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Determinants of Investment Grade Status in Emerging Markets

Laura Jaramillo

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Western Hemisphere Department

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Prepared by Laura Jaramillo[1]

Authorized for distribution by David Vegara

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Abstract

Emerging market countries seek investment grade status to lower financing costs for the sovereign, expand the pool of potential investors to institutional investors, and allow corporates the possibility of reducing their borrowing costs. Using a random effects binomial logit model on a sample of 48 emerging markets, the paper finds that, to a large extent, investment grade rating assignments can be explained by a handful of variables. The results also suggest that efforts by emerging markets to increase the likelihood of an upgrade should focus on debt indicators rather than the other key determinants of investment grade status.

Author's E-Mail Address: ljaramillomayor@imf.org

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I. INTRODUCTION

Sovereign credit ratings play an important part in determining countries' access to international capital markets and the terms of that access, with the threshold between investment-grade and speculative-grade ratings having important market implications. Achieving investment grade status not only lowers financing costs for the sovereign and corporates with international capital market access that are constrained by the sovereign rating, it also expands the pool of potential buyers of a country's bond issuances to institutional investors.

For those countries with speculative grade ratings, identifying the main determinants of investment grade status can help guide policies towards achieving an upgrade. Sovereign ratings summarize a vast amount of quantitative and qualitative information. Gauging the weights given by rating agencies to alternative macroeconomic variables can be a helpful input for policymakers as they set their macroeconomic policies, including the role of a medium term public debt objective.

This paper builds on the existing literature on the determinants of sovereign credit ratings in three main ways. First, it focuses on the investment grade/speculative grade threshold, therefore defining the dependent variable in binary form as opposed to the ordinal ratings used in other studies. Second, it restricts the sample to emerging market economies, to avoid any industrial country bias on rating determinants as all advanced countries are currently rated as investment grade. Third, the paper presents additional explanatory variables not included in previous studies, exploring potential differences in types of debt—by breaking down debt indicators into public/private and external/domestic—and introducing a measure of financial depth—often cited in rating agencies' methodology reports as an important consideration.

The paper finds that, to a large extent, investment grade rating status can be explained by a small number of variables. The analysis is based on a random effects binomial logit model estimated with data for a sample of 48 emerging market economies during the period 1993−2008. The model identifies a set of five core variables that are relevant for the determination of investment grade status, namely external public debt, domestic public debt, political risk, exports, and broad money (all variables as a share of GDP, except for political risk). The analysis goes on to suggest that efforts by emerging markets to increase the likelihood of an upgrade should focus on debt indicators, in particular external public debt, rather than the other key determinants of investment grade.

This paper is organized as follows. Section 2 provides background information on sovereign credit ratings and reviews the existing literature on rating determinants. Section 3 outlines the econometric methodology. The fourth section describes the data and presents the main results of the estimation, including goodness of fit and marginal effects analyses. Based on these findings, Section 5 discusses the public debt implications for emerging markets with ratings just below the investment grade threshold. The last section summarizes and provides some concluding remarks.

II. BACKGROUND AND LITERATURE REVIEW

Sovereign debt ratings are intended to be forward-looking qualitative measures of the probability of default elaborated by rating agencies. They are summary assessments of a government's ability and willingness to repay its debts in full and on time. The three major credit rating agencies—Moody's Investor Services (Moody's), Standard and Poor's (S&P), and Fitch Ratings (Fitch)—indicate that their assessments of government risk are based on the analysis of a broad set of economic, social, and political factors, but are not explicit about the weights given to those variables in their final assessments.[2] The ratings (and meaning) given by these agencies are summarized in Table 1. Countries with a rating of BBB or above in the case of S&P and Fitch, and Baa or above in the case of Moody's, are considered to be investment grade; countries with ratings below that threshold are considered to be speculative grade.

Sovereign credit ratings are important for at least three reasons. First, they are a key determinant of a country's borrowing costs in international capital markets. Second, the sovereign rating generally sets a ceiling for the ratings assigned to domestic banks and companies, and therefore affects private financing costs.[3] And third, some institutional investors have lower bounds for the risk they can assume in their investments and will choose their portfolio composition taking into account the credit risk signaled by the rating notations.

Table 1. Sovereign Credit Ratings by Agency			
	S&P	Moody's	Fitch
Investment Grade			
Highest quality, reliable, stable	AAA	Aaa	AAA
Quality, but a little more risk	AA	Aa	AA
Economic situation can affect finances	A	A	A
Just making the grade	BBB	Baa	BBB
Speculative Grade			
More sensitive to economic changes	BB	Ba	BB
Financial situation varies considerably	B	Ba	B
Vulnerable, dependent on favorable economic conditions to meet payments	CCC	Caa	CCC
Highly vulnerable, speculative	CC	Ca	CC
Close to default, may be in arrears	C	C	C
Defaulted on obligations	D		D

Note: Within rating categories, S&P and Fitch use plus (+) or minus (-) signs to show relative standing, with A+ being better than A or A-.

Moody's uses a modifier of 1,2,or 3 for the same purpose, with A1 being better than A2 or A3.

Since sovereign ratings summarize a vast amount of information, empirical studies have tried to predict country ratings based on a parsimonious set of economic variables. The seminal paper by Cantor and Packer (1996), based on a sample of 49 industrialized and developing countries, suggested that six variables were likely to explain ratings: per capita income, GDP

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[2] See http://www2.standardandpoors.com/aboutcreditratings/RatingsManual_PrintGuide.html for criteria used by Standard and Poor's; http://www.moodys.com/moodys/cust/research/MDCdocs/09/2007200000530576.pdf?doc_id=2007200000530576&frameOfRef=corporate for criteria used by Moody's; and http://www.fitchratings.com/creditdesk/reports/report_frame.cfm?rpt_id=474248&sector_flag=5&marketsector=1&detail= for criteria used by Fitch.

[3] Borensztein et al. (2007) find that sovereign ratings have a significant effect on private ratings even after controlling for country specific macroeconomic conditions and firm-level performance indicators.

growth, inflation, external debt, level of economic development, and default history. Using the same methodology, Afonso (2003) found that GDP per capita was the only relevant determinant of ratings of developed countries, while external debt played a key role for developing countries. In contrast, Mulder and Perrelli (2001) found that for emerging market economies the ratio of investment to GDP was the key variable explaining ratings. Results on the significance of political variables have been mixed: Archer et al. (2007) concluded that political factors had little effect on bond ratings; Mellios and Paget-Blanc (2006) found that indicators of corruption were an important determinant of ratings; and Afonso et al. (2007) found a significant coefficient for an indicator of government effectiveness. (See Table 2).

Table 2. Main Studies on the Determinants of Sovereign Ratings

Study and Regression Technique	Data Sample	Significant explanatory variables
Afonso (2003) OLS	81 countries, June 2001	GDP per capita (+), GDP growth (+) Inflation (-), External debt ratios (-) Economic development (+), Default history (-)
Afonso, Gomes, Rother (2007) Pooled ordered probit, random effects ordered probit	130 countries, 1970-2005 Moody's, S&P, Fitch	GDP per capita (+), GDP growth (+) Inflation (-), External debt ratios (-) International reserves (+), Default history (-) Government effectiveness (+) EU countries (+)
Archer et al. (2007) Linear regression with panel-corrected standard errors	50 developing countries, 1987-2003 Moody's, S&P, Fitch	Trade (+), Inflation (-) GDP growth (+), Default (-)
Cantor and Packer (1996) OLS	49 countries, September 1995 Moody's, S&P	GDP per capita (+), GDP growth (+) Inflation (-), External debt ratios (-) Economic development (+), Default history (-)
Mellios and Paget-Blanc (2006) Ordered logistic model	86 countries, December 2003 Moody's, S&P, Fitch	Per capita GDP (+), Government income (+) Real exchange rate changes (+), Inflation (-) Default history (-), Corruption index (+)
Mulder and Perrelli (2001) Pooled OLS and Feasible GLS	25 emerging market economies, 1992-1999 Moody's, S&P	Debt over exports (-), Rescheduling history (-) Fiscal balance (+), Output growth (+) Inflation (-), Investment to GDP (+)
Rowland (2004) OLS regression	50 developing countries, July 2003 Moody's, S&P	GDP per capita (+), GDP growth (+) Inflation (-), External debt ratios (-) International reserves (+), Openness (+)
Rowland and Torres (2004) Random effects GLS regression	16 emerging market economies, 1987-2001 Moody's, S&P	GDP growth (+), Inflation (-) External debt ratios (-), International reserves (+) Openness (+), Default history (-)

III. EMPIRICAL MODEL SPECIFICATION

This paper will focus on the determinants of investment grade ratings for emerging market economies. All the studies listed in Table 2 transformed credit ratings into a linear scale and used this ordinal measure as the dependent variable. In contrast, this paper defines a binary dependent variable for investment grade status, based on long-term foreign currency sovereign ratings data from Moody's, S&P, and Fitch. The rating for any given year is the end-December rating, and the dummy is made equal to 1 for countries that were assigned

investment grade status by at least two out of the three agencies.[4] A panel data framework is used to control for heterogeneity across countries. A random effects binomial logit model produces better results (from an econometric point of view) than those obtained from a pooled regression and a fixed effects regression. The advantage of this technique is that it uses information from all countries in the sample and the marginal effect of any independent variable on the probability is conditional on the values of all covariates.[5]

The model specification can be written as:

$$IG_{it} = \alpha + \beta X_{it} + \lambda Z_i + a_i + \mu_{it} , \quad i = 1,...N , t = 1,...T \tag{1}$$

Where IG_{it} is the binary variable equal to 1 for countries with investment grade status; X_{it} is a vector containing the time-varying explanatory variables described below; Z_i is a vector of time invariant variables that include regional and default dummies; a_i stands for the individual effects for each country i (that can either be modeled as an error term or as N dummies to be estimated) and μ_{it} represent disturbances that are independent across countries and across time.

Building on the evidence provided by the existing literature, the paper identifies a set of potential determinants of investment grade status. The selection of the explanatory variables is guided by the rating agencies' reports and previous empirical evidence. Table 3 lists the explanatory variables (and their expected signs) included in model as regressors X_{it}, and consist of macroeconomic,

Table 3. Explanatory Variables and Expected Sign

Macroeconomic Indicators		Government Sector	
GDP per capita (US$ dollars)	+	Primary balance	+
Real GDP growth	+	External public debt to GDP**	-
Potential GDP growth	+	Domestic public debt to GDP**	-
Inflation rate	-		
Unemployment rate	-	**Financial Depth**	
		Broad money to GDP**	+
External Sector		**Other**	
Exports to GDP	+	Political risk index ICRG	
Current account balance to GDP	-	(higher index implies lower risk)	+
Private external debt to GDP**	-	Default history	-
NIR to GDP	+	Regional dummies	
		Time dummies	

Note: ** denotes variables not included in previous empirical studies

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[4] The ratings do not differ significantly across the three agencies. Investment/speculative grade status coincided across the three rating agencies for 94 percent of all observations in the sample. Investment grade is defined as those ratings at or above BBB/Baa.

[5] The pooled estimation does not control for unobserved country effects, while the fixed effects logit model has the disadvantage that only countries where the dependent variable "switches" (from 0 to 1 and vice versa) can be included in the estimation—which in this case would lead to a sizeable number of cases being dropped. In addition, the fixed effects estimations cannot assess the impact of non-time varying country characteristics.

external, government sector, financial depth and other indicators. Appendix I provides a more detailed description of the explanatory variables and rationale for their inclusion in the regression analysis.

IV. DATA AND ESTIMATION RESULTS

The regression analysis is based on a sample of 48 emerging market countries.[6] The ratings data are obtained from the three main rating agencies for the 1993–2008 period. Table 4 provides some descriptive statistics of the dependent variable. Unless otherwise specified, the macroeconomic variables are drawn from the WEO database. The political risk variable is based on the political risk index published by the International Country Risk Guide, where a higher value indicates lower risk.[7] For all the time-varying regressors, lagged values of the explanatory variables are used to avoid endogeneity problems.

Table 4. Descriptive Statistics of Countries in the Sample and Investment Grade Status

	Latin America	Europe	East Asia	Other	Total
Number of countries	15	16	7	10	48
Number of observations	218	222	112	139	691
Percent of observations in the total sample	31.3	33.3	14.6	20.8	100.0
Percent of observations with investment grade status	17.4	63.1	57.9	27.0	40.7
Percentage of countries with a switch in status	40.0	50.0	57.1	30.0	43.8
Percentage of countries with at least one upgrade to investment grade	33.3	37.5	42.9	30.0	37.5
Percentage of countries with at least one downgraded to speculative grade	20.0	18.8	57.1	10.0	22.9

Tests of means and medians show that investment grade countries tend to outperform speculative grade countries on most of the economic dimensions captured by the regressors. Welch tests were used to test for equality of means across the two groups of observations (investment and speculative grade), and Wilcoxon rank-sum tests were used to test whether the distribution is independent across the two groups of observations.[8] Table 5 shows that both tests yielded similar results, with investment grade countries showing "better" values for the indicator than speculative grade countries on most accounts.

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[6] The sample of countries consists of: Argentina, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Jamaica, Mexico, Panama, Peru, Uruguay, Venezuela, Bosnia & Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Iceland, Israel, Latvia, Lithuania, Poland, Romania, Russia, Serbia, Turkey, Ukraine, China, Indonesia, Korea, Malaysia, Philippines, Thailand, Vietnam, Egypt, India, Jordan, Kazakhstan, Lebanon, Morocco, Pakistan, South Africa, Sri Lanka, and Tunisia.

[7] A description of the ICRG methodology can be found at https://www.prsgroup.com/ICRG_Methodology.aspx

[8] A comparison of means only could be misleading in the presence of large outliers.

Table 5. Test of Equality of Means and Medians of Country Characteristics, by Investment Grade Rating

Variable	Mean			Median		
	Investment grade	Speculative grade	Welch test	Investment grade	Speculative grade	Wilcoxon test
Macroeconomic Variables						
GDP per capita (US$ dollars)	8,083	3,766	**	4,950	2,800	**
Real GDP growth	4.8	3.8	**	5.1	4.4	**
Potential GDP growth	4.4	3.7	**	3.9	3.8	*
Inflation	5.7	25.9	**	4.4	7.7	**
Unemployment	8.3	10.5	**	7.5	9.8	**
External Sector						
Exports to GDP	45.7	30.4	**	40.9	29.1	**
Current account balance to GDP	(3.0)	(2.4)		(2.9)	(2.4)	
Private external debt to GDP	42.4	19.6	**	32.3	14.3	**
NIR to GDP	18.7	14.5	**	17.1	11.2	**
Government Sector						
Primary balance	0.4	0.8	*	(0.1)	0.8	**
External public debt to GDP	12.8	30.6	**	9.9	25.3	**
Domestic public debt to GDP	21.7	27.3	**	15.2	19.6	**
Financial Depth						
Broad money to GDP	64.3	54.6	**	50.4	42.6	**
Other						
Political risk index ICRG (+ is lower risk)	73.0	64.6	**	74.0	65.5	**

Sources: Authors' calculations based on data from IMF, World Bank, and International Country Risk Guide.

Note: ** stands for statistical significance at the 1 percent level; * stands for statistical significance at the 5 percent level.

Table 6 shows the results of estimating equation (1), with three different techniques: pooled, random effects and fixed effects. For each technique, the first column reports the unrestricted model (i.e. columns A, C, and E), whereas the second shows the results for the restricted model (i.e. columns B, D and F). The unrestricted model incorporates all the variables listed in Table 3, whereas the restricted model contains only the variables which were found to have a statistically significant impact.[9]

The random effects model (column D) is found to be the preferred specification. The likelihood-ratio test rejected the null hypothesis of no variation in the country specific errors of the pooled regression (columns A and B), indicating the need to control for country-specific effects. At the same time, Hausman specification tests did not reject the null hypothesis that the random effects (column D) and consistent fixed effects coefficients (column F) were the same, suggesting that the random effects model is appropriate.

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[9] Variables that did not reveal any explicative power were dropped based on Wald tests. The restricted models are robust to alternative exclusion procedures. Furthermore, the variables found to be significant in the unrestricted model generally remain significant with the same sign in the restricted model.

	Pooled regression		Random effects		Fixed Effects	
VARIABLES	A	B	C	D	E	F
GDP per capita (US$)	0.00 **	0.00 ***	0.00		0.00	
	(0.00)	(0.00)	(0.00)		(0.00)	
Potential GDP growth	0.12		-0.34		-0.59	
	(0.12)		(0.42)		(0.53)	
Inflation	-0.05		-0.02		-0.01	
	(0.03)		(0.04)		(0.01)	
Unemployment	0.06 *		0.19		-0.03	
	(0.04)		(0.14)		(0.17)	
Exports to GDP	0.02 *	0.01	0.10	0.08 ***	0.23 *	0.10 **
	(0.01)	(0.01)	(0.07)	(0.03)	(0.12)	(0.04)
Current account balance to GDP	0.06 *		0.01		-0.02	
	(0.04)		(0.12)		(0.16)	
Private external debt to GDP	0.02		-0.02		-0.05	
	(0.02)		(0.03)		(0.04)	
Net international reserves to GDP	0.00	0.01	0.16		0.29	
	(0.03)	(0.02)	(0.12)		(0.18)	
Primary balance to GDP	0.05		0.03		-0.31	
	(0.08)		(0.18)		(0.26)	
External public debt to GDP	-0.09 ***	-0.09 ***	-0.38 ***	-0.25 ***	-0.45 ***	-0.22 ***
	(0.02)	(0.01)	(0.10)	(0.04)	(0.11)	(0.04)
Domestic public debt to GDP	-0.06 ***	-0.05 ***	-0.18 ***	-0.09 ***	-0.24 ***	-0.08 ***
	(0.01)	(0.01)	(0.05)	(0.02)	(0.06)	(0.03)
Broad money to GDP	0.02 **	0.02 ***	0.11 **	0.04 ***	0.24 ***	0.07 **
	(0.01)	(0.01)	(0.06)	(0.02)	(0.08)	(0.03)
ICRG political risk index	0.09 **	0.10 ***	0.09	0.15 ***	0.11 *	0.15 **
	(0.04)	(0.03)	(0.08)	(0.05)	(0.06)	(0.06)
Latin America and Caribbean dummy	-1.06	-1.69 ***	1.60			
	(0.72)	(0.38)	(3.81)			
Europe dummy	0.35		4.56			
	(0.66)		(4.28)			
East Asia dummy	-0.25		-0.27			
	(0.73)		(4.40)			
Default dummy	-1.82 ***		-3.27			
	(0.56)		(4.85)			
Constant	-7.53 **	-6.44 ***	-10.55	-10.10 ***		
	(2.96)	(1.80)	(8.25)	(3.83)		
Observations	483	536	483	540	248	284
Number of countries			35	37	17	19

Table 6. Regression Results

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results in Table 6 suggest that investment grade status can be modeled parsimoniously with a handful of regressors (Appendix II provides a robustness analysis).[10]

- *In line with other studies (e.g. Afonso (2003)), the results show that the level of debt matters for determining investment grade.* However, the findings suggest that rating agencies do distinguish between types of debt. They tend to see risk in high public debt indicators, but do not seem to assign a significant weight to private external debt. Furthermore, rating agencies seem to attach greater risk to external public debt than to domestic public debt, with the coefficients of the former being more than 2½ times larger than the latter.

- *The political risk index was found to be significant and positively related to the investment grade rating.* The importance of this measure, a proxy of a country's willingness to repay, is in line with the findings of Mellios and Paget-Blanc (2006) and Afonso et al. (2007).

- *Exports to GDP and broad money to GDP were also found to be significant.* The positive effect of exports on investment grade captures a country's capacity to obtain hard currency to repay foreign debt, and is line with the findings by Rowland (2004). The significant and positive impact of broad money on the determination of investment grade confirms the relevance of financial depth and a country's capacity to sustain a given domestic debt burden.

The random effects model provides a good fit, as it performs well in predicting both investment grade status and "switches" in status from and to investment grade. Using the overall in-sample probability of being investment grade (40 percent) as the cut-off point, the number of times the models correctly predicts zeroes and ones was computed. The model correctly classifies 86 percent of all observations, with Type I error (failing to predict investment grade status) of 8.9 percent, and Type II error (failing to predict speculative grade status) of 5.2 percent. In terms of "switches", the model correctly predicts 6 out of 9 downgrades (68 percent), failing to predict the downgrades of Korea, Malaysia and Thailand—which happened in the context of the Asian crisis and were reversed within two years. The model also predicts correctly 11 of the 17 upgrades in the sample (65 percent). Among the upgrade cases that the model fails to predict are those of Mexico and South Africa (which are predicted with a three year lag) and those of Colombia and Uruguay (which lost their investment grade status within 3−5 years of the upgrade).

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[10] Although rating agencies may assign substantial weight to other factors in determining specific rating assignments to a particular country at a given point in time, no systematic relationship between those variables and investment grade status was detected in the sample. Appendix II discusses the results for individual rating agencies.

Figure 1. Emerging Markets: Value of Explanatory Variables at Time of Upgrade to Investment Grade and Five Years Earlier 1/ 2/
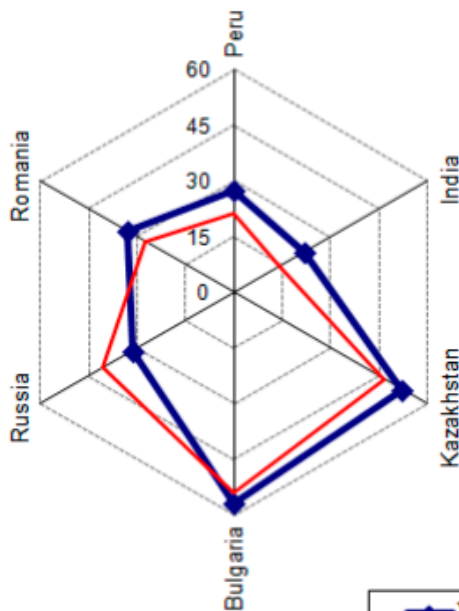
External Public Debt
(Percent of GDP)
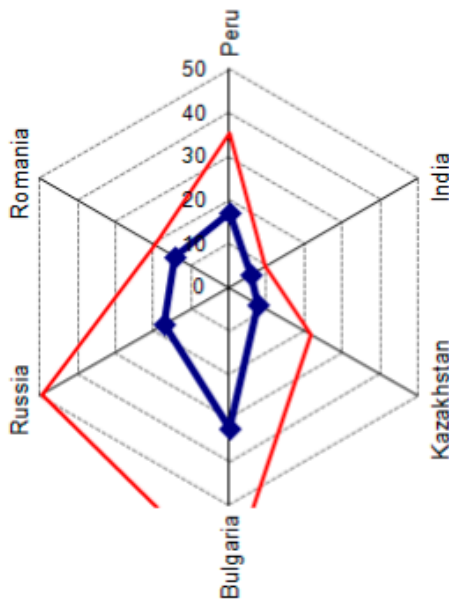
Broad Money
(Percent of GDP)
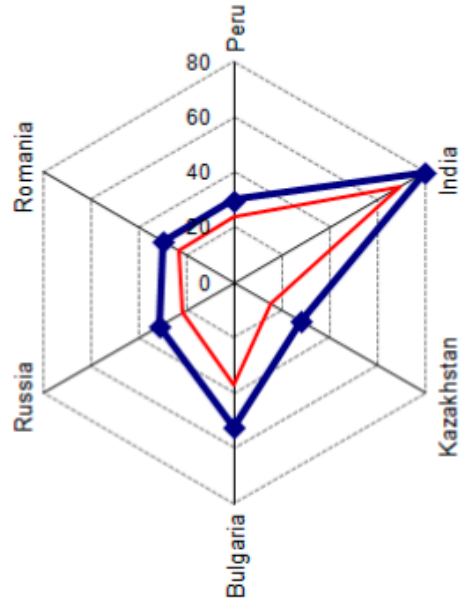
Exports
(Percent of GDP)

ICRG Political Risk Index
(+ indicates less political risk)
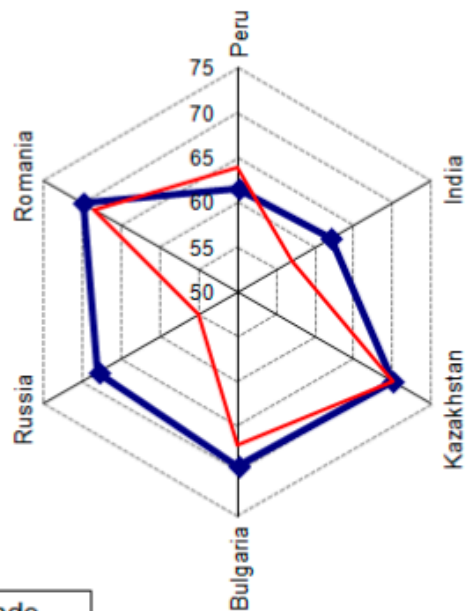
◆ Year of upgrade
— Five years earlier

1/ Domestic debt to GDP was not graphed as there was not a significant change in this variable for the particular country examples shown.
2/ Investment grade ratings by at least two major rating agencies were obtained by Bulgaria, Russia and Kazakhstan in 2004, Romania in 2005, India in 2006, and Peru in 2008.

Figure 1 depicts the behavior of the regressors in some of the cases that experienced a switch to investment grade during the sample period, comparing each variable at the time of upgrade with its value five years earlier. As the figure shows, the variable that improved the most in the countries illustrated was external public debt to GDP, with a median decline of 16 percentage points of GDP (more than 30 percentage points in the cases of Russia and Bulgaria). Progress is also visible in terms of broad money to GDP in all cases. While exports to GDP appear to rise only mostly, upgrades followed positive announcements with regard to trade, in particular completion of EU accession negotiations by Bulgaria and Romania, the approval of Peru's free-trade agreement by the U.S. Congress, and prospects for increasing oil exports in the cases of Russia and Kazakhstan. Downgrades to speculative status experienced by countries during the sample period typically followed a large jump in debt, with a median increase in total public debt of 23 percentage points of GDP (mostly external public debt, in some cases linked to a depreciation of the currency).

Table 7. Average Partial Effects on the Probability of Investment Grade Status

	Average Partial Effects	APE by Quartile			
		1	2	3	4
External public debt to GDP, 10 percentage point decline	0.16	0.09	0.30	0.20	0.04
Domestic public debt to GDP, 10 percentage point decline	0.06	0.05	0.07	0.06	0.05
Political risk index, 10 point increase	0.10	0.05	0.12	0.14	0.08
Exports to GDP, 10 percentage point increase	0.05	0.04	0.08	0.08	0.02
Broad money to GDP, 10 percentage point increase	0.03	0.02	0.03	0.04	0.02
Memorandum items:					
Quartile cut-off points					
External public debt to GDP	26	12	21	37	120
Domestic public debt to GDP	26	10	19	33	141
Political risk index	67	63	69	73	87
Exports to GDP	36	23	32	45	120
Broad money to GDP	59	34	45	67	279

An analysis of marginal effects provides further insights on the impact of the regressors on the probability of investment grade status. Table 7 shows the average partial effects for alternative levels of debt, openness, financial development and political risk.[11] As expected in a binomial logit model, the marginal effects of each variable are nonlinear and are therefore larger for values in the middle of the distribution. For example, a 10 percentage point decrease in external public debt to GDP would increase the probability of investment grade by 16 percentage points on average, with the effect being almost double for those countries in the second quartile of the distribution. Similarly, a 10 point increase in the political risk index (implying an improvement in risk perception) would increase the probability of investment grade by 10 percentage points on average, with somewhat greater

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[11] Average partial effects are calculated as the partial effects averaged across the population. See Wooldridge (2002).

impact for countries in the middle of the distribution. Figure 2 shows that there are investment grade observations throughout the distribution of exports, broad money and political risk variables, suggesting that there is not a minimum threshold for these determinants. However, there are no investment grade observations for external public debt beyond 64 percent of GDP and domestic public debt beyond 85 percent of GDP, which is an indication of an implicit ceiling.

Figure 2. Histogram of Explanatory Variables by Investment Grade/Speculative Grade Status
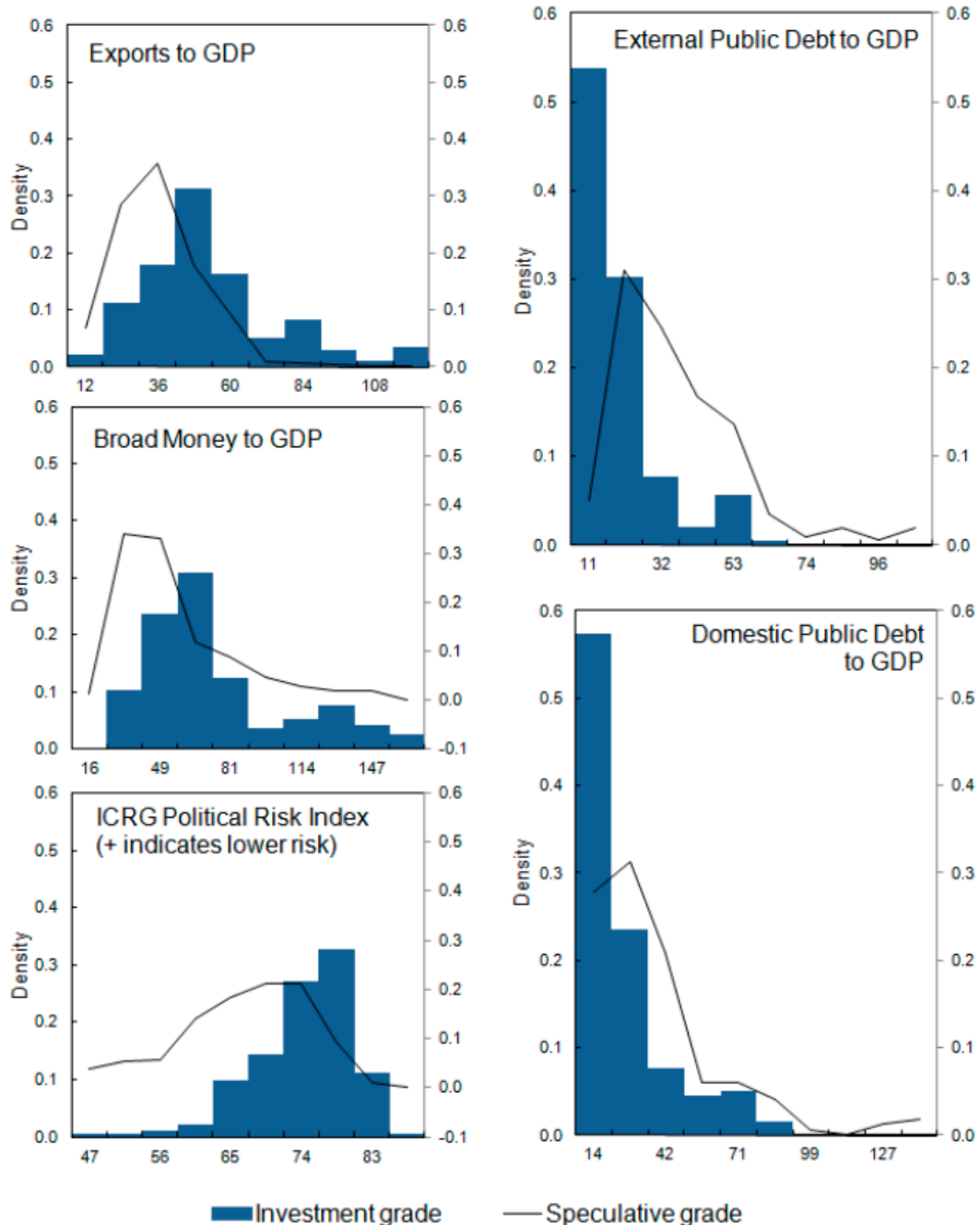
V. PUBLIC DEBT IMPLICATIONS FOR EMERGING MARKETS

The above results can provide some guidance of where efforts should lie for those emerging market countries seeking an upgrade to investment grade. Figure 3 depicts the 2009 values for each of the investment grade determinants for countries that in 2009 were rated as BB/Ba

(one rating category below investment grade). External public debt in all these countries is above the investment grade median, but not so in the case of domestic public debt; this is in line with the findings that external public debt has greater weight in rating decisions than domestic public debt. With only few exceptions, exports to GDP, broad money to GDP, and the ICRG index for these countries are below the investment grade medians. While efforts to improve on all fronts would be desirable, progress on trade, financial depth and political risk is likely to be gradual and not directly linked with macroeconomic policies. In contrast, a strong process of fiscal consolidation could result in a steady reduction in debt levels.

A marginal effects analysis for BB/Ba countries finds that reducing public debt, in particular external public debt, would increase substantially the probability of an upgrade. Figure 4 shows the external public debt reduction needed by each country to increase its probability of attaining investment grade status to 40 percent (the sample cut-off point), based on the marginal effect analysis reported in Table 7 and holding other variables at their 2009 levels. Broadly speaking, countries with higher

Figure 3. Explanatory Variables for Emerging Markets with BB/Ba Sovereign Credit Rating, 2009
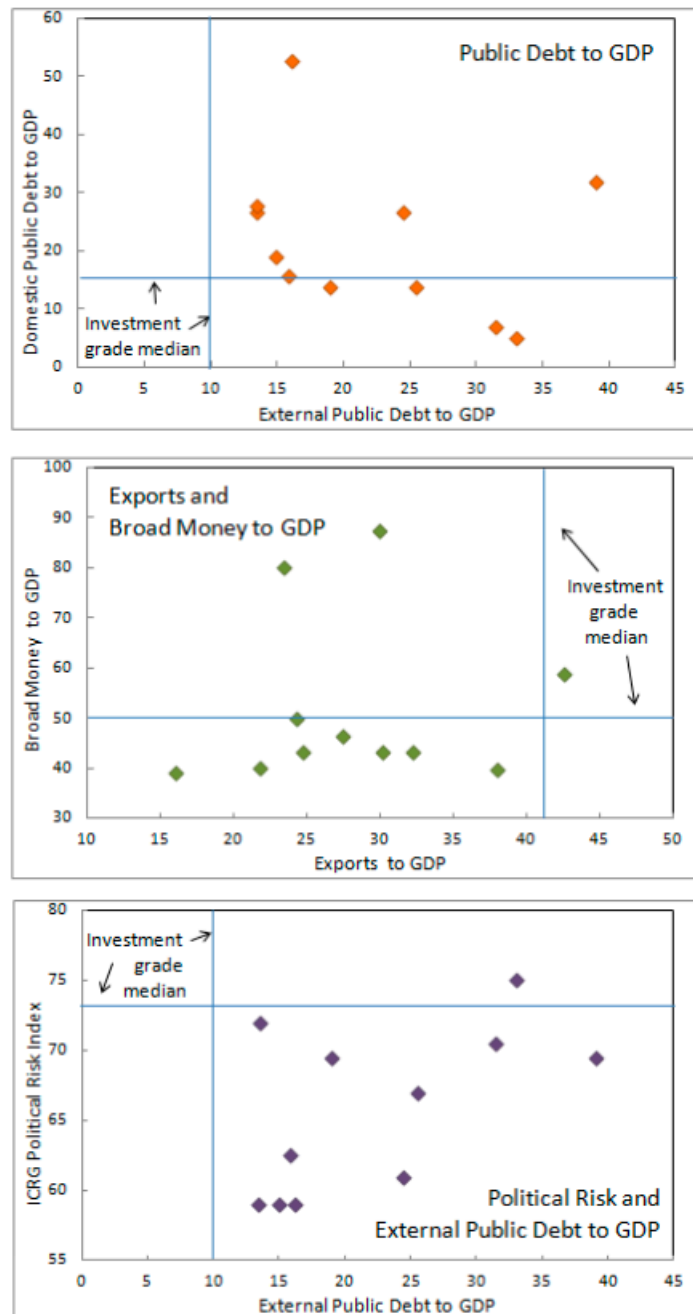
overall public debt levels would need to make greater efforts in debt reduction. However, the figure also illustrates that these efforts are not homogenous and depend on where these countries stand in terms of the other indicators: while one country with total public debt levels close to 40 percent of GDP may only need to reduce its public debt by a few percentage points, a country with total public debt levels closer to 30 percent of GDP may need to reduce debt by 10 percentage points.

Figure 4. Proposed Adjustment for Emerging Markets with
BB/Ba Sovereign Credit Rating
(Marginal Effects Analysis Based on 2009 Figures)
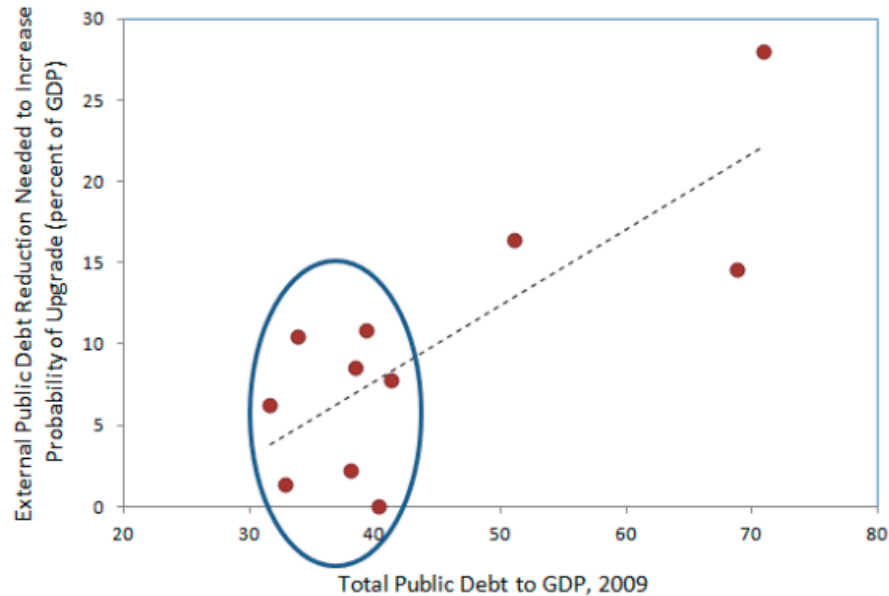
VI. SUMMARY AND CONCLUSIONS

The paper finds that investment grade ratings by the three major credit agencies can be explained by a small number of variables. The panel random effects framework identifies a set of five core variables that are relevant for the determination of investment grade status, in particular external public debt, domestic public debt, political risk, exports, and financial depth. Overall, the specification correctly predicts 86 percent of investment grade status of all observations, and two thirds of the upgrades and downgrades from and to investment grade.

The findings suggest that efforts by emerging markets to increase the likelihood of an upgrade to investment grade should focus on a faster pace of public debt reduction, in particular external public debt. While efforts to improve on all fronts would be desirable, progress on trade, financial depth and political risk is likely to be gradual and not directly linked with macroeconomic policies. In contrast, a strong process of fiscal consolidation could result in a steady reduction in debt levels. Furthermore, given the larger weight assigned by rating agencies to external debt over domestic debt in their assessments, a sharper decline in external debt is likely to have greater impact on increasing the near-term probability of achieving investment grade status.

Appendix I. Explanatory Variables

Macroeconomic variables
- *Per capita income in U.S. dollars.* Higher per capita income tends to suggest a larger potential tax base and a greater ability to repay debt. It also serves as a proxy for the level of economic development, which might influence default risk.

- *Real GDP growth and potential GDP growth.* Higher economic growth tends to decrease the relative debt burden and may help in avoiding insolvency.

- *Inflation rate.* A low inflation rate reveals sustainable monetary and exchange rate policies. It can also be seen as a proxy of the quality of economic management.

- *Unemployment rate.* A country with low unemployment tends to have more flexible labor markets making it less vulnerable to changes in the global environment.

External sector variables
- *Exports to GDP.* A higher ratio suggests a greater capacity to obtain hard currency to repay foreign currency denominated debt. Unlike most previous studies, where exports are included only as a metric for external debt, this paper introduces it as an independent regressor.

- *External current account to GDP.* A large current account deficit suggests a high dependence on foreign capital, which can be a source of risk to macroeconomic stability.

- *Private and public external debt to GDP.* The higher the external indebtedness, the higher the risk of fiscal or balance of payments stress. In contrast to existing literature, this paper distinguishes between private and public externally issued debt to allow for differences in the weight assigned by rating agencies to each one.

- *Net international reserves to GDP.* The higher the ratio, the more resources are available to service foreign debt. It reduces a country's vulnerability to liquidity shocks.

Government sector variables
- *Primary balance to GDP.* A low primary balance indicates that the government lacks the ability or the will to increase taxes to cover current expenses. A weak fiscal position also implies a higher likelihood that external shocks result in a default. In contrast to previous studies, the regressions use the primary balance instead of the overall balance to avoid possible endogeneity with the credit rating.

- *Public debt to GDP.* The higher the debt burden, the larger the transfer effort the government will have to make over time to service its obligations, and therefore a higher risk of default. In contrast to existing literature, this paper distinguishes between domestic and external public debt to allow for differences in weights.

Financial depth

- *Broad money to GDP.* Countries that have access to a deep and diversified pool of finance are in a better situation than those whose private savings are low and whose financial system is repressed. For this reason, financial depth is a useful indicator of government financial flexibility. High levels of financial intermediation, as proxied by broad money to GDP, can be associated with a greater capacity to sustain a given domestic debt burden. Existing literature has not included this variable.

Other regressors

- *Political risk.* Rule of law and respect for property rights provide confidence that political (and civil) institutions have a strong commitment to honoring financial obligations. As summarized by the International Country Risk Guide (ICRG), the political risk index is used as a proxy to measure a country's willingness to repay.

- *Default history.* A country's default history tends to influence its rating. A binary variable is set equal to 1 when the sovereign has defaulted on its external debt at least once in the previous ten years.

- *Regional dummies.* Dummies are included for the Latin America and the Caribbean, Europe, and East Asia.

- *Time dummies.* Annual dummies are included to capture possible bunching in rating movements due to global conditions.

Appendix II. Robustness Analysis

The paper's results are robust to alternative measures of the explanatory variables.

- Using foreign and local currency denominated debt in place of external and domestic debt variables renders similar results to those of the preferred specification (Table A1, column A). Both foreign and local currency denominated debt have a significant and negative impact on the probability of investment grade status, with the former having a much larger coefficient than the latter. Measures capturing the maturity structure of public debt (proxied by short term public debt at original maturity as a percent of GDP and as a percent of total public debt) did not prove to be significant.

Table A1. Alternative Specifications			
	Random effects		
	A	B	C
External public debt to GDP			-0.41 ***
			(0.08)
Domestic public debt to GDP		-0.10 ***	-0.10 ***
		(0.02)	(0.04)
Foreign currency denominated debt to GDP	-0.27 ***		
	(0.06)		
Local currency denominated debt to GDP	-0.12 ***		
	(0.03)		
External public debt to exports		-0.04 ***	
		(0.01)	
Exports to GDP	0.13 ***		0.07 **
	(0.04)		(0.03)
Broad money to GDP	0.05 **	0.04 ***	0.07 ***
	(0.02)	(0.01)	(0.03)
ICRG political risk index	0.10 *	0.14 ***	
	(0.06)	(0.05)	
WGI political stability index			3.90 ***
			(1.15)
Constant	-8.05 *	-8.11 **	-7.68 **
	(4.56)	(3.45)	(3.88)
Observations	484	540	553
Number of ccode	37	37	41

Robust standard errors in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

- The model was estimated using debt scaled by exports as a regressor (as opposed to having debt and exports to GDP enter separately in the regression), in order to compare the results with those of previous studies such as Mulder and Perrelli (2001) and Rowland and Torres (2004). In line with these studies, Column B shows that the coefficient for the debt to exports ratio is negative and significant, without altering the sign or significance of the other coefficients; however, this specification deteriorates the fit of the model.

- The political stability index of the World Bank Governance Indicators was used as an alternative measure to the ICRG political risk indicator. This coefficient was positive and significant, did not affect the sign or significance of the other coefficients, but the fit of the model deteriorated (column C).

- Alternative measures of financial depth, in particular net credit to the private sector and market capitalization of listed companies as a percent of GDP, did not prove to be significant, implying that broad money to GDP is the variable that best captures rating agencies' concerns regarding financial depth.

VARIABLES	Moody's		Standard and Poor's		Fitch Ratings	
	A	B	C	D	E	F
GDP per capita (US$)	0.00		0.00 *		0.00	
	(0.00)		(0.00)		(0.00)	
Potential GDP growth	0.18		-1.88 **		-1.57 **	
	(0.51)		(0.75)		(0.74)	
Inflation	0.00		-0.18 *	-0.11 **	-0.11	
	(0.01)		(0.10)	(0.06)	(0.08)	
Unemployment	-0.55 **		0.17		0.06	
	(0.23)		(0.21)		(0.22)	
External public debt to GDP	-0.39 ***	-0.29 ***	-0.55 ***	-0.44 ***	-0.54 ***	-0.26 ***
	(0.09)	(0.08)	(0.11)	(0.08)	(0.17)	(0.05)
Domestic public debt to GDP	-0.15 **	-0.06 *	-0.20 ***	-0.16 ***	-0.32 ***	-0.13 ***
	(0.06)	(0.03)	(0.07)	(0.04)	(0.12)	(0.03)
Primary balance to GDP	-0.97 ***		0.33		0.21	
	(0.35)		(0.26)		(0.25)	
ICRG political risk index	0.36 ***	0.28 ***	-0.07		0.02	0.15 ***
	(0.13)	(0.07)	(0.12)		(0.12)	(0.06)
Private external debt to GDP	0.06	0.05 **	0.06		-0.04	
	(0.04)	(0.02)	(0.05)		(0.05)	
Net international reserves to GDP	0.00		0.16		0.43 **	0.17 ***
	0.14		(0.15)		(0.21)	(0.06)
Current account balance to GDP	-0.04		0.02		-0.05	
	(0.14)		(0.19)		(0.19)	
Exchange rate volatility	-0.23 **		0.04		0.03	
	(0.11)		(0.12)		(0.13)	
Broad money to GDP	0.13 **		0.20 ***	0.15 ***	0.27 **	0.06 **
	(0.06)		(0.06)	(0.03)	(0.12)	(0.02)
Exports to GDP	0.25 **	0.10 ***	0.03	0.06 **	0.13	
	(0.11)	(0.03)	(0.08)	(0.02)	(0.13)	
Latin America and Caribbean dummy	-0.46		-0.60		-5.13	-2.78 *
	(4.97)		(4.10)		(5.89)	(1.55)
Europe dummy	2.69		8.64 **	8.02 **	-1.53	
	(4.89)		(4.32)	(3.21)	(4.76)	
East Asia dummy	-9.13		-4.02		-24.70	-5.81 **
	(5.82)		(5.61)		(15.88)	(2.82)
Default dummy	-2.55		-10.38		-4.61	
	(6.48)		(8.89)		(6.50)	
Constant	-26.42 **	-17.21 ***	11.99	0.47	4.65	-7.61 *
	(10.34)	(5.05)	(11.00)	(2.55)	(12.38)	(4.06)
Observations	479	595	431	487	404	436
Number of ccode	35	41	35	38	33	35

Table A2. Regression Results by Rating Agency

Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

The model also yielded similar results when the dependent variable was defined based on the investment grade ratings of each individual credit agency. The results in Table A2 suggest that S&P, Fitch and Moody's broadly share the same criteria for determining investment grade, although they weigh some variables differently. The broad similarity in criteria is not surprising given that the agencies agree on the classification of countries across investment/speculative grades in 94 percent of the cases. In all cases, the agencies attribute

more weight to external public debt over domestic public debt. However, while Moody's seems to put more weight on the political risk variable than the average, this variable was not significant for S&P. The ratio of exports to GDP was significant for Moody's and with a lower coefficient for S&P, and broad money to GDP was significant for S&P and with a lower coefficient for Fitch.

Beyond the set of core regressors, credit agencies appear to rely on a few additional variables. In the case of Moody's, private external debt was found to have a positive significant effect on the investment grade rating, reflecting the view that steady private access to international markets serves as an indicator of market confidence in the soundness of the corporate sector (column B). In the case of S&P, inflation was found to have a negative significant effect, which serves as a proxy for the overall quality of macroeconomic management (column D). Finally, in the case of Fitch, net international reserves were found to have a significant and positive effect, reflecting the importance attributed to strong liquidity buffers (column F).

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