

# Sovereign Ratings in the Post-Crisis World

## An Analysis of Actual, Shadow and Relative Risk Ratings

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## Abstract

This paper analyzes the evolution of sovereign credit ratings in the wake of the global financial crisis by studying changes in actual, shadow, and relative ratings between 2008 and 2012. For countries that do not have a rating from the major rating agencies, shadow ratings are estimated as a function of macroeconomic, structural, and governance variables. The shadow rating exercise confirms earlier findings in the literature that even after the financial crisis, many unrated countries appear to be more creditworthy than previously believed and can access international capital markets. The paper also develops a new rating scale called the “relative risk rating,” which ranks countries according to their actual or shadow ratings after controlling for changes in the world weighted average rating. When relative ratings

in 2012 are compared with the first half of 2008, the world average rating is found to be weaker because of the financial crisis. The relative rating improved in developing economies such as Azerbaijan, Ethiopia, Kazakhstan, Indonesia, and the Philippines, whereas it deteriorated in crisis-affected high-income countries such as Cyprus, Greece, Spain, Portugal, Ireland, and Egypt. Interestingly, India, Jordan, Poland, and the United Kingdom had their rating outlook downgraded by the rating agencies, but their relative rating actually improved as other countries suffered even worse downgrades. A regression model is used to analyze the relative contributions of different variables to rating changes during 2008–2012, a helpful feature for policy makers interested in improving sovereign ratings.

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# Sovereign Ratings in the Post-Crisis World: An Analysis of Actual, Shadow and Relative Risk Ratings

## 1. Introduction

Sovereign credit ratings assigned by the major rating agencies (such as Fitch, Moody's and Standard and Poor's) play a major role in determining the government's access to international capital markets. Although sovereign ratings relate to debt and creditworthiness of the central government, in effect they serve as a barometer of confidence and a ceiling for creditworthiness for the private sector as well. They influence the borrowing costs of private entities and in a wider sense overall investment flows. The sovereign rating is often a benchmark and sub-sovereign entities, such as companies and banks based in developing countries, rarely get a rating higher than the sovereign's. Furthermore, sub-sovereign ratings in developing and emerging markets are linked to sovereign rating movements (Ferri, Liu and Majnoni 2001).

Since the global financial crisis that began in the second half of 2008, there has been a major realignment of sovereign ratings that has especially affected advanced economies. At the same time, some large developing economies (for example, India) have had minor erosions in their ratings or outlooks. However, capital flows to these economies have remained robust, suggesting that these flows may be guided not so much by the absolute credit ratings, but by *relative* ratings. Given the massive downgrades of certain highly rated economies, other economies that have not suffered these downgrades would become relatively more attractive, even if their absolute ratings remain the same or are slightly eroded (Basu et al. 2012).

This paper carries out a comprehensive analysis of sovereign rating developments from the pre-crisis (July 2008) to post-crisis (December 2012) period. It develops a new rating measure which we shall refer to as the "relative risk rating." We then go on to compute the relative risk ratings for all countries for which data are available and use an econometric model to analyze the contribution of various factors to changes in the relative and absolute sovereign ratings of countries. Since nearly 50 developing countries do not have a rating from the major rating agencies, the paper uses a modified version of the methodology of Ratha, De and Mohapatra (2011) to develop shadow ratings for some countries.<sup>1</sup>

A useful by-product of the shadow rating exercise is a confirmation that the rating model still works: despite the disturbance caused by the global financial crisis, a handful of macroeconomic, structural and governance variables are sufficient to predict nearly 90 percent of the variations in ratings. The model also revealed that many currently unrated

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<sup>1</sup> Even the ratings of the rated countries are reaffirmed only periodically – see Ratha, De and Mohapatra (2011). The rating process is costly in terms of the requirement of devoting executive time to meet the process requirements. Furthermore, the stigma and political cost associated with a low rating may make politicians hesitant in approaching ratings agencies. Consequently many countries, especially low income ones, avoid going in for a rating.

countries are not necessarily at the tail end of the rating spectrum; that is, some countries appear to be even investment grade and many are in the B or BB category, the rating range for emerging markets, and could potentially access international capital markets. During this period, the average rating of high-income countries deteriorated, while that of developing countries registered a slight improvement. Some of the largest improvements in relative ratings occur in developing economies, including newly rated ones such as Azerbaijan, unrated ones such as Ethiopia, and large emerging markets such as Kazakhstan, Indonesia and the Philippines. Peripheral European economies such as Cyprus and Greece perform poorly in terms of changes in relative and actual ratings. Politically troubled Tunisia and Egypt also face deteriorated ratings. The contributions of various factors to changes in ratings are also deconstructed.

This research advances the knowledge frontier in several ways and has significant policy implications:

- 1) By juxtaposing actual, shadow and relative ratings, it allows the study of sovereign ratings to cover (almost) all countries in the world, including many unrated countries.
- 2) To our knowledge, this is the first confirmation of the rating model after the disturbances of the global financial crisis; and it shows that cyclical factors (such as growth or inflation) have become somewhat less important than structural factors (such as the rule of law) in the rating determination process.
- 3) The empirical results show that relative risk ratings can improve even as the absolute rating is downgraded or put on negative credit watch.
- 4) By analyzing contributions to rating changes, it provides a means of directing policy efforts in developing countries in a manner whereby concrete steps can be taken to improve ratings.

The rest of the paper is organized as follows: Section 2 provides an overview of the literature; Section 3 analyzes the numerical conversion of alphabetical ratings and its characteristics; Section 4 reports empirical estimation of the rating model; Section 5 discusses predicted (shadow) ratings; Section 6 develops the formula for computing relative risk ratings; Section 7 discusses the contribution of various factors to relative and actual rating changes; and Section 8 concludes the paper.

## 2. Literature review

The seminal analysis of sovereign ratings is that of Cantor and Packer (1996). They describe the determinants and impact of sovereign credit ratings given by the major U.S. based rating agencies, Moody's Investors Service and Standard and Poor's. They state that both agencies use a relatively small set of well-defined criteria with similar weights to arrive at credit ratings. Sovereign debt yields broadly share the rankings assigned by the agencies. Ratings appear to have correlation with yields over and above publicly available information. Dadush and Dasgupta (2001) examine capital account liberalization risks in developing economies. They carry out a pioneering work in converting the alphabetic rating scores into numeric

ratings. Afonso, Gomes and Rother (2009) use ordered logit and probit plus random effects ordered probit methods with panel data to study determinants of sovereign ratings. They find that the last procedure is the best for panel data as it takes into account the additional cross-section error. Bissoondoyal-Bheenick (2005) analyzes quantitative determinants that influence the sovereign ratings given by the main rating agencies, Standard and Poor's and Moody's. The paper finds that current economic financial indicators alone do not determine the ratings. Furthermore, economic variables do not have the same importance for high-rated countries with a history of financial stability in comparison with low-rated countries subject to structural changes. Hauner, Jonas and Kumar (2010) examine whether rating agencies and investors perceive the sovereign risk of the new member states of the European Union as different from that of other emerging markets. Their results suggest a favorable treatment of new member states, probably because of higher policy credibility bestowed by EU membership. Gaillard (2009) studies Moody's ratings for sub-national entities and provides a useful linear transformation of the ratings into numerical scores. Moody's Investor Service (2011) provides a guide to the rating system of the agency.

A large body of work also reviews the performance of the rating agencies and their rating actions. Ferri, Liu and Stiglitz (1999) explore the role and reactions of the rating agencies following the East Asian Crisis of 1997. They state that the rating agencies aggravated the crisis. After failing to predict the crisis, they attempted to recover their reputation by being more conservative. So they downgraded economies more than what economic fundamentals warranted. Reinhart (2002) states that in emerging market economies there is a strong link between currency crises and default. The analysis suggests that sovereign credit ratings systematically fail to predict currency crises but do considerably better in predicting defaults. Tennant and Tracy (2013) examine whether controlling for macroeconomic and institutional factors, S&P has been less generous with sovereign ratings issued to developing countries when compared with those assigned to developed countries. Using an ordered-probit mixed-effects regression with annual data for around 70 countries across the 1999 to 2009 period, they find support for their hypothesis. Altman et al. (2004) find that rating agencies focus more on the long term and give less importance to short-term indicators of credit quality. Löffler (2005) finds that rating changes happen only when the difference between the actual agency rating and that predicted by a model exceeds a certain threshold. Furthermore, rating migrations are slow and partial. Bruner and Abdelal (2005) elucidate the role of credit rating agencies in global capital markets. They describe the host of problems that arise when their ratings are given the force of law and discuss public policy alternatives. Barua (2011) carries out a critical appraisal of the credit rating system in the wake of the global financial crisis. He finds that rating agencies face a "revenue versus reputation" conflict of interest. Furthermore, rating agencies are pro-cyclical and failed to provide appropriate early warnings. He also detects flaws in their methodology; the variables they use often do not capture important economic aspects, such as currency misalignment, that may turn out to be crucial factors in precipitating an adverse economic event. As a constructive remedy, he suggests a balance between the credit rating and early warning functions. Becker and Milbourn (2011) find that increase in competition from Fitch coincided with lower ratings from the incumbents, that is, rating levels went up. But the correlation

between ratings and market-implied yields fell and the ability of ratings to predict default deteriorated. Alsakka and Gwilym (2012) analyze the sovereign watch and outlook signals from Moody's, Standard and Poor's and Fitch. They demonstrate that each agency's actions indicate or imply different policies. For instance, Standard and Poor's has more emphasis on short-term accuracy while Moody's actions are consistent with greater stability.

With regard to the impact of ratings, Kim and Wu (2008), analyze how sovereign credit ratings history provided by independent rating agencies affects domestic financial sector development and international capital inflows to emerging countries. They find strong indication that sovereign credit ratings affect financial intermediary sector developments and capital flows. Afonso, Furceri and Gomes (2012) use EU sovereign bond yields and CDS spreads daily data to carry out an event study analysis on the reaction of government yield spreads before and after announcements from rating agencies. Their results demonstrate significant responses of government bond yield spreads to changes in rating notations and outlook, particularly in the case of negative announcements. Alsakka and Gwilym (2012a) analyze how the foreign exchange markets reacted to sovereign credit events prior to (2000-2006) and during the crisis (2006-2010). They find that rating agencies' signals do affect the own country exchange rate and identify strong spillover effects to other countries' exchange rates in that region.

### 3. Characteristics and numerical analytics of sovereign ratings

Sovereign ratings are assigned by various agencies, but the three prominent ones are Standard and Poor's, Moody's and Fitch. The broad rating scales are similar, allowing for the classification of around 20 ratings with each divided into three outlooks, namely, "positive," "stable," and "negative." These outlooks indicate, respectively, the possibilities of an upgrade, remaining at the same rating, or having a lower rating. Systems of converting the alphabetical ratings into numerical scores have been proposed in papers such as Dadush and Dasgupta (2001) and Gaillard (2009). We build on this system but introduce an innocuous cardinal change (Sen 1977; Basu 1983) of multiplying each number by 3, as done in Basu et al. (2012).<sup>2</sup> This modification allows for a richer analysis.<sup>3</sup> Since in addition to the grades, the agencies give three outlook classifications, positive, stable, and negative for each grade, we refine the conversion system further by subdividing each grade across the three outlook classes and assigning a numerical score corresponding to each. Furthermore, following Ratha, De and Mohapatra (2011), better scores are assigned smaller numbers since the scores for the lower-than-default category are indeterminate. The resulting scoring system is described in Table 1.

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<sup>2</sup> The measure proposed in Basu et al. (2012) is a non-cardinal, positive monotone transformation of the measure developed in this paper.

<sup>3</sup> It should be recognized that rankings could be done in many different ways, satisfying different axiomatic properties, with the additional hazard of there being sets of reasonable axioms which are together inconsistent (see, for example, Pattanaik and Xu, 2007). We use a very simple form here but there is scope for developing this further in different ways.

**Table 1: Ratings, outlooks and numerical scores**

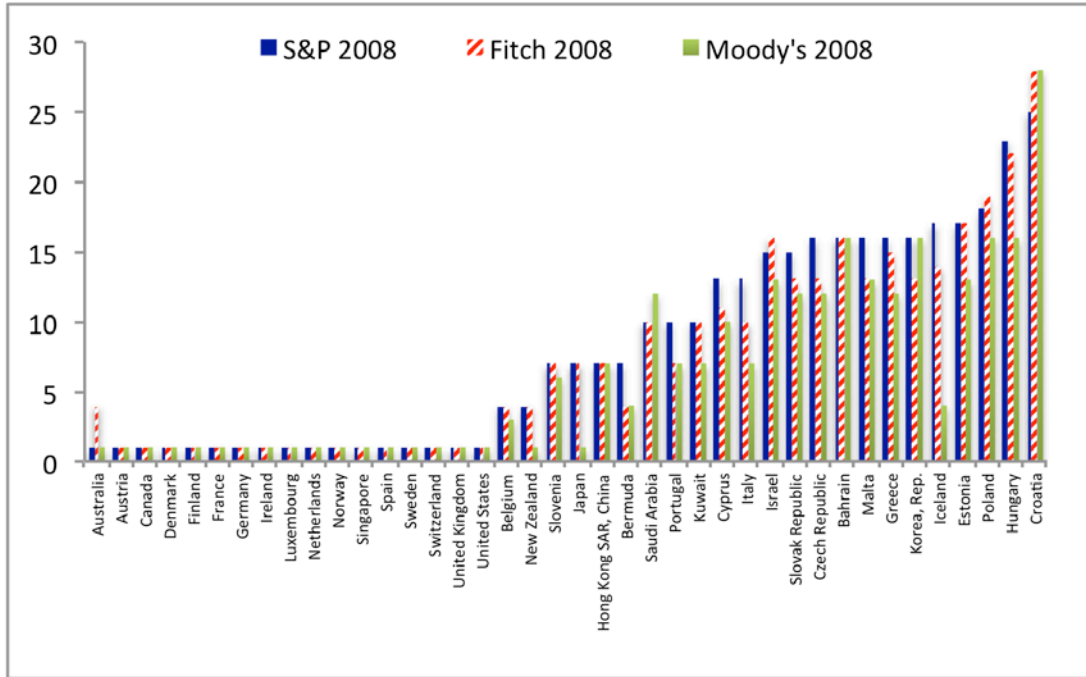
S&P	Fitch	Moody's	Outlook	Outlook adjusted score
AAA	AAA	Aaa	P	Does not exist
			S	1
AA+	AA+	Aa1	N	2
			P	3
			S	4
AA	AA	Aa2	N	5
			P	6
			S	7
AA-	AA-	Aa3	N	8
			P	9
			S	10
A+	A+	A1	N	11
			P	12
			S	13
A	A	A2	N	14
			P	15
			S	16
A-	A-	A3	N	17
			P	18
			S	19
BBB+	BBB+	Baa1	N	20
			P	21
			S	22
BBB	BBB	Baa2	N	23
			P	24
			S	25
BBB-	BBB-	Baa3	N	26
			P	27
			S	28
BB+	BB+	Ba1	N	29
			P	30
			S	31
BB	BB	Ba2	N	32
			P	33
			S	34
BB-	BB-	Ba3	N	35
			P	36
			S	37
B+	B+	B1	N	38
			P	39
			S	40
B	B	B2	N	41
			P	42
			S	43
B-	B-	B3	N	44
			P	45
			S	46
CCC+	CCC+	Caa1	N	47
			P	48
			S	49
CCC	CCC	Caa2	N	50
			P	51
			S	52
CCC-	CCC-	Caa3	N	53
			P	54
			S	55
CC	CC	Ca	N	56
			P	57
			S	58
C	C	C	N	59
				60

Notes: Based on Gaillard (2009), Ratha, De and Mohapatra (2011) and Basu, et al. (2012), as adapted by the authors. 'P' signifies Positive, 'S' Stable and 'N' Negative.

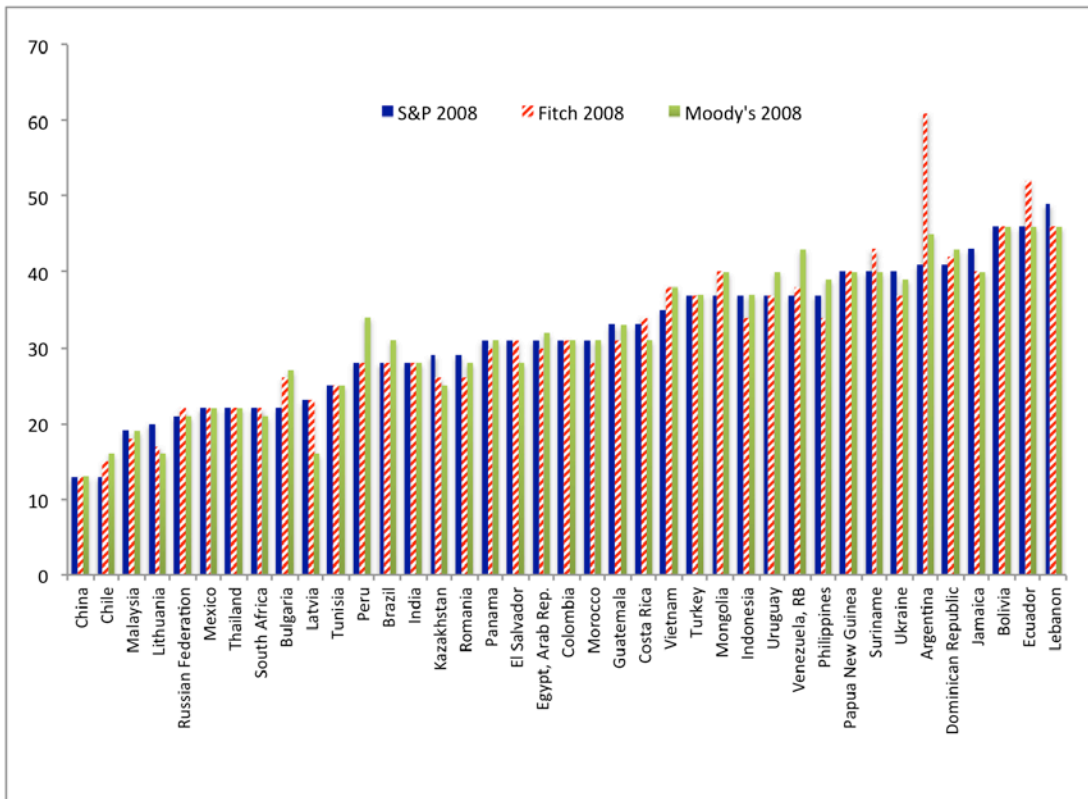
The numerical values of the ratings for the high-income and developing countries are shown for the pre-crisis period (July 2008) and the post-crisis period (December 2012) in Figures 1–4. By and large there is a high degree of correlation among the ratings for the three agencies.



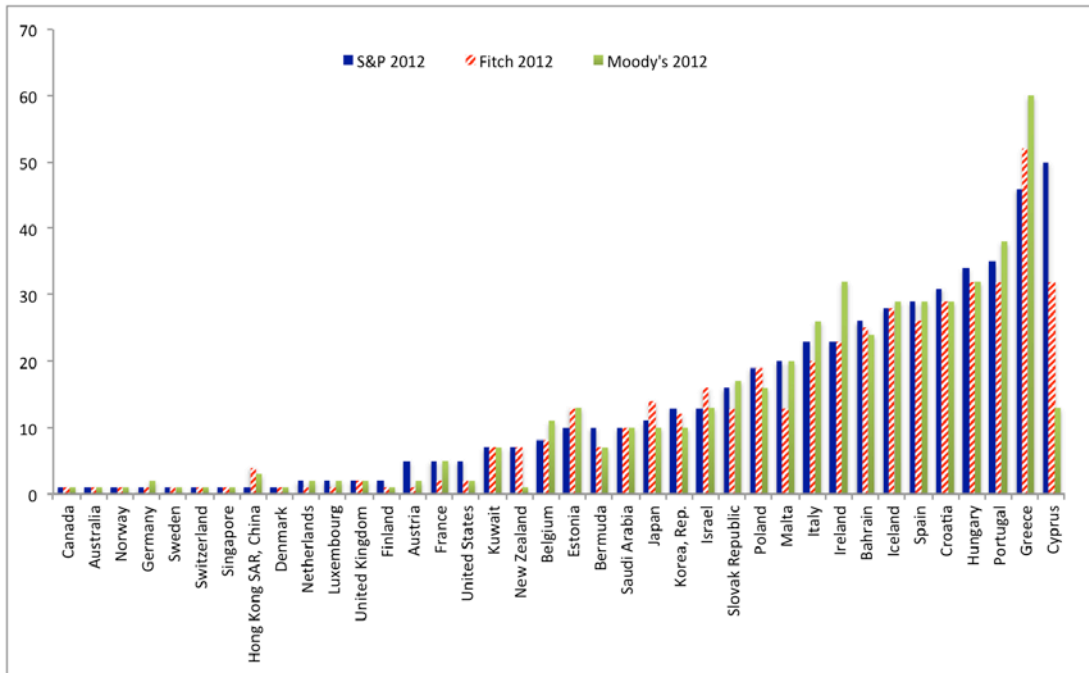
**Figure 1: Sovereign ratings in high-income countries in July 2008**



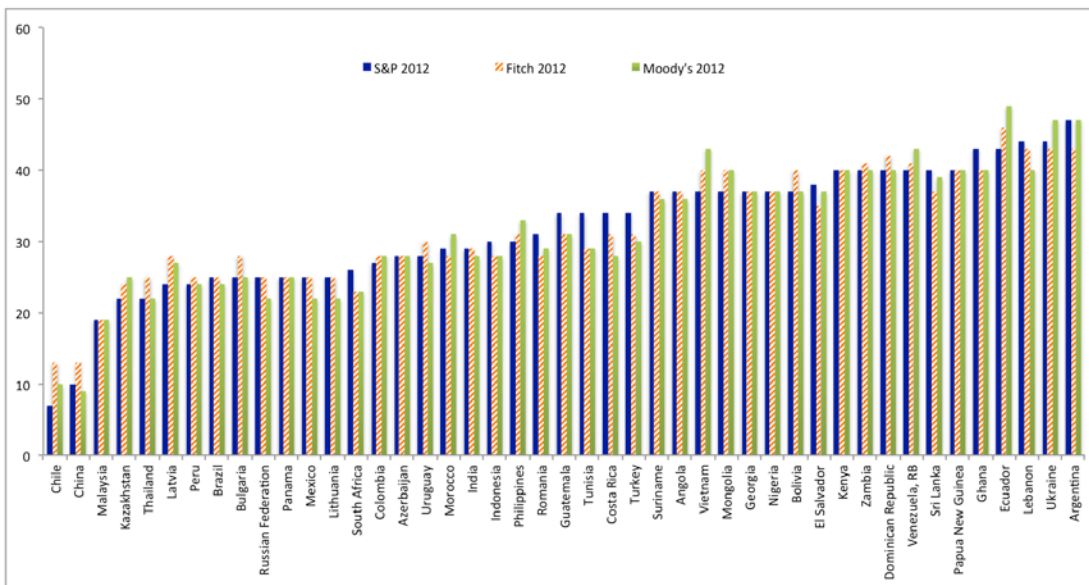
**Figure 2: Sovereign ratings in developing countries in July 2008**



**Figure 3: Sovereign ratings in high-income countries in December 2012**



**Figure 4: Sovereign ratings in developing countries in December 2012**



In 2008 the correlation between the ratings assigned by the three agencies to the high-income countries ranged between 92 percent and 98 percent, and that for the developing countries ranged between 93 percent and 96 percent. By 2012, post-crisis, the correlation among ratings decreased to 87–96 percent for the high-income countries as some of them got downgraded; whereas the correlation among the ratings of the developing countries increased to 96–98 percent. While there may be subtle differences in the rating methods and timings of the agencies, there remains a high degree of correlation among the ratings of the three

agencies. This suggests that just as one sees evidence of herd behavior among corporations and investors, there may be herd behavior among rating agencies. Alternatively, the rating agencies respond to broadly similar variables and information. Whether that is true or not, the fact remains that analyzing the rating of any one agency gives a fair indication of the rating of the other two agencies. Explicit announcements from rating agencies indicate that they rely on certain key economic and structural variables for arriving at ratings. For instance, Moody's assesses sovereigns on the basis of economic strength, institutional strength, fiscal strength and susceptibility to event risk. Furthermore, there have been realignments in rating methods following the crisis (Moody's 2013b).

#### 4. Empirical model for sovereign ratings

Based on the numerical assignment of scores for agency ratings, the following equation is used to analyze various macroeconomic, structural and governance factors determining ratings:

$$\begin{aligned} \text{Sovereign rating} = & \alpha + \beta_1(\text{GDP growth}) + \beta_2(\log \text{ of GNI per capita}) + \beta_3(\text{Reserves/ Imports} \\ & + \text{Short term debt}) + \beta_4(\text{External debt/Exports} + \text{Remittances}) + \beta_5(\text{GDP volatility}) + \\ & \beta_6(\text{Rule of law}) + \beta_7(\text{Inflation}) + \beta_8(\text{Government debt}) + \beta_9(\log \text{ of GDP}) + \beta_{10}(\text{High income} \\ & \text{dummy}) + \text{error} \end{aligned} \quad (1)$$

This model is a modified version of the one used in Ratha, De and Mohapatra (2011), which in turn builds on Cantor and Packer (1996). The dependent variable is the numerical score described earlier encompassing both the rating and the outlook (1–59 for the available ratings scale with lower numbers assigned to better ratings; selective default and C rating excluded). On the right hand side, GDP growth captures medium-term economic performance, GNI per capita reflects market and economic development, the ratio of reserves to the sum of imports and short-term debt and the ratio of external debt to the sum of exports and remittances serve as indicators of short-run external liquidity and solvency, the rule of law encompasses the overall impact of governance, and total GDP indicates the size of the economy. The variables and data sources are listed in Table 2.

To avoid repetition, we confine the econometric analysis to S&P long-term foreign currency ratings. Given the high degree of correlation among the ratings of the three agencies, the results are expected remain qualitatively similar if ratings of other agencies were used. The explanatory variables are one period lagged (2007 explanatory variables for 2008 ratings and 2011 ones for 2012 ratings) values of GDP growth (3-year moving average), log of GNI per capita, ratio of reserves to sum of imports and short term debt, ratio of total external debt to sum of exports and remittances, GDP volatility (5-year standard deviation), rule of law (+2.5 to –2.5 from World Governance Indicators, Kraay, Kaufmann and Mastruzzi 2010), inflation, general government gross debt (% of GDP), log of GDP and a dummy for highincome countries. The use of lagged explanatory variables helps address, to some extent, the simultaneity problem.

**Table 2: Variable composition and data sources**

Variable	Composition	Data sources
Sovereign rating	Numerical values as in Table 1.	Standard & Poor's.
GDP growth	3-year moving average of GDP growth. Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2000 U.S. dollars.	World Bank, World Development Indicators.
Log of GNI per capita	Natural log of GNI per capita. GNI per capita is the gross national income, converted to U.S. dollars using the World Bank Atlas method, divided by the midyear population.	World Bank, World Development Indicators.
Reserves/ Imports + Short term debt	Total reserves divided by sum of imports and short-term debt. Total reserves (includes gold, current US\$). Imports of goods and services (constant 2000 US\$). Short-term external debt, residual maturity.	World Bank, World Development Indicators for reserves and imports, and Bank of International Settlements for short-term debt.
External debt/Exports + Remittances	External debt divided by sum of exports and remittances. External debt stocks (US\$), total of 'Liabilities to BIS banks, consolidated, total', 'International debt securities, all maturities', 'Official bilateral loans, total' and 'Multilateral loans, total'. Exports of goods and services (constant 2000 US\$). Remittances in US\$.	Joint External Debt Hub for constructing external debt. World Bank, World Development Indicators database for exports and Global Migration Report for remittances.
GDP volatility	5-year standard deviation of GDP growth	World Bank, World Development Indicators.
Rule of law	Rule of law with values from +2.5 to -2.5 spanning the best and the worst scores, respectively.	Estimates from World Governance Indicators (Kraay, Kaufmann and Mastruzzi, 2010)
Inflation	Inflation, consumer prices (annual %).	World Bank, World Development Indicators.
Government debt	General government gross debt (US\$)	International Monetary Fund, World Economic Outlook.
log of GDP	Natural log of GDP	World Bank, World Development Indicators.

The model is run separately for data pertaining to ratings as of July 2008 (before the crisis set in) and December 2012. A pooled regression across the two periods is also carried out. Additional explanatory variables in the pooled model are a dummy for the year 2008 and a term interacting GDP volatility with the 2008 dummy (to check if the relationships were impacted by the financial crisis, see below).<sup>4</sup>

<sup>4</sup> Following Ratha, De and Mohapatra (2011), we eliminate outliers where the residual is greater than one standard deviation of the dependent variable's distribution. For the 2008 estimates there are no such outliers; for 2012, the outliers are Argentina, Cyprus and Spain; and for the pooled regression, the outliers are Argentina and Cyprus.

The results are reported in Table 3.

**Table 3: Estimation results for determinants of sovereign ratings**

<b>Dependent variable: Sovereign rating</b>	<b>S&amp;P 2008 OLS</b>	<b>S&amp;P 2012 OLS</b>	<b>2008-2012 Pooled</b>	<b>S&amp;P 2008 O. Probit</b>	<b>S&amp;P 2012 O. Probit</b>
GDP growth	-0.43** (0.23)	-.55** (0.27)	-0.53*** (0.17)	-0.10 (0.06)	-0.13** (0.06)
Log of GNI per capita	-3.66*** (0.81)	-3.60*** (0.86)	-3.82*** (0.58)	-0.80*** (0.26)	-0.87*** (0.20)
Reserves to import and ST debt	-4.07*** (1.21)	-3.78* (1.99)	-3.92*** (1.03)	-0.97** (0.39)	-0.70 (0.45)
External debt to exports & remittances	0.59** (0.25)	0.73 (0.51)	0.78*** (0.27)	0.16** (0.06)	0.15* (0.09)
GDP volatility	1.58*** (0.56)	-0.13 (0.33)	-0.17 (0.25)	0.40** (0.16)	-0.05 (0.07)
Rule of law	-6.34*** (1.03)	-7.91*** (0.91)	-7.46*** (0.71)	-1.74*** (0.27)	-1.64*** (0.23)
Inflation	0.48** (0.20)	0.12** (0.05)	0.19*** (0.05)	0.12** (0.05)	0.04*** (0.01)
Govt. debt	0.08*** (0.02)	0.14*** (0.03)	0.11*** (0.02)	0.02*** (0.004)	0.03*** (0.006)
Log of GDP	-1.65*** (0.28)	-2.32*** (0.31)	-1.94*** (0.23)	-0.49*** (0.09)	-0.52*** (0.09)
High income dummy	-5.83*** (1.84)	-3.8* (2.10)	-3.82** (1.51)	-1.56*** (0.52)	-0.53 (0.41)
Intercept	96.47*** (7.68)	113.56*** (8.21)	107.48*** (5.77)		
GDP volatility X 2008 dummy			1.61*** (0.57)		
2008 dummy			-2.59** (1.18)		
Observations	94	90	191	94	90
Adj. R-sq. (OLS)	0.93	0.87	0.90		
Pseudo-R-sq. (O. Probit)				0.40	0.30
Log pseudo-likelihood				-172.99	-202.81

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Robust standard errors in parenthesis.

The empirical estimates are arrived at using ordinary least squares (OLS). OLS is appropriate if we are willing to assume that the ratings scale is cardinal and adjacent rating/outlook states have equal distance. However, credit ratings are often estimated using ordered probit which relaxes this assumption and requires the scale to be merely ordinal. We therefore also report ordered probit estimates. But for estimating ratings for developing countries and shadow ratings for unrated countries, ordered probit suffers from some drawbacks. Its ability to estimate ratings at the lower end of the ratings spectrum where data

points are sparse is limited.<sup>5</sup> Furthermore, it cannot be used to infer ratings out of the range of the sample. On the other hand, the drawbacks of OLS in estimating ordered categorical data are somewhat mitigated when the number of categories increases (Larabee 2011). This is only to be expected because when the number of categories increases, the categorical variable behaves closer to a continuous one. In this trade-off, we find that OLS serves our purpose better because it can be used to estimate out-of-range or extremes-of-the-range values (for instance, very low rated countries) and has good in-sample predictive powers. The assumption of a linear ratings scale does not mean that default risk is linear in ratings. Rather empirical evidence indicates that default risk is non-linear in ratings (Moody's 2013a). Similarly, spreads are non-linear in ratings with a distinct jump below investment grade (Jaramillo and Tejada 2011).

For 2008, the OLS estimates have 94 observations and yield an adjusted R-square of 0.93. All the explanatory variables are statistically significant and have expected signs. GDP growth, log of GNI per capita, the reserve ratio, rule of law, log of GDP and the high-income dummy all have negative signs indicating that increases in these values leads to better rating outcomes (lower is better in the numerical conversion scale since smaller numbers correspond to higher ratings). This matches usual economic logic. GDP growth captures economic performance, GNI per capita indicates level of income and economic development, the reserve ratio reveals ability to meet international financial commitments, rule of law reflects various governance aspects and GDP is linked to overall size of the economy.

The high-income dummy indicates that high-income countries are generally rated higher than other countries even after accounting for factors such as GDP and GNI per capita. However, this impact was larger in 2008. External debt to imports-remittances, GDP volatility, inflation and government debt have negative signs. Larger values of these variables have a detrimental effect on ratings (since larger numerical scores correspond to worse ratings). External debt to imports-remittances and government are indebtedness indicators, while GDP volatility and inflation reflect macroeconomic instability. While the other variables have been used previously (Ratha, De and Mohapatra 2011), GDP is a new addition and is seen to have a significant impact. Furthermore, in the pooled regression, a slope dummy for GDP volatility is introduced to test for structural changes in the post-2008 scenario.

For the 2012 OLS estimates, we have 90 observations with an adjusted R-square of 0.87. While the overall fit for 2008 is better, indicating the relatively stable economic circumstances and less divergence in rating outcomes, the explanatory power of the model remains substantial. All variables other than external debt to imports-remittances and GDP volatility are significant and have the right signs. The pooled 2008-2012 model has 191 observations and an adjusted R-square of 0.9. All explanatory variables other than GDP volatility are significant and have the correct signs. However, the GDP volatility-2008

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<sup>5</sup> Our estimates show that for the lower ends of the rating spectrum, ordered probit predicted ratings are not very accurate. The 2008 estimates generate 28 cut-offs while the 2012 estimates have 30 cut-offs. Faced with a similar situation, Afonso, Gomes and Rother (2009) gave up trying to distinguish ratings below B-.

dummy interaction term is significant at 1% level indicating that the variable had an impact in 2008 but not in 2012. The 2008 dummy is also significant and has a negative sign indicating that on the whole 2008 ratings were better than 2012 ratings.

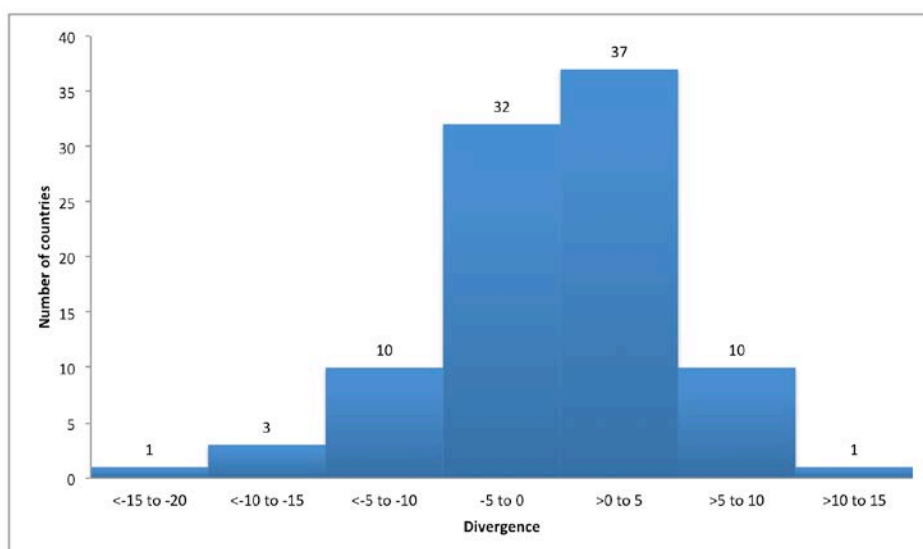
The 2008 ordered probit estimates have signs similar to OLS and all coefficients except that for GDP growth are significant. For 2012, the ordered probit estimates again have signs similar to the OLS estimates and all coefficients other than those for the ratio of reserves to import and short-term debt. GDP volatility and the high income dummy are not significant. The coefficients are not comparable to the OLS estimates since the two methods are essentially different. Nevertheless, both methods tell a similar story.

Broadly, it appears that following the events of 2008, rating agencies give lesser importance to cyclical variables such as GDP volatility, imports (as captured in the reserves ratio) and exports (reflected in the composite external debt to exports-remittances ratio) and have more stress on structural factors such as the rule of law. The advantage bestowed upon high-income countries is somewhat muted after the crisis.

#### 5. Model validity, predictions and shadow ratings

Having estimated the empirical sovereign ratings model, we move on to use it for in-sample predictions of ratings for rated countries and execute out-of-sample prediction of (shadow) ratings for unrated countries. As stated earlier, given the advantages displayed by OLS for our specific purpose, these are based on OLS estimates. The predictive ability of the model is good, especially where the economic variables are the main drivers. Expectedly the predictive power is lower for countries that were affected by unforeseen political disturbances (for example, Egypt). For 2012, in 64 out of 96 countries (about 66 percent), the predicted rating is within 1.5 notches (that is 4.5 outlook states) of the actual rating. Of these, 53 (about 57 percent) fall within one notch (3 outlook states) of the actual rating.

**Figure 5: Divergence of predicted ratings from actuals**



**Table 4: Predictions within one-third of a notch**

Country	S&P 2012	Predicted 2012	S&P June 2013
India	BBB- o-	BBB- os	
Colombia	BBB- o+	BBB o-	<i>BBB os</i>
Zambia	B+ os	B+ os	
Lithuania	BBB os	BBB os	
Belarus	B- os	B- os	<i>B- o+</i>
Georgia	BB- os	BB- os	
Nigeria	BB- os	BB- os	
Mexico	BBB os	BBB o-	<i>BBB o+</i>
Vietnam	BB- os	BB- o-	<i>BB- os</i>
Serbia	BB- o-	B+ o+	<i>BB- o-</i>
Cape Verde	B+ os	B+ o-	<i>B+ os</i>
Botswana	A- os	A- o-	<i>A- os</i>

Notes: “os” stands for stable outlook, “o+” for positive outlook and “o-” for negative outlook for actual ratings. Nomenclature for predicted ratings are deliberately kept different and unabbreviated.

The distribution of divergences of the predicted ratings for 2012 from the actuals is displayed in Figure 5. This shows a strong central tendency and a longer tail for negative divergences related to cases where the predicted rating is better than the actual rating arising largely due to the persistence of the 2008 shock for peripheral European economies. In certain cases the predicted rating is within one-third of a notch (that is close to the precise outlook state) (see Table 4).

**Table 5: Prediction higher than actual rating<sup>6</sup>**

Country	S&P 2012	Predicted 2012	S&P June 2013
Turkey	BB os	BBB+ positive	<i>BB+ os</i>
Portugal	BB o-	BBB positive	<i>BB os</i>
Hungary	BB os	BBB positive	<i>BB o-</i>
Costa Rica	BB os	BBB os	<i>BB os</i>
Greece	B- os	BB- negative	<i>B- os</i>
Iceland	BBB- os	BBB+ positive	<i>BBB- os</i>
Saudi Arabia	AA- os	AA+ positive	<i>AA- o+</i>
Ghana	B os	BB- positive	<i>B os</i>
Uruguay	BBB- os	BBB+ os	<i>BBB- os</i>
Dominican Rep	B+ os	BB os	<i>B+ os</i>
Ecuador	B os	BB- os	<i>B os</i>
Bahrain	BBB o-	BBB+ positive	<i>BBB os</i>

Notes: “os” stands for stable outlook, “o+” for positive outlook and “o-” for negative outlook for actual ratings. Nomenclature for predicted ratings are deliberately kept different and unabbreviated.

In some cases the predicted rating is higher than the actual rating (Table 5). Some of these cases pertain to unanticipated political shocks while others relate to the continuation of the European crisis. In the latter case, it is possible that rating agencies are lagging in restoring ratings, as has been discussed in the past in the literature (Ferri, Liu and Stiglitz

<sup>6</sup> Shadow ratings for some countries could not be calculated due to unavailability of data on ‘general government gross debt’. Instead, if ‘government net lending/borrowing’ (from IMF World Economic Outlook) is used in the regressions, the resulting shadow ratings are: Bangladesh B positive for 2012, lower than the actual rating of BB- stable; Republic of Korea AA positive for 2012, higher than the actual rating of A+ stable; Sri Lanka BB- negative for 2012, higher than the actual rating of B+ stable; and Samoa BB stable shadow rating for 2012.



1999; Barua 2011). At the other end of the spectrum are the cases – such as Belgium, Canada, Luxembourg, Singapore, and Japan – where the predicted rating is lower than the actual rating (Table 6).

**Table 6: Prediction lower than actual rating**

Country	S&P 2012	Predicted 2012	S&P June 2013
Belgium	AA o-	A+ stable	AA o-
Bulgaria	BBB os	BB+ positive	BBB os
Canada	AAA os	AA positive	AAA os
El Salvador	BB- o-	B stable	BB- o-
Guatemala	BB os	B+ positive	BB os
Thailand	BBB+ os	BBB- positive	BBB+ os
Kazakhstan	BBB+ os	BBB- positive	BBB+ os
Luxembourg	AAA o-	AA negative	AAA os
Fiji	B os	CCC+ stable	B os
Singapore	AAA os	AA stable	AAA os
United Kingdom	AAA o-	AA- positive	AAA o-
Kenya	B+ os	CCC+ positive	B+ os
Trinidad & Tob.	A os	BBB positive	A os
Japan	AA- o-	BBB+ negative	AA- o-

Notes: “os” stands for stable outlook, “o+” for positive outlook and “o-” for negative outlook for actual ratings. Nomenclature for predicted ratings are deliberately kept different and unabbreviated.

**Table 7: Shadow ratings for unrated countries\***

Algeria	A- negative
Mauritius	BBB negative
St. Vincent & the Grenadines	B+ positive
Dominica	B+ positive
Swaziland	B+ stable
Moldova	B+ negative
Seychelles	B positive
Armenia	B positive
Bhutan	B stable
Tanzania	B negative
Mali	B negative
Solomon Islands	B- positive
Maldives	B- stable
Malawi	B- negative
Guyana	B- negative
Nepal	CCC+ positive
Ethiopia	CCC+ positive
Belize*	CCC+ stable*
Lao PDR	CCC+ stable
Togo	CCC+ stable
Nicaragua	CCC+ negative
Yemen, Rep.	CCC+ negative
Haiti	CCC+ negative
Gambia, The	CCC- positive
Kyrgyz Rep	CCC- negative
Cote d'Ivoire	CC positive
Sierra Leone	CC stable

\*Unrated refers to countries not rated by S&P. Belize was in selective default in December 2012 and came back with a rating of B- stable, that is a notch above our prediction in March 2013.

The predicted shadow ratings for the unrated countries are reported in Table 7. It can be seen that countries like Algeria that have little need for debt have shadow ratings well within investment grade. Mauritius has an investment grade shadow rating. A fairly large range of countries such as Dominica, Moldova, Armenia, Bhutan and Mali have below investment grade shadow ratings which are still in the middle of the B range or even better.

## 6. Relative risk ratings

With the vector of actual ratings for the rated countries and shadow ratings for the unrated countries, it is relatively easy to compute the relative risk rating of countries by sorting them in ascending or descending order. In this case, an improvement in relative rating of a country will usually be accompanied by a worsening of relative rating of another country. The complication arises when the average rating of the overall portfolio changes over time: in this case, it becomes important to compare rating changes of a country with the change in the average rating. Another source of complication is the choice of weight for a country for computing the world average. In our calculation, we use the GDP as weight, thus assuming that the larger a country, the greater is its impact on the world average rating. To avoid confusion that may arise from changes in the GDP over time, we use the data for 2008 to compute the weights.<sup>7</sup>

The *relative risk rating*,  $RR$ , is then computed as:

$$RR_{it} = r_{it} - \sum_j w_j r_{jt} \quad (2)$$

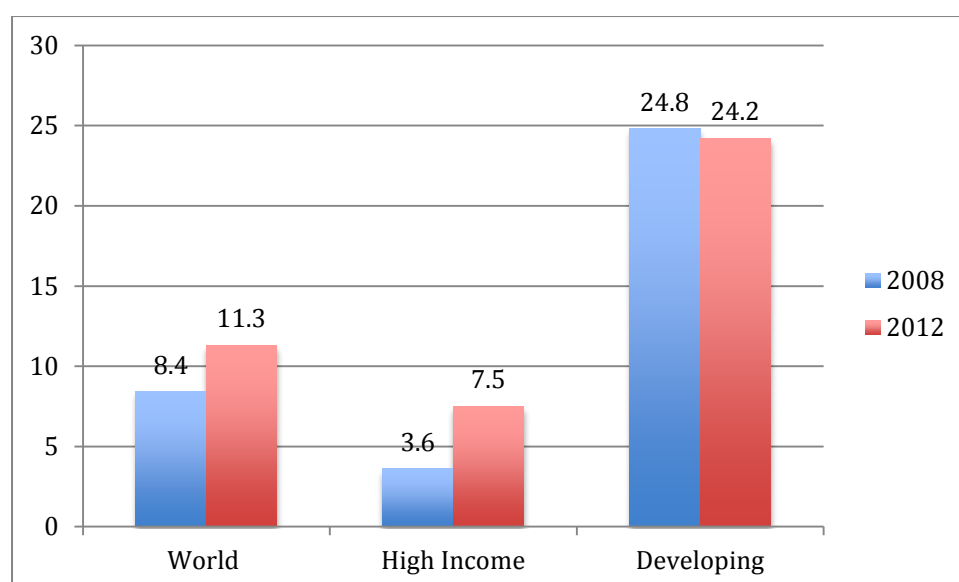
where  $r_{it}$  stands for the rating of country  $i$  in time  $t$  and  $w_i$  for the share of the country's GDP in the world GDP in 2008. Since in our scoring system smaller numbers relate to better ratings, a negative  $RR$  value would indicate a better than average rating performance. Similarly, when we compare 2008 and 2012, a higher positive value of relative risk rating,  $RR$ , would indicate a worse outcome.

The average ratings (not  $RR$ ) for the world and separately for the high-income and the developing countries are shown for 2008 and 2012 in Figure 6. In 2008 the world average stood at 8.4 (approximately AA with negative outlook). By 2012 this had worsened to a score of 11.3 (AA- with a negative outlook), a downgrade of one rating notch. Most of this change arose due to a worsening of the weighted average of the high-income countries, from a score of 3.6 (AA+ stable) in 2008 to 7.5 (AA stable) in 2012. In contrast, developing countries had a slight improvement from 24.8 (BBB stable) to 24.2 (BBB positive).

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<sup>7</sup> This is an innocuous assumption when comparing ratings over two relatively close years as in the exercise below. As with the construction of index numbers a la Laspeyres and Paasche we can use the GDP weights of the start year or the end year. We prefer to use the start year for the pragmatic reason of more reliable data availability.

**Figure 6: Weighted averages for the world, high income and developing countries in 2008 and 2012.**



In terms of relative ratings, some of the largest improvements were recorded by Azerbaijan and Ethiopia (both unrated) followed by rated countries such as Bolivia, Uruguay and Kazakhstan.<sup>8</sup> Philippines and Indonesia also recorded sizable improvements. Some of the worst performers in terms of relative ratings have been peripheral European economies, namely, Cyprus, Greece, Spain, Portugal and Ireland. Egypt, Hungary and Iceland have also not performed well (Table 8). In all these cases, the countries had rating downgrades and also did worse than the approximately one-notch downgrade in the world average.

Interestingly enough, between 2008 and 2012, 19 countries in the sample registered improvements in relative rating even though their actual ratings were unchanged. Another 20 countries had a slight lowering of outlook but still had relative rating improvements because this erosion was less than the deterioration of the world average. Interesting examples in this category are India, Jordan, Poland and the United Kingdom.

**Table 8: Actual, Predicted and Relative Risk Ratings for 2008 and 2012**

	Country	Actual 2008	Actual 2012	Predicted 2008	Predicted 2012	RR 2008	RR 2012
1	Azerbaijan		BBB- os	B stable	BB+ stable	34.7	16.7
2	Ethiopia			CC positive	CCC+ positive	48.5	36.4
3	Bolivia	B- os	BB- os	B+ stable	B+ positive	37.6	25.7
4	Uruguay	BB- os	BBB- os	BB+ positive	BBB+ stable	28.6	16.7
5	Kazakhstan	BBB- o-	BBB+ os	BB positive	BBB- positive	20.6	10.7
6	Estonia	A o-	AA- os	A+ positive	A+ stable	8.6	-1.3
7	Indonesia	BB- os	BB+ o+	BB positive	BBB- negative	28.6	18.7
8	Philippines	BB- os	BB+ o+	BB positive	BB+ stable	28.6	18.7

<sup>8</sup> As mentioned earlier, ratings at default or below are difficult to quantify and compare. Hence we do not report relative rating changes for countries with shadow ratings of 60 and below. This happens for Tajikistan, Burundi and Guinea-Bissau with respect to their 2008 shadow ratings.

9	Panama	BB+ os	BBB os	BB+ negative	BBB- stable	22.6	13.7
10	Paraguay	B os	BB- os	B negative	BB- positive	34.6	25.7
11	Czech Republic	A os	AA- os	AA- stable	A+ stable	7.6	-1.3
12	Hong Kong SAR, China	AA os	AAA os	AAA negative	AAA stable	-1.4	-10.3
13	Guyana			CCC stable	B- negative	43.8	35.3
14	Moldova			B- stable	B+ negative	37.9	29.6
15	Seychelles	B o-	NR	CCC+ positive	B positive	38.6	30.5
16	Rwanda		B os	CCC+ positive	B+ negative	39.7	31.7
17	Togo			CCC- positive	CCC+ stable	46.0	38.2
18	Haiti			CCC- stable	CCC+ negative	46.5	39.0
19	Maldives			CCC+ negative	B- stable	41.3	34.4
20	Colombia	BB+ os	BBB- o+	BB+ positive	BBB negative	22.6	15.7
21	Peru	BBB- os	BBB o+	BB+ positive	BBB negative	19.6	12.7
22	Solomon Islands			CCC+ stable	B- positive	40.6	33.8
23	Zambia		B+ os	B negative	B+ stable	35.4	28.7
24	Malawi			CCC+ negative	B- negative	41.8	35.3
25	Mauritius			BBB- negative	BBB negative	21.1	15.1
26	Brazil	BBB- os	BBB os	BBB- positive	BBB+ stable	19.6	13.7
27	Georgia	B+ os	BB- os	BB- negative	BB- stable	31.6	25.7
28	Turkey	BB- os	BB os	BBB negative	BBB+ positive	28.6	22.7
29	Kuwait	AA- os	AA os	A+ positive	AA stable	1.6	-4.3
30	Kenya	B os	B+ os	B- negative	CCC+ positive	34.6	28.7
31	Ecuador	B- os	B os	B+ positive	BB- stable	37.6	31.7
32	China	A+ os	AA- os	A- stable	A+ stable	4.6	-1.3
33	Israel	A o+	A+ os	AA- negative	AA- negative	6.6	1.7
34	Trinidad and Tobago	A- o+	A os	BBB positive	BBB positive	9.6	4.7
35	Morocco	BB+ os	BBB- o-	BB positive	BB positive	22.6	17.7
36	Kyrgyz Republic			CC stable	CCC- negative	49.3	44.9
37	Pakistan	B o-	B- os	B+ negative	B negative	38.6	34.7
38	Dominican Republic	B+ o-	B+ os	BB- stable	BB stable	32.6	28.7
39	Swaziland			B+ stable	B+ stable	31.9	28.3
40	Algeria			A- negative	A- negative	11.7	8.3
41	Canada	AAA os	AAA os	AAA stable	AA positive	-7.4	-10.3
42	Norway	AAA os	AAA os		AAA stable	-7.4	-10.3
43	Saudi Arabia	AA- os	AA- os	AA- positive	AA+ positive	1.6	-1.3
44	Malaysia	A- os	A- os	A- stable	BBB+ positive	10.6	7.7
45	Serbia	BB- o-	BB- o-	BB- stable	B+ positive	29.6	26.7
46	Senegal	B+ o-	B+ o-	B+ stable	B stable	32.6	29.7
47	Mozambique	B+ os	B+ os	B- stable	B negative	31.6	28.7
48	Thailand	BBB+ os	BBB+ os	BBB negative	BBB- positive	13.6	10.7
49	Switzerland	AAA os	AAA os	AAA stable		-7.4	-10.3
50	Denmark	AAA os	AAA os		AAA negative	-7.4	-10.3
51	Singapore	AAA os	AAA os	AA+ negative	AA stable	-7.4	-10.3
52	Sweden	AAA os	AAA os			-7.4	-10.3
53	Nigeria	BB- os	BB- os	BB- stable	BB- stable	28.6	25.7
54	Germany	AAA os	AAA os	AAA negative	AA+ stable	-7.4	-10.3
55	Australia	AAA os	AAA os			-7.4	-10.3
56	Fiji	B os	B os	B stable	CCC+ stable	34.6	31.7
57	Cameroon	B os	B os	B+ positive	B+ negative	34.6	31.7
58	Uganda		B+ o-	B+ negative	B positive	32.3	29.7
59	Honduras		B+ os	B+ stable	B stable	31.1	28.7
60	Nicaragua			CCC+ stable	CCC+ negative	40.8	38.5
61	Gambia, The			CCC negative	CCC- positive	44.8	42.6
62	Finland	AAA os	AAA o-	AAA stable	AA+ stable	-7.4	-9.3
63	India	BBB- os	BBB- o-	BBB- negative	BBB- stable	19.6	17.7
64	Luxembourg	AAA os	AAA o-	AA positive	AA negative	-7.4	-9.3
65	Netherlands	AAA os	AAA o-	AA+ positive	AA positive	-7.4	-9.3
66	Poland	A- o+	A- os	A positive	A positive	9.6	7.7
67	Latvia	BBB+ o-	BBB o+	BBB+ negative	BBB- positive	14.6	12.7

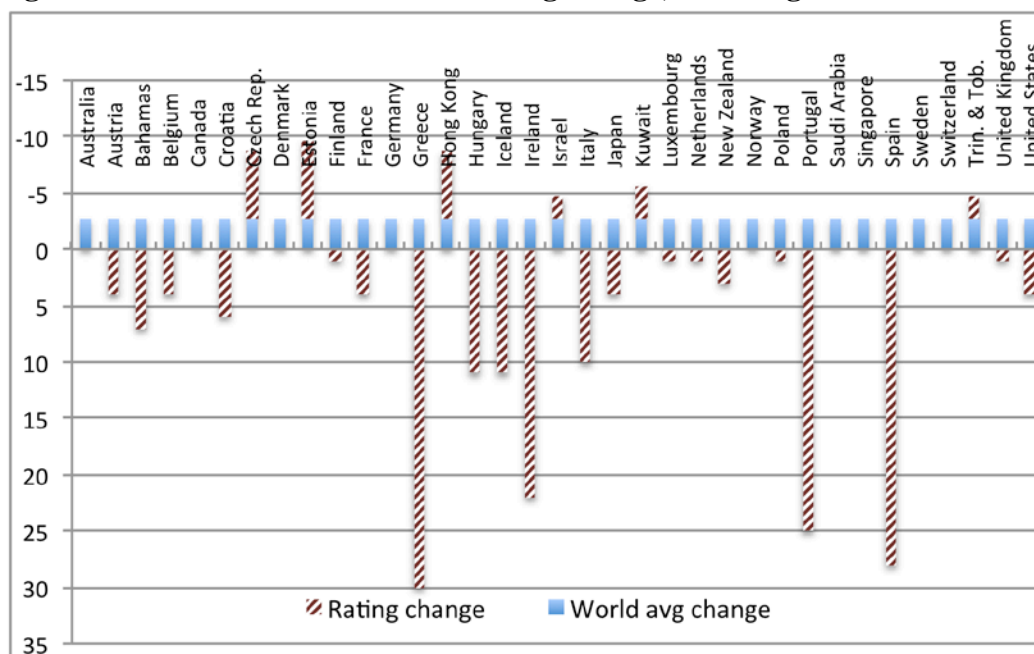
68	Jordan	BB os	BB o-	BB+ negative	BB stable	25.6	23.7
69	Costa Rica	BB o+	BB os	BBB- stable	BBB stable	24.6	22.7
70	Guatemala	BB o+	BB os	B+ stable	B+ positive	24.6	22.7
71	United Kingdom	AAA os	AAA o-	AAA stable	AA- positive	-7.4	-9.3
72	Lao PDR			CCC+ positive	CCC+ stable	39.6	38.0
73	Dominica			BB- negative	B+ positive	29.5	27.9
74	Nepal			B- stable	CCC+ positive	37.4	36.3
75	Vietnam	BB o-	BB- os	BB- stable	BB- negative	26.6	25.7
76	Romania	BBB- o-	BB+ os	BBB negative	BBB- negative	20.6	19.7
77	Benin	B o+	B o-	B+ stable	B- stable	33.6	32.7
78	Cape Verde		B+ os	BB- stable	B+ negative	28.8	28.7
79	Bulgaria	BBB+ os	BBB os	BB+ positive	BB+ positive	13.6	13.7
80	Cambodia	B+ os	B os	B- positive	B- positive	31.6	31.7
81	Ghana	B+ os	B os	B+ stable	BB- positive	31.6	31.7
82	Macedonia, FYR	BB+ os	BB os	BB stable	BB- positive	22.6	22.7
83	Botswana	A os	A- os	A- stable	A- negative	7.6	7.7
84	Mexico	BBB+ os	BBB os	BBB negative	BBB negative	13.6	13.7
85	New Zealand	AA+ os	AA os	AA+ positive	AA+ negative	-4.4	-4.3
86	Albania		B+ os	BB- stable	B positive	28.5	28.7
87	Sierra Leone			CCC- stable	CC stable	46.7	46.9
88	Bhutan			B+ stable	B stable	31.7	32.0
89	Tanzania			B+ negative	B negative	32.1	32.6
90	Mali	NR	NR	B+ negative	B negative	32.1	33.2
91	St. Vinc& Grenadns			BB negative	B+ positive	26.5	27.6
92	Japan	AA os	AA- o-	AA positive	BBB+ negative	-1.4	-0.3
93	Austria	AAA os	AA+ o-	AA+ positive	AA stable	-7.4	-6.3
94	Ukraine	B+ os	B o-	B+ stable	B+ stable	31.6	32.7
95	South Africa	BBB+ os	BBB o-	BBB stable	BBB stable	13.6	14.7
96	Grenada	B- os	CCC+ o-	B- stable	CCC+ positive	37.6	38.7
97	France	AAA os	AA+ o-	AA+ stable	AA negative	-7.4	-6.3
98	Russian Federation	BBB+ o+	BBB os	BBB positive	BBB+ stable	12.6	13.7
99	Belgium	AA+ os	AA o-	AA negative	A+ stable	-4.4	-3.3
100	United States	AAA os	AA+ o-		AA+ stable	-7.4	-6.3
101	Lithuania	A- o-	BBB os	BBB+ positive	BBB stable	11.6	13.7
102	Belize	B os	SD	B stable	CCC+ stable	34.6	37.3
103	Belarus	B+ os	B- os	BB- stable	B- stable	31.6	34.7
104	Croatia	BBB os	BB+ os	A- stable	BBB negative	16.6	19.7
105	Argentina	B+ o-	B- o-	BBB- stable	BBB stable	32.6	35.7
106	Cote d'Ivoire			CCC positive	CC positive	42.3	45.7
107	El Salvador	BB+ os	BB- o-	BB- stable	B stable	22.6	26.7
108	Bahamas, The	A- os	BBB o-	A negative	BBB- negative	10.6	14.7
109	Yemen, Rep.			B stable	CCC+ negative	34.6	38.8
110	Slovenia	AA os	A	A+ positive	A negative	-1.4	4.7
111	Tunisia	BBB os	BB os	BBB- negative	BB positive	16.6	22.7
112	Italy	A+ os	BBB+ o-	A positive	BBB+ negative	4.6	11.7
113	Bahrain	A os	BBB o-	A+ negative	BBB+ positive	7.6	14.7
114	Armenia			BB+ negative	B positive	23.7	30.9
115	Bosnia&Herzegovina		B os	BB positive	BB- negative	24.4	31.7
116	Hungary	BBB+ o-	BB os	A- negative	BBB positive	14.6	22.7
117	Iceland	A o-	BBB- os	A+ stable	BBB+ positive	8.6	16.7
118	Egypt, Arab Rep.	BB+ os	B- o-	BB- stable	BB- negative	22.6	35.7
119	Ireland	AAA os	BBB+ o-	AA+ stable	A- stable	-7.4	11.7
120	Portugal	AA- os	BB o-	A positive	BBB positive	1.6	23.7
121	Spain	AAA os	BBB- o-	AA positive	A+ positive	-7.4	17.7
122	Greece	A os	B- os	A- positive	BB- negative	7.6	34.7
123	Cyprus	A+ os	CCC+ o-	A positive	BBB+ negative	4.6	38.7

Notes: "os" stands for stable outlook, "o+" for positive outlook and "o-" for negative outlook for actual ratings. Nomenclature for predicted ratings are deliberately kept different and unabbreviated. Countries whose 2008 shadow values were beyond the rating scale (greater than 60) are not included in the table. These are Tajikistan (2008- 64.70; 2012- 40.15), Burundi (2008-66.62; 2012- 47.18) and Guinea-Bissau (2008- 61.55; 2012- 48.47).

## 7. Factors contributing to changes in actual and relative ratings

Deciphering factors underlying the changes in relative ratings and actual or shadow ratings is essential for drawing policy implications. To do so, we first decompose the relative rating change during 2008–2012 as the sum of a change in the global average and that in the actual (or shadow) ratings as shown in Figures 7, 8 and 9.

**Figure 7: Contributions to relative rating change, rated high income countries 2008-12**

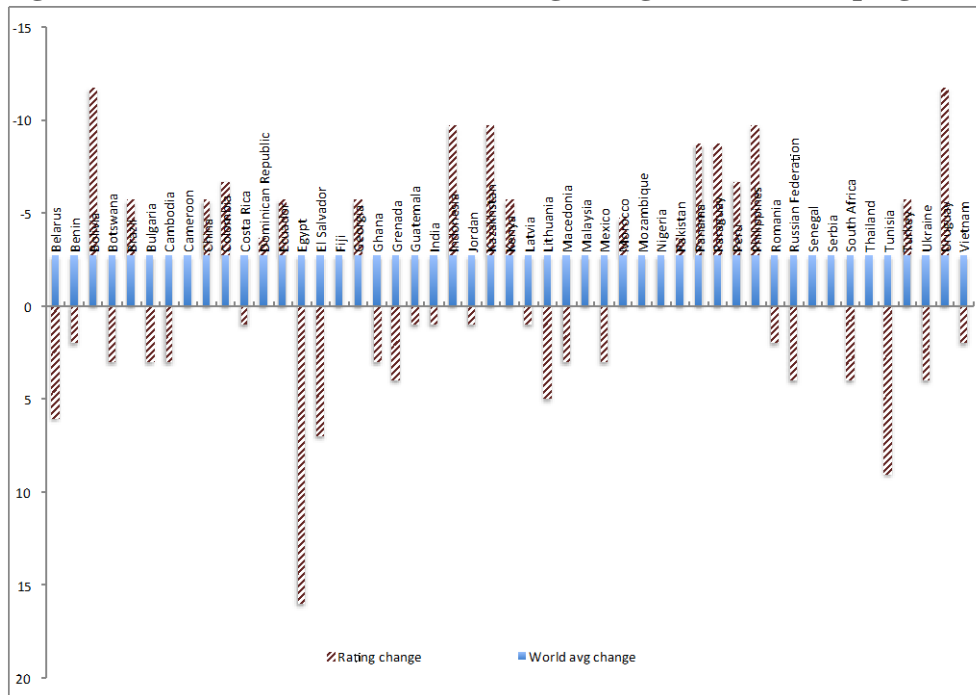


The deterioration of the global average rating between 2008 and 2012 is seen as uniformly impacting (recall that worsening of rating is seen as a higher positive number) all countries. Its impact on a country that experienced no change in rating is to improve the relative rating of the country vis-à-vis other countries; this effect is observed for rated countries such as Australia, Canada, Germany, Malaysia, Nigeria and Sweden. If the actual rating of a country has improved during this period, the effect is only accentuated, as seen in the case of rated countries such as Columbia and Turkey, and unrated countries such as Burundi and Guinea-Bissau. Also actual rating downgrades (or negative outlooks) that are not larger than the deterioration in the world average show up as an improvement in relative ratings; rated countries like Costa Rica, Finland, Guatemala, India, Latvia and the United Kingdom, together with unrated countries such as Bhutan, Nepal and Sierra Leone fall into this category. In cases where the actual rating change is far worse than the global average change, the relative rating is seen to deteriorate. Besides the severely downgraded countries described in the earlier section, this occurs in the case of rated countries like Austria, Japan, Russia and the United States, and unrated countries such as Armenia and Tanzania.

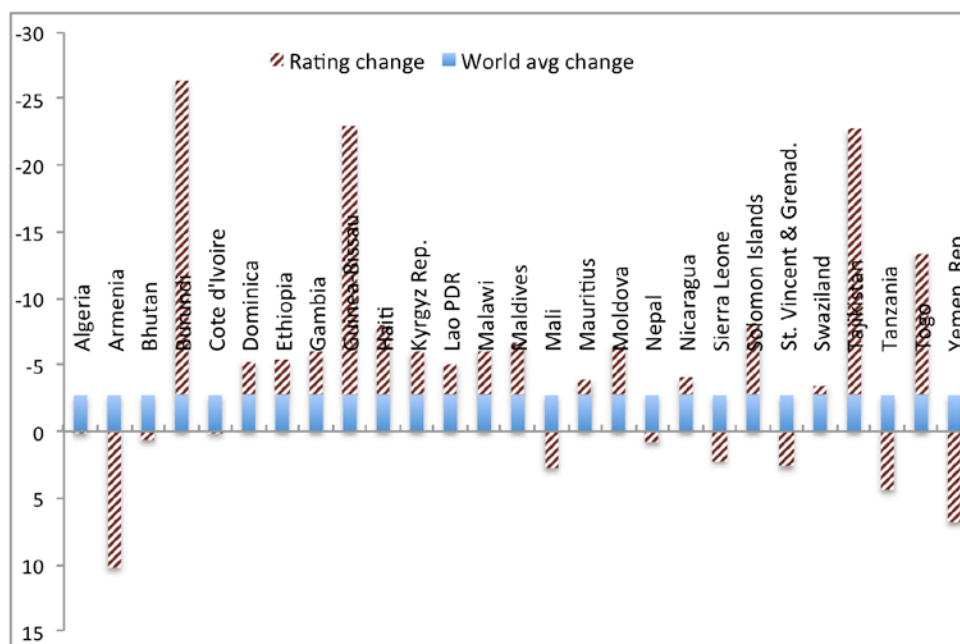
To analyze the contributions of various factors to the changes in the actual and shadow ratings, we utilize the estimates from the 2008–2012 pooled regression. For expositional ease, we group the explanatory variables as follows: ‘Growth and income’ subsume GDP growth, log of GNI per capita and log of GDP; ‘Debt indicators’ include the

ratio of external debt to export and remittances, and government debt; and ‘macro-stability’ encompasses GDP volatility and inflation. The reserve to imports and short-term debt ratio and rule of law variables stand separately.<sup>9</sup>

**Figure 8: Contributions to relative rating change, rated developing countries 2008-12**



**Figure 9: Contributions to relative rating change, unrated developing countries 2008-12\***

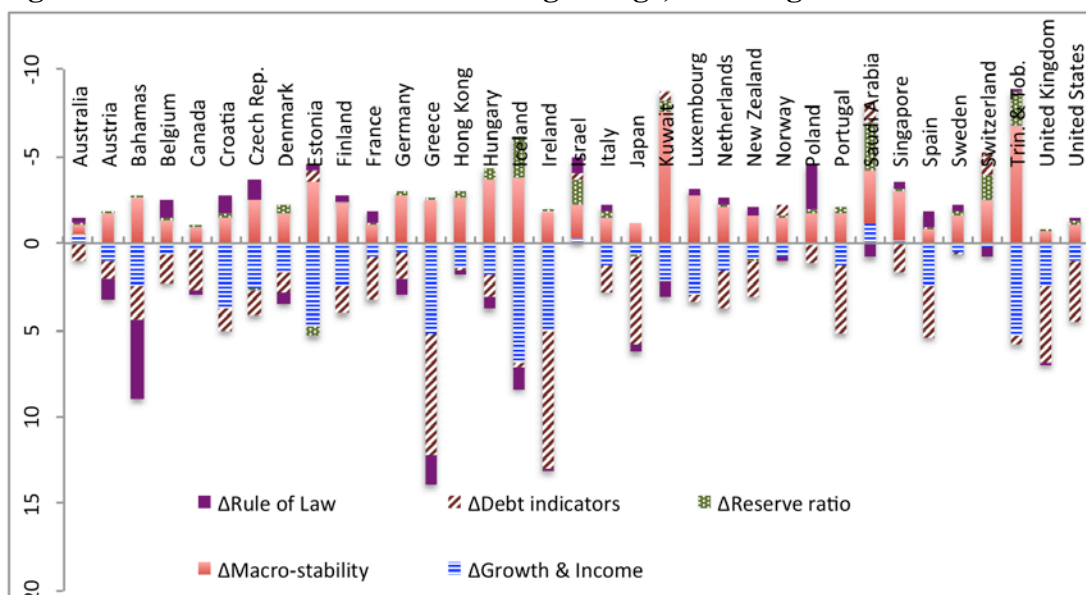


\*Unrated refers to countries not rated by S&P.

<sup>9</sup> The changes in the rating of a country during 2008-12 are also due to the erosion of the global average rating (captured by the 2008 dummy) and changes in regression residuals for individual countries. Since their policy implications are limited, these are not discussed.

Figures 10, 11 and 12 show the contributions of various factors to changes in ratings during 2008–2012 for, respectively, rated high-income, rated developing, and unrated developing countries. The analysis reveals differentiated patterns: Broadly, for the high-income economies, debt indicators and growth and income contributed to an erosion of ratings while macro-stability contributed in the opposite direction. Among the rated developing countries, macro-stability improvements contributed largely to rating improvements (except in the case of Belarus) whereas debt indicators had a general negative contribution. For the unrated developing countries, by and large, improved debt indicators (especially in HIPC countries that received debt relief) and macro-stability had positive effects (Armenia appears to be a notable exception).

**Figure 10: Contributions to actual rating change, rated high-income countries 2008-12**



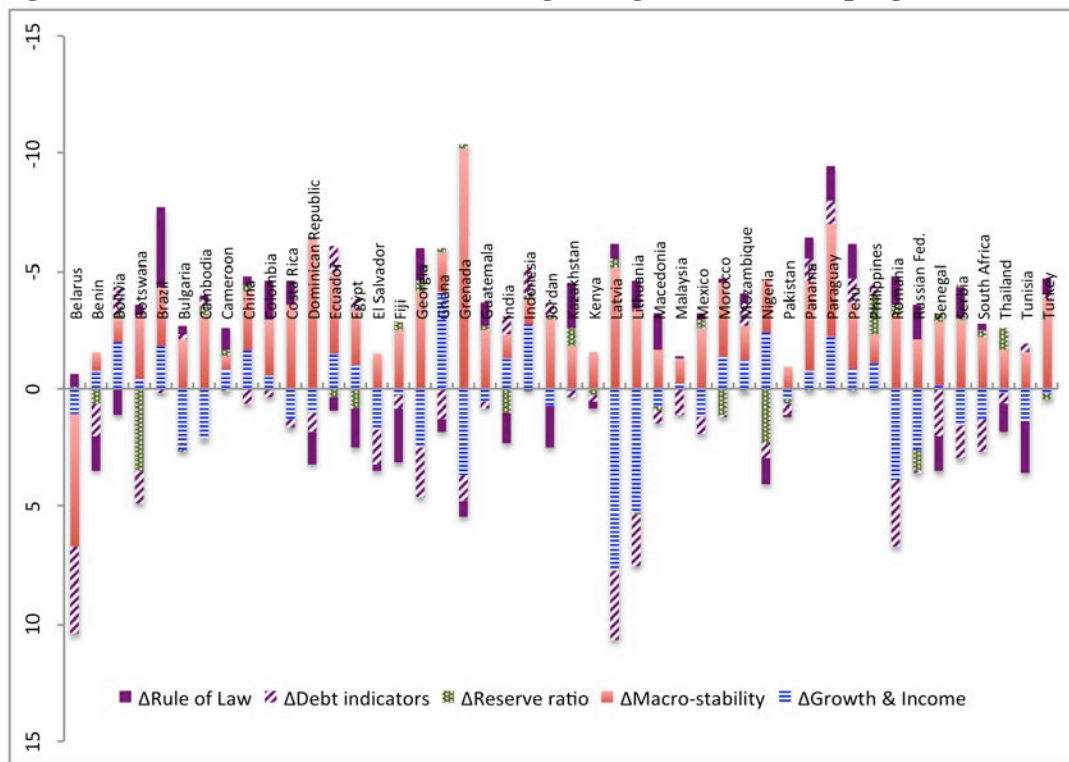
In Brazil, rule of law, macro-stability and growth contributed to improvement in sovereign rating. For China, macro-stability and growth had large positive impacts, while its debt indicators led to a minor erosion of this effect. For the Philippines, the reserve ratio as well as macro-stability and growth pointed to improvements. In the case of Russia, worsening of growth and the reserve ratio offset gains on rule of law and macro-stability. Similarly for Nigeria, worsening reserve ratio, debt and rule of law counteracted growth and macro-stability improvements. In India, gains in growth, macro-stability and debt were countered by losses in terms of reserve ratio and rule of law. Egypt and Tunisia both showed losses due to worsening rule of law.

Among European economies, for Greece, debt and growth both had a large role to play in its massive rating downgrade. For Ireland, growth had a much greater role in the downgrade. Among unrated countries Armenia and St. Vincent and the Grenadines both suffered due to deterioration in growth and income, and debt indicators. Improved debt indicators played a large role in improvements for Burundi, Guinea-Bissau and Togo, all HIPC countries. In Algeria, a negative impact of rule of law was more than compensated by

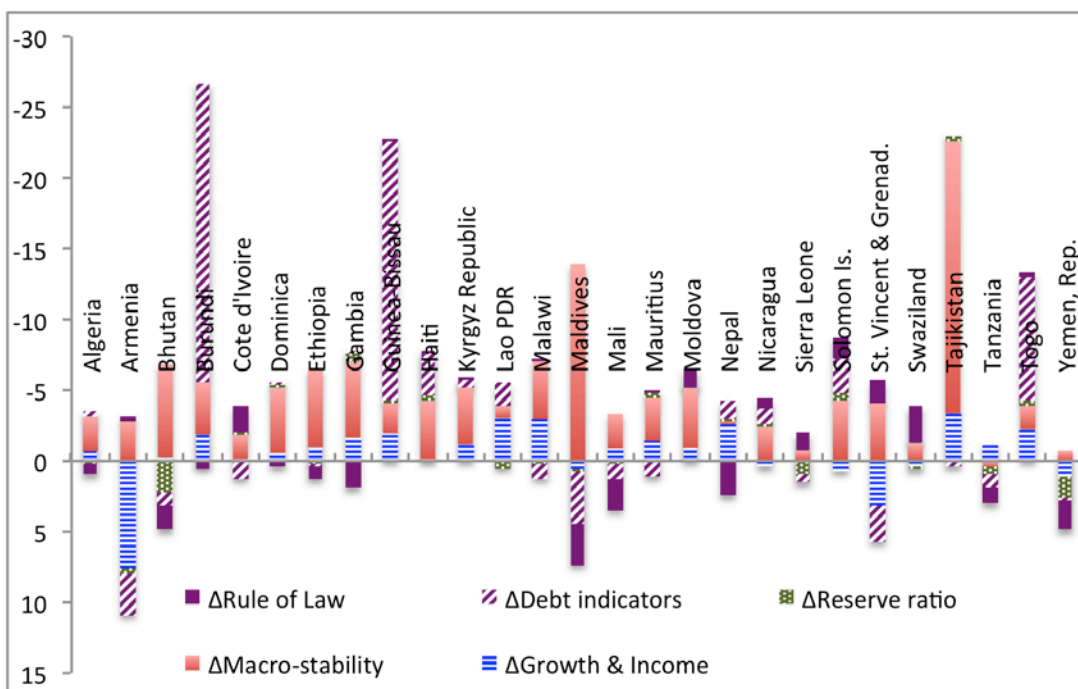


improvements in growth and macro-stability indicators. Nepal and Bhutan both had worsening rule of law. But this was counteracted by macro-stability in the case of Bhutan and growth and debt indicators in the case of Nepal. Yemen's worsening rule of law, reserve ratio and growth were unredeemed by minor macro-stability improvements.

**Figure 11: Contributions to actual rating change, rated developing countries 2008-12**



**Figure 12: Contributions to actual rating change, unrated developing countries 2008-12\***



\*Unrated refers to counties not rated by S&P.

## 8. Conclusion

This paper analyzed changes in actual, shadow and relative sovereign ratings between 2008 and 2012. For the unrated countries, shadow ratings were predicted using a regression equation based on macroeconomic, structural and governance variables. It is revealed that some unrated developing countries, such as, Dominica, Moldova, Armenia, Bhutan and Mali, have shadow ratings below investment grade but still in the B range or better. If they were to obtain corresponding formal ratings, their access to international capital markets would improve. The paper then computed relative risk ratings to compare the actual or shadow ratings of a country against those of other countries after controlling for changes in the global average rating. Broadly, certain developing economies, such as Azerbaijan, Ethiopia, Kazakhstan, Indonesia and Philippines, have done well in terms of improvements in relative ratings after the crisis. Some economies, such as India, Jordan, Poland and the United Kingdom, suffered a rating downgrade or a negative outlook, but their relative ratings improved in 2012 compared with pre-crisis levels (of July 2008) as other countries suffered greater downgrades. Several European economies (such as Greece and Portugal) and countries facing political adjustments (such as Egypt and Tunisia) fared badly in terms of both relative and actual ratings.

The paper goes on to deconstruct factors contributing to changes in relative and actual or shadow ratings. While wide variances exist between countries, macro-stability and debt indicators seemed to have a major impact on rating outcomes either way.

This research advances the literature by comprehensively analyzing post-crisis sovereign rating developments and developing actionable policy implications based on the contributions of various factors to rating changes. It also opens up avenues for policy innovation and further research. The availability of shadow ratings allows unrated countries to be judged in terms of international benchmarks of credit risk. This can open ways for risk-pooling and joint borrowing for regional development projects. The methodology developed in this paper may allow an analysis of the behavior of rating agencies during the recent financial crisis, a topic for future research. This could take into account stated changes in their methodologies. S&P and Moody's are now also supplying market-based ratings for sovereigns (where market information, for example, credit default swaps, is translated into the traditional ratings scale used by the rating agencies). It may be useful to augment the analysis in the paper in the future by incorporating these ratings. Future avenues of research include studying sovereign rating transitions and analyzing the factors influencing sub-sovereign and supra-sovereign ratings.

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