONS AND FUTURE RESEARCH

The current study not only hopes to fill some of the gap in emerging-market sovereign ratings research, but also to contribute to future lines of research. First, the current research presented a static model of a single cross-section of data, future research could expand on this by creating a panel of cross-sectional longitudinal data. There would be a trade-off between the breadth and depth of economic and ratings data because some countries have only recently been assigned ratings (Cuba, Lesotho and Nicaragua). However, there would be clear statistical advantages to panel analyses.

Second, although the present research attempted to identify the broad determinants of all countries' ratings, future research could identify parameters for country and agency-specific models. Owing to the fact that some EM countries such as Greece and Mexico have a significant history of sovereign ratings and economic data, it would be compelling to analyse the determinants over time for individual countries. Moreover, even though there is a high correlation amongst agencies' ratings, there is still disagreement about the precise level of sovereign creditworthiness. The majority of the countries in the current dataset have ratings that are not perfectly in line with other agencies – so-called “split ratings” – and it would be informative to examine the determinants of each agency's ratings. Explanatory power might be increased by identifying the idiosyncratic determinants for each rating agency's assessments. Lastly, future research might move up a level of analysis and examine not only the determinants of ratings, but also why certain countries choose to be unrated at all, even when they have ample resources to fund the service. At least 58 countries remain unrated, and despite misconceptions, many of them have relatively strong credit

metrics. Patient, but compelling, “out of sample” research could produce potential credit ratings for these countries and then wait until a sufficient number of these ratings are eventually published.

APPENDIX

	<u>Model 6a: Average FC rating</u>			<u>Model 6b: Average LC rating</u>		
	B	SE of B	β	B	SE of B	β
C	41.833***	6.712		41.700***	6.996	
Voice	-0.057	0.140	-0.080	-0.053	0.146	-0.071
GDP Capita	0.001**	0.001	0.460	0.002**	0.001	0.482
GDP Capita * Voice	0.000	0.000	0.151	0.000	0.000	0.124
Countries	79			79		
R ²	0.313			0.315		
Adj-R ²	0.286			0.287		
SE	12.755			13.293		
Durbin-Watson	1.567			1.539		
F-statistic	11.39***			11.49***		

Note. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.1: Results of regression and interaction analyses predicting average foreign and local-currency ratings

	<u>Model 7a: Average FC rating</u>			<u>Model 7b: Average LC rating</u>		
	B	SE of B	β	B	SE of B	β
C	43.823***	5.574		44.396***	5.793	
Political Stability	-0.133	0.134	-0.193	-0.154	0.140	-0.214
GDP Capita	0.001**	0.001	0.461	0.002***	0.001	0.492
GDP Capita * Political Stability	0.000	0.000	0.235	0.000	0.000	0.216
Countries	79			79		
R ²	0.321			0.326		
Adj-R ²	0.293			0.299		
SE	12.684			13.182		
Durbin-Watson	1.621			1.601		
F-statistic	11.799***			12.108***		

Note. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.2: Results of regression and interaction analyses predicting average foreign and local-currency ratings

	Model 8a: Average FC rating			Model 8b: Average LC rating		
	B	SE of B	β	B	SE of B	β
C	34.242***	6.246		33.926***	6.527	
Gov	0.230**	0.134	0.294	0.242**	0.140	0.297
GDP Capita	0.000	0.001	-0.087	0.000	0.001	-0.063
GDP Capita * Gov	0.000	0.000	0.481	0.000	0.000	0.456
Countries	79			79		
R ²	0.440			0.438		
Adj-R ²	0.417			0.416		
SE	11.520			12.040		
Durbin-Watson	1.652			1.633		
F-statistic	19.608***			19.483***		

Note. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.3: Results of regression and interaction analyses predicting average foreign and local-currency ratings

	Model 9a: Average FC rating			Model 9b: Average LC rating		
	B	SE of B	β	B	SE of B	β
C	36.987***	6.303		36.639***	6.591	
Reg Qual	0.148	0.129	0.194	0.161	0.135	0.202
GDP Capita	-0.001	0.001	-0.222	-0.001	0.001	-0.200
GDP Capita * Reg Qual	0.001***	0.000	0.746	0.001***	0.000	0.719
Countries	79			79		
R ²	0.520			0.518		
Adj-R ²	0.500			0.499		
SE	10.665			11.151		
Durbin-Watson	1.829			1.801		
F-statistic	27.048***			26.853***		

Note. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.4: Results of regression and interaction analyses predicting average foreign and local-currency ratings

	<u>Model 10a: Average FC rating</u>			<u>Model 10b: Average LC rating</u>		
	B	SE of B	β	B	SE of B	β
C	37.621***	5.922		37.589***	6.195	
Law	0.116	0.127	0.161	0.120	0.133	0.160
GDP Capita	0.000	0.001	0.114	0.000	0.001	0.133
GDP Capita * Law	0.000	0.000	0.400	0.000	0.000	0.382
Countries	79			79		
R ²	0.399			0.396		
Adj-R ²	0.375			0.372		
SE	11.934			12.483		
Durbin-Watson	1.637			1.616		
F-statistic	16.567***			16.378***		

Note. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.5: Results of regression and interaction analyses predicting average foreign and local-currency ratings

	<u>Model 11a: Average FC rating</u>			<u>Model 11b: Average LC rating</u>		
	B	SE of B	β	B	SE of B	β
C	38.430***	5.277		38.550***	5.510	
Corruption	0.062	0.118	0.089	0.061	0.124	0.084
GDP Capita	0.001	0.001	0.319	0.001	0.001	0.332
GDP Capita * Corruption	0.000	0.000	0.226	0.000	0.000	0.216
Countries	79			79		
R ²	0.343			0.342		
Adj-R ²	0.316			0.316		
SE	12.477			13.027		
Durbin-Watson	1.542			1.516		
F-statistic	13.030***			12.995***		

Note. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.6: Results of regression and interaction analyses predicting average foreign and local-currency ratings

Table A.7: Correlations across explanatory and independent variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
1 S&P LC rating	0.975***																										
2 Fitch LC rating	0.960***	0.972***																									
3 Moody's LC rating	0.987***	0.992***	0.991***																								
4 Average LC rating	0.993***	0.972***	0.961***	0.985***																							
5 S&P FC rating	0.976***	0.991***	0.975***	0.988***	0.980***																						
6 Fitch FC rating	0.960***	0.971***	1.000***	0.990***	0.961***	0.975***																					
7 Moody's FC rating	0.983***	0.986***	0.992***	0.998***	0.988***	0.993***	0.992***																				
8 Average FC rating	-0.052	-0.193	0.138	0.08	-0.022	-0.134	0.151	0.095																			
9 GDP growth	0.346***	0.312***	0.322***	0.326***	0.339***	0.341***	0.322***	0.327***	0.090																		
10 GDP level	0.540***	0.649***	0.461***	0.507***	0.553***	0.660***	0.469***	0.511***	-0.443***	0.047																	
11 GDP per capita	-0.232	-0.222	-0.301***	-0.271***	-0.245**	-0.198	-0.276**	-0.276**	-0.357***	-0.169	0.064																
12 Unemployment rate	-0.271***	-0.355***	-0.391***	-0.356***	-0.287***	-0.352***	-0.375***	-0.363***	-0.311***	0.027	-0.174	0.078															
13 Inflation	0.374***	0.497***	0.314***	0.345***	0.371***	0.484***	0.289***	0.336***	-0.21**	0.270**	0.194**	-0.185	0.063														
14 Current account	0.204*	0.114	0.343***	0.282**	0.230**	0.126	0.326***	0.294***	0.433***	0.188*	-0.134	-0.395***	-0.140	-0.281***													
15 Investment	0.400***	0.409***	0.485***	0.445***	0.420***	0.412***	0.462***	0.448***	0.175	0.316***	-0.012	-0.362***	-0.065	0.567***	0.618***												
16 Savings	0.326***	0.506***	0.301***	0.326***	0.329***	0.492***	0.300***	0.321***	-0.009	-0.029	0.099	-0.195	-0.275**	0.398***	-0.011	0.337***											
17 Fiscal balance	-0.062	0.101	-0.089	0.003	-0.081	0.093	-0.067	-0.010	-0.106	0.002	0.151	0.032	-0.239**	0.267**	-0.293***	0.004	0.614***										
18 Primary balance	-0.441	-0.391***	-0.488***	-0.425***	-0.445***	-0.380	-0.482***	-0.427***	-0.179*	-0.044	0.146	0.361***	-0.081	-0.148	-0.245**	-0.308***	-0.268***	0.361***									
19 Gross debt	-0.638***	-0.636***	-0.691***	-0.668***	-0.649***	-0.624***	-0.691***	-0.668***	-0.178	-0.099	0.001	0.331**	-0.122	-0.170	-0.308**	-0.349**	-0.399**	0.237	0.942***								
20 Net debt	0.601***	0.663***	0.583***	0.607***	0.607***	0.668***	0.589***	0.597***	-0.181**	0.097	0.707***	0.053	-0.385***	0.185*	0.132	0.229**	0.191*	0.173	0.156	-0.132							
21 Govt effectiveness	0.258***	0.329***	0.201*	0.232**	0.262**	0.333***	0.241**	0.261***	-0.224*	-0.171	0.518***	0.257**	-0.263***	0.037	-0.161	-0.080	0.179***	0.286***	0.284***	0.023	0.567***						
22 Voice and accountability	0.319***	0.369***	0.298***	0.296***	0.353***	0.386***	0.270***	0.289***	-0.239***	-0.214**	0.635***	0.153	-0.265**	0.001	0.074	0.085	0.174	0.014	0.081	-0.144	0.603***	0.587***					
23 Political stability	0.645***	0.649***	0.649***	0.654***	0.646***	0.654***	0.663***	0.668***	-0.065	-0.071	0.593***	0.091	-0.504***	0.075	0.077	0.106	0.313***	0.207**	0.004	-0.234	0.817***	0.621***	0.511***				
24 Regulatory quality	0.508***	0.522***	0.529***	0.526***	0.524***	0.538***	0.536***	0.537***	-0.067	-0.030	0.612***	0.123	-0.431***	0.058	0.191*	0.194*	0.133	0.106	0.166	-0.044	0.875***	0.649***	0.652***	0.632***			
25 Rule of law	0.408***	0.439***	0.441***	0.424***	0.426***	0.465***	0.421***	0.412***	-0.086	-0.054	0.551***	0.105	-0.375***	0.017	0.155	0.148	0.166	0.115	0.19*	-0.069	0.804***	0.599***	0.698***	0.704***	0.877***		
26 Control of corruption																											

Note: *p < 0.10, **p < 0.05, ***p < 0.01

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