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SOVEREIGN RISK RATINGS: BIASED TOWARDS DEVELOPED COUNTRIES?*

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1 Introduction

The internationalization of financial markets for the last few decades has dramatically expanded and diversified investment possibilities in these markets accompanied by new risks. Measuring these risks has been the core challenge prior to any financial investment decision. Financing with minimum risk has brought about the necessity of a benchmark risk measurement that the credit rating agencies (CRAs) currently undertake.

Sovereign credit ratings (SCRs) have a core importance in credit rating industry. Yet, the CRAs have been intensely criticized due to misalignments in the SCRs. The debates have grown further as the SCRs are also generally the benchmark for all other debts in a national economy. So, rating changes impact all investment decisions in a country regardless of being financial or whatsoever. While the SCRs give an opportunity of comparison among peer

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country groups, many think that the CRAs do not concentrate on financial or general economic performance of a country indicated by the rate of economic growth, the balances of foreign trade and public budget as well as the level of foreign exchange reserves. Rather, value judgments of the analysts or politics are of core importance (Akıncılar, 2008; Sandström, 2008). Nevertheless, as the SCRs are allegedly the evidence of the performance of a national economy, changes, especially the downgrades, in ratings frequently trigger a negative market response.

Since the mid-1980s, the CRAs have become very influential in the access to funds in international capital markets by governments and corporations. That is because bond ratings highly affect international capital flows by supplying and confirming information to investors. Of course, the role of these intermediaries has never been without controversy. Among the widely-debated many issues regarding the CRAs, the following controversial ones deserve close attention: the conflict of interest, lack of transparency and reliability. Many steps have been taken at national and international scales to address the conflict of interest and lack of transparency issues.[5] Yet, the question of reliability merits serious discussions.

This fact has been an inspiration for the issue to be revisited. The determinants of sovereign ratings have been a core subject to many studies (e.g., Hu et al., 2002; Alexe et al., 2003; Bissoondoyal-Bheenick et al., 2005; Bennell et al., 2006). Among these, Alexe et al. (2003) discussed the issue of country risk and developed a non-recursive regression model to verify country grades and assign a rating for unrated ones. Their study has been held on S&P and Moodys ratings and the authors found out that Moodys and S&P ratings are verified with the model they developed. Bennell et al. (2006) also discussed the issue by comparing the artificial neural network (ANN) method with ordered probit modeling. Their conclusion is

[5]The CRAs, as profit-oriented private institutions, are paid by the debt issuer in return for rating bonds and giving advices. This conflict of interest may pressure these firms to assign higher ratings than what the reality would suggest. Furthermore, regarding transparency, the CRAs might fail to adequately disclose information to their subscribers and unintentionally disclose confidential information about the institutions they rate.

that the ANN model had a higher predictive power than the ordered probit modeling.[6]

These and many other studies estimate the whole SCRs over a single model. Our study, in contrast to previous studies, examines the major determinants of credit ratings by estimating two separate ordered probit models for developed and emerging market economies. Such a two-modeled analysis, thereby, gives an opportunity for a comparison between developed and emerging market economies in order to find out if the CRAs behave biased towards developed countries. In the analysis, we use the Moodys data for the period of 1999-2010. Given the fact that the CRAs use roughly the same metrics, the sole Moodys data will be fair enough to capture the overall picture.

In this study, we will also shed light on the performance of the estimation results over the two estimated models for the developed and emerging economies. We will then compare these predicted ones with the actual ratings. This comparison will be an interesting topic for further studies as emerging market cases have been intensely discussed since the late 1990s as in the Mexican, Malaysian and Russian cases. In todays global economic conjuncture, macroeconomic indicators of the developed countries are getting worse. Hence, by focusing on the credit ratings of the developed country cases, we will be able to evaluate the CRAs in terms of their timely reaction to changing conditions regardless of their political support to a specific country or the classification of a country as a developed one. So the emphasis will also be on the comparison of developed and emerging country classifications in terms of the SCRs.[7]

The remainder of this paper is designed as follows: Section 2 discusses the CRAs rating process, specifically concentrating on sovereign rating. Section 3 presents the data and Section 4 examines the credit ratings of the 94 countries with cross country comparisons. This examination especially attaches great importance to developed-emerging market country segregation

[6]The studies that focused on estimation of soverign ratings are not solely these ones. Hoti & McAleer (2002) identify 50 empirical studies for sovereign ratings with various econometric methods.

[7]In international capital markets, after the collapse of Lehman Brothers, many emerging market economies have outperformed many developed countries in terms of financial, fiscal and economic terms.

by using ordered probit modeling. Section 5 will conclude.

2 Sovereign Rating

A SCR gives signal for the creditworthiness of a sovereign or its debt issues. The rating does not guide for other aspects that are crucial for investment decisions, such as market liquidity or price volatility. As a result, bonds with the same rating may have very different market prices. Yet, market participants have often treated similarly-rated securities as generally fungible, i.e. the credit ratings are used as a calibration metric for market participants especially for portfolio management. According to the sovereign methodology, the credit risk of a country is scaled with letter symbols and thereby the credit risk of a country is consolidated. Governments generally seek higher credit ratings not only because they can ease their access to international capital markets, but also these assessments affect the ratings of other borrowers in a national economy (Larraín et al., 1997). That is to say, the country risk is also a benchmark risk indication for other borrowers that accommodate in that country.[8] Sovereign risk indicates not only the credit risk of government debts denominated in foreign currency, but also the debts of semi-governmental institutions and private sector, i.e. the whole domestic economy.

SCRs may reduce information asymmetries by giving information on the rated security. They can also help to solve some principal-agent problems, such as capping the amount of risk that the agent, i.e. the investor, can take on behalf of the principal, i.e. the issuer (Katz et al., 2009). In addition, ratings can solve collective action problems of dispersed debt investors by helping them to monitor performances via downgrades/upgrades which serve as a signal to take action. Beyond all these economic functions that SCRs play, the main purpose of them is

[8]Ratings of the foreign-currency bonds of governments have generally served as ceilings for ratings of foreign-currency debt obligations of domestic issuers up to 2001. The analytic rationale for that practice was that all domestic issuers are potentially subject to foreign currency transfer risk. However, the country credit ceiling methodology has been relaxed after 2001 behind the rationale that governments in default may choose to allow foreign currency payments on some favored classes of obligors or obligations (Levey, 2001).

that of compressing a variety of information about a country into a single parameter which is easily comprehendible. In this way, credit ratings provide an efficient opportunity for cross-country comparisons. That is to say, credit rating is nothing but an aggregation of various indicators into a single metric. According to Kunczik (2000), this process is similar to taking a picture of a country at a specific time with respect to its financial, economic and political conditions. Indeed, a rating from a recognized CRA, while not intended to do so, effectively reduces the burden on investors to examine the creditworthiness of a security or issuer. SCRs are typically among the main tools used by portfolio managers in their investment decisions and by lenders in their credit decisions.

Allegedly the SCRs are beneficial tools for the measurement of the credit risk of a country or a corporation in that country. However, there is discontentment with the basic characteristics of the rating process applied by the CRAs. First of all, the SCRs published by different CRAs appear as an output of a black box that is unknown to both issuers and investors. The processing of various and distinct variables into a single metric seems complicated to issuers and investors. Moreover, the rule of compression is not open to criticism. Although it is now evident that the CRAs allegedly use the average weight of a variable in a unique model, there appears the risk of missing a salient improvement in that specific variable. The CRAs assert that beyond their quantitative analyses, specific attention is given to the qualitative factors, such as political factors and projections. All in all, the process of assigning a credit rating is allegedly opaque to issuers who are exposed to the direct effects of credit ratings. It seems weird for many to use many variables in order to estimate the possibility and the capacity of a country to pay back its debt liabilities in due course (Alexe et al., 2003; Haque et al., 1997; Brewer & Rivoli, 1990). In other words, the system of assigning a SCR seems to be reductionist and over-simplistic.

The second critical issue that is debatable is the poor predictive power of the SCRs. The CRAs were conspicuous among the many who failed to predict the sovereign originated crises such

as the Mexican, Russian and Asian crises. These crises have thus produced the sentiment that the CRAs react to events rather than anticipating them. This pro-cyclicality raised questions about how seriously investors should take sovereign ratings on developing/emerging market economies as an indication for sovereign credit risk (Larraín et al., 1997). According to Kaminsky & Schmukler (2002), credit rating decisions lag the market behavior, i.e. the CRAs behave pro-cyclically when they downgrade or upgrade. Rating agencies decide to downgrade (upgrade) a country when the prices of its financial instruments go down (up). Many have concluded that the CRAs have been abstained to downgrade timely the SCRs due to the possible damage to the income streams that would be earned from sovereigns. Also some have asserted that the late downgrade stems from the fact that the CRAs abstain from self-fulfilling crises in hard times by timely downgrades. There are also others who point out the lack of the qualified staff in the CRAs that could do reliable analyses as the main cause of lagging behavior. The CRAs have been blamed for their flawed credit ratings without any anticipating power towards developing/emerging market economies. Currently, the issue is reversed and market has been doubtful towards developed countries higher credit ratings.[9] Whether the concern is towards the credit ratings of developed countries or of the emerging market economies, there is discomfort among market players regarding the SCRs.

Last but not the least, there are a few allegations that some CRAs have regional bias. Accordingly, certain CRAs favor particular regions. Haque et al. (1997) note that Euromoney usually gives higher credit ratings to the Asian and European countries than Latin or Caribbean countries, while Institutional Investor is more generous to the Asian and European countries than to African countries.

Despite the pros and cons of the CRAs in credit rating market, credit ratings are, as the CRAs

[9]After the collapse of Lehman Brothers, many developed countries have announced fiscal measures that damaged their fiscal balances and increased debt stocks. Developed countries may in the future need to finance their short term debt liabilities with greater risk premia, i.e. in practical terms with lower credit ratings. For instance, many investment grade EU countries, e.g. Greece, had paid higher risk premium compared to the countries which have non-investment grade since their budgetary indicators began to deteriorate. However going over technical reasoning, this contradicts with the very basic definition of the credit rating.

contend, mere opinions and not recommendations to purchase, sell, or hold any security. In the USA, the CRAs assert that they have the same status as financial journalists and are, therefore, protected by the constitutional guarantee of freedom of the press (Partnoy, 1999, 2001). They claim that this protection precludes government regulation of the content of a credit rating or the underlying methodology, i.e. credit rating is a mere opinion and there is freedom of expression. While similar protection does not exist in other countries, the CRAs have generally stated, in contrasts with credit rating users, that their opinions are not financial advice. This has traditionally kept them away from investor litigation and until recently prevented direct regulation of their operations. All in all, the CRAs managed to be insulated from litigation or market criticism by announcing that they only express their views.

Even though the SCR is not a financial advice to buy or sell, the flaws of the ratings may put extra cost by not showing the actual risk premium of the sovereign and the whole national economy without any enforcement on the CRAs. Needless to say, the reliability of SCRs is a very critical issue for country risk measurement. Yet, the problem is not delimited with national scale but international financial system is also exposed to the risks stemming from the flawed SCRs. Unless a fair analysis is held, the matter is not only the cost that is borne by a national economy but rather the whole international financial system as seen in the previous financial crises.

Hence, the issue that makes the CRAs systemically important is the dependence of the financial system mostly on credit ratings for risk measurement. With an unfair downgrade/upgrade, the dislocation of credit risk will prevail too fast due to herd behavior of the market. The main reason behind this quick response is that the regulatory framework of the financial system dictates risk weights for different risk categories which are assigned according to credit ratings.

3 Data and Econometric Method

3.1. *Data*

This study examines the SCRs of the countries and the most influential factors on the SCRs. It also attempts to find out whether the SCRs are biased upwards towards the more developed countries. Both the country risk rating and macro economic indicators data used in the analysis are obtained from Moody's. According to Moody's rating classification, there are 20 possible credit ratings for a country: Aaa, Aa1, Aa2, Aa3, A1, A2, A3, Baa1, Baa2, Baa3, Ba1, Ba2, Ba3, B1, B2, B3, Caa1, Caa2, Caa3, Ca; Aaa being the highest rank that a country can get and Ca is the lowest. A rating between Aaa and Baa3 signals a good investment environment for a country whereas any rating between Ba1 and Ca is speculative.

The data that is obtained from Moody's originally had information on 106 countries for the 1999-2010 period. Because of the few number of observations for the Caa2, Caa3, and Ca ratings, countries who have been in the "junk" category (i.e. countries with a credit rating of Caa1 and lower) at least once over the period examined are excluded during the estimations.[10]

To be able to assess the differences in the rating structures of countries with different development levels, the data is divided into two sub-samples of high- and low&middle income countries.[11] Therefore, besides estimating models on a pooled sample of all countries in the data, separate models for high and low&middle income countries are also estimated.

[10]These countries are: Argentina, Belize, Cuba, Ecuador, Jamaica, Nicaragua, Pakistan, Paraguay, Ukraine, and Venezuela. Although they had higher ratings, Cayman Islands, Bermuda, and Bahamas are also excluded from the regressions as these countries had many missing values for the explanatory variables considered.

[11]The World-Bank country classification is used for this purpose. The *high income: OECD* and *high income: non-OECD* countries in World Bank's classification are grouped under the "high-income"category while countries under the *low income*, *lower middle income*, and *upper middle income* categories are grouped under the "low&middle-income"category.

3.2. *Econometric Method*

Considering that the SCR of countries is a categorical variable measured with an ordinal scale, ordered probit modelling is applied to estimate the models in this study.

Let y_{it} be the propensity for the credit evaluation of a country i at time t:

$$y_{it} = \beta' x_{it} + u_{it} \tag{1}$$

where β is a kx1 parameter vector, x_{it} is a kx1 vector for the individual characteristics measured at time t and u_{it} is the stochastic disturbance term. The observability criterion for the 16 possible outcomes in the model are given by:

$$S_{it} = s \quad \text{if} \quad \mu_{s-1} \leq y_{it} \leq \mu_s \quad \text{for} \quad s = 1, 2, 3, \ldots, 16 \tag{2}$$

$$\text{where } s = \begin{cases} 1 & \text{if the country's credit rating is B3} \\ 2 & \text{if the country's credit rating is B2} \\ \vdots & \vdots \\ 16 & \text{if the country's credit rating is Aaa} \end{cases}$$

Note that μ's are the threshold values where $\mu_0 < \mu_1 < \cdots < \mu_{16}$, $\mu_0 = -\infty$ and $\mu_{16} = +\infty$. Assuming a standard normal distribution for the stochastic disturbance term ($u_{it} \sim N(0,1)$), the conditional probabilities could be written as:

$$Pr(S_{it} = s | x_{it}) = \Phi(\mu_s - \beta' x_{it}) - \Phi(\mu_{s-1} - \beta' x_{it}) \tag{3}$$

where Φ is the normal probability density function with $\Phi(-\infty) = 0$ and $\Phi(+\infty) = 1$.

Using the conditional probabilities, the log-likelihood function for the sample is written and

the parameters maximising this function are obtained.

A just rating for the countries could only be achieved if all countries are evaluated with a similar approach, where the same macroeconomic indicators are taken into consideration. Introducing country-specific differences into the model as fixed or random effects would detract from the purposes of the study. Nevertheless, random effects ordered probit models are also estimated in order to observe the changes that the estimation approach makes on the results.

Let θ_i represent the unobserved country characteristics that is assumed to be common in all years for the same country. The credit evaluation of a country i at time t then takes the form:

$$y_{it} = \beta' x_{it} + \theta_i + u_{it} \tag{4}$$

It is assumed that θ_i is normally distributed with a variance of $\sigma^2_{\theta_i}$. The correlation between the two disturbance terms is:

$$\rho = \sigma^2_\theta / (\sigma^2_\theta + \sigma^2_u) = \sigma^2_\theta / (\sigma^2_\theta + 1) \tag{5}$$

The conditional probabilities for the rating outcomes of the countries can be re-written as:

$$Pr(S_{it} = s | x_{it}) = \Phi(\mu_s - \beta' x_{it} - \theta_i) - \Phi(\mu_{s-1} - \beta' x_{it} - \theta_i) \tag{6}$$

The conditional likelihood for the i^{th} country is the product of all conditional probabilities for all available years, T:

$$L_i(\theta_i) = \prod_{t=1}^{T} P(S_{it}) \tag{7}$$

The probability functions in the conditional likelihood in Eq.(7) include the random country-specific component θ_i. The unconditional likelihood is thus written by integrating the marginal likelihood over all possible values of θ_i (Butler & Moffit, 1982; Glick & Sahn, 2000; Greene, 2002). Defining $\widetilde{\theta} = \theta_i/\sigma_\theta$, the likelihood function takes the form:

$$L_i = \int_{\widetilde{\theta}} \phi(\widetilde{\theta}_i) \prod_{t=1}^{T} P(S_{it}) d\widetilde{\theta}_i \tag{8}$$

where

$$P(S_{it}) = \Phi(\mu_s - \beta' x_{it} - \widetilde{\theta}_i(\rho/1-\rho)^{1/2}) - \Phi(\mu_{s-1} - \beta' x_{it} - \widetilde{\theta}_i(\rho/1-\rho)^{1/2}) \tag{9}$$

The log-likelihood function for the total sample is obtained by taking the natural logarithm of the product of unconditional likelihood functions for all countries in the sample.[12]

4 Results

4.1. *Regression Estimations*

Mentioned above the data set used in the estimations belongs to 93 countries covering the 1999-2010 time period. The models are estimated for the whole sample as well as separately for the high income and low-middle income countries. Disaggregating the data by the income level will allow us to observe the differing effects of the explanatory variables as well as asses the 'justness' of the ratings. All the indicators that are reported to be considered for the SCRs of both for industrialized and developing countries, with the exception of percentage change

[12]Note that the log-likelihood function includes multiple integrals, which makes it computationally very hard to obtain the paramater estimates for the model. The Stata code that is used during the estimations in this study (Frechette, 2001) makes use of the Gauss-Hermite quadrature suggested by Butler & Moffit (1982) which reduces the T-dimentional integrals to a single integral.

in real GDP, government effectiveness index, and percentage change in real exchange rate, are included in the estimations.[13,14,15]

Table 1 presents the ordered probit and random effects ordered probit results for the pooled sample of countries. Model I includes the macroeconomic indicators that are considered in the study while Model 2 has additional dummy variables for the income level of the countries.[16] Low income country group is chosen to be the base category. Since there are 16 alternative rating categories for the dependent variable, 15 threshold values are estimated. These threshold values, however are not reported in table for the sake of saving some space.[17]

Results for the country income dummy variables suggest that, holding everything else constant, high income countries are more likely to receive higher rating than the low-income countries; the increasing effect being higher for the OECD than non-OECD countries. For the ordered probit estimations, the parameter estimate for the lower-middle income countries is insignificant, suggesting that these countries are not significantly different than the low-income countries in terms of their credit ratings. The upper-middle income countries, on the other hand, are likely to receive higher ratings than low-income countries, the coefficient estimate being lower than the other two high-income dummy variables. These results are in line with our expectations. As for the random effects ordered probit model estimations, the results

[13]Percentage change in real GDP is excluded from the estimations as it measures the same effect as the percentage change in nominal GDP, which is included in the models. There are some other variables which are likely to be correlated with each other, such as the percentage changes in imports and exports of goods and services. The variables that are likely to cause multicollinearity problems have been excluded from the model estimation trials in order to observe the possible effects that the multicollinearity might have on the results. The exclusion of these potentially correlated variables, however, has not changed the results significantly.

[14]Government effectiveness and percentage change in real exchange rate are not considered as 409 and 387 observations, respectively, were missing for these variables.

[15]There are some macroeconomic indicators which are reported either for the industrialized or the developing countries. These variables are not included in the estimations to be able to compare the rating structures for these two groups of countries. Besides, most of these macroeconomic indicators are likely to be correlated with each other; their simultaneous inclusion in one model is highly likely to create problems of multicollinearity and to reduce the explanatory power. All in all, the variables included in the models are the fundamental indicators for the ability to pay by sovereigns such as, current account, fiscal and GDP indicators.

[16]Time dummy variables are also experimented, but not included in the final regressions as they did not have statistically significant contribution.

[17]Almost all of the estimated threshold values are significant at 1% significance level, some few are significant at 5 %.

for the country income level dummies change. The inclusion of the country-specific random effects reverses the sign of the parameter estimate for the lower- and upper-middle income categories. Holding unobserved country specific factors as well as other macroeconomic indicators constant, countries in upper-middle income country are likely to receive lower ratings than the low income and lower-middle income countries.

Table 2 presents the regression estimates for the high and low-middle income countries. Note that the observed credit rating ranges from B3 to A1 for the low-middle income and from Ba1 to Aaa for the high income countries. The models for the low-middle income countries are, therefore, estimated by considering twelve alternative rating categories whereas the models for the high income countries have eleven alternative ratings.[18]

The regression results signal that current account balance, nominal exchange rate, the ratio of government interest rate payments to government revenue, foreign exchange reserves, government debt, the ratio of government debt to government revenue are the important macroeconomic indicators determining a country's credit rating. For the ordered probit estimations, the parameter estimate for GDP is highly significant for the high income countries while it is insignificant for the low-middle income. After controlling for the unobserved country specific random effects, the parameter estimate of GDP for low-middle income countries becomes highly significant, its value approaching to the estimate for the high income countries.

Regarding the estimation results both for ordered probit and random effects ordered probit models for the pooled sample of countries, parameter estimates for some macroeconomic indicators become statistically significant after the inclusion of country group dummy variables (Table 1). This is important in a sense that the parameters which have direct influence over the ability to pay of sovereigns, e.g. ratio of government expenditure to GDP, ratio of gov-

[18]If the same alternative categories were observed for the two group of countries, the 'would be' credit rating of the low-middle income countries if they had the same evaluation structure as the high income group and the 'would be' credit rating of the high income countries if they had the same evaluation structure as the low-middle income would be calculated. The differences in the observed and predicted ratings in this case would signal whether the rating for these two groups are just or unjust.

Table 1: Estimations for the pooled sample of countries

Variables	Ordered Probit		Random Effects Ordered Probit	
	Model I	Model II	Model I	Model II
Current account balance / GDP	-0.008	0.014**	-0.004	-0.017**
	(0.006)	(0.006)	(0.007)	(0.008)
Current account balance	0.003	-0.000	0.004	0.005*
	(0.002)	(0.002)	(0.003)	(0.003)
Nominal exchange rate	-0.119***	-0.095***	-0.300***	-0.298***
	(0.021)	(0.023)	(0.023)	(0.026)
Government expenditure / GDP	-0.813***	-0.671***	-0.385	-0.481**
	(0.211)	(0.215)	(0.235)	(0.231)
Government financial balance / GDP	-0.579***	-0.355*	-0.301	0.081
	(0.193)	(0.196)	(0.209)	(0.210)
Government interest payment / Revenue	0.047***	0.045***	-0.008	0.097***
	(0.017)	(0.017)	(0.021)	(0.019)
Government primary balance / GDP	-0.271***	-0.344***	-0.145*	-0.537***
	(0.072)	(0.074)	(0.087)	(0.082)
Government revenue / GDP	0.869***	0.707***	0.528**	0.514**
	(0.212)	(0.215)	(0.237)	(0.232)
Exports, % change	-0.001	-0.006	0.005	-0.003
	(0.004)	(0.004)	(0.005)	(0.004)
GDP	1.355***	1.081***	1.790***	2.153***
	(0.156)	(0.166)	(0.227)	(0.237)
GDP per capita	-0.004**	-0.005**	-0.017***	0.008***
	(0.002)	(0.002)	(0.002)	(0.002)
GDP, % change	-0.034***	-0.020***	-0.020***	-0.022***
	(0.007)	(0.007)	(0.007)	(0.007)
Imports, % change	0.005	0.010***	0.001	0.008*
	(0.004)	(0.004)	(0.004)	(0.004)
Inflation	-0.037***	-0.032***	-0.021**	-0.028***
	(0.009)	(0.009)	(0.010)	(0.010)
Gross investment / GDP	-0.006	0.017**	0.068***	0.042***
	(0.008)	(0.008)	(0.009)	(0.009)
Domestic saving / GDP	0.048***	0.016***	0.042***	0.027***
	(0.005)	(0.005)	(0.005)	(0.006)
Net FDI / GDP	-0.027***	-0.022***	-0.063***	-0.034***
	(0.006)	(0.007)	(0.009)	(0.009)
Foreign exchange reserves	-0.979	0.130	1.727**	2.029**
	(0.693)	(0.703)	(0.851)	(0.873)
Government debt	-0.554***	-0.556***	0.565***	-0.788***
	(0.120)	(0.125)	(0.158)	(0.149)
Government debt / GDP	0.012**	-0.004	-0.031***	-0.028***
	(0.005)	(0.006)	(0.006)	(0.006)
Government debt / Revenue	-0.004***	0.001	0.002	-0.000
	(0.001)	(0.001)	(0.002)	(0.002)
High income OECD		3.925***		8.571***
		(0.292)		(0.391)
High income non-OECD		2.477***		4.173***
		(0.281)		(0.327)
Lower middle income		0.229		-1.161***
		(0.258)		(0.286)
Upper middle income		1.048***		-1.216***
		(0.267)		(0.304)
Rho			0.865***	0.855***
			(0.007)	(0.008)
No. of observations	1009	1009	1009	1009
Log-likelihood	-2115.021	-1838.452	-1435.079	-1266.024
Chi-squared	1047.848	1600.987	537.638	875.749

Notes:
* p<0.10, ** p<0.05, *** p<0.01
Standard errors are reported in parentheses

ernment interest payment to revenue etc., become statistically meaningful after the inclusion of dummies in Model II of random effects ordered probit. Yet, for both ordered probit and random effects ordered probit models, ratio of government debt to revenue is found to be statistically insignificant.

Government debt is found to be an important indicator for high and low-middle income countries (Table 2). To recall, the same indicator is not statistically significant in pooled country sample. Another interesting point is that, after controlling for the unobserved country specific random effects, the parameter estimate for the ratio of government debt to GDP becomes highly significant for both country groups with same signs. The same situation also holds for the ratio of current account balance to GDP and the ratio of government primary balance to GDP. The parameter estimates for these indicators, after controlling for the unobserved country specific random effects, are significant for low-middle income country group. Allegedly, the current account balance and government primary balance dynamics in this country group are highly determinant for their credit rating.

Marginal effects of the parameter estimates for the ordered probit regressions give more detailed information about the effect of the explanatory variables on the probability of observing each category.[19] Marginal effects calculated for low-middle income countries are highly in line with real life experience. Current account and fiscal balance indicators, i.e. ratio of current account balance to GDP, current account balance, ratio of government expenditure to GDP, ratio of government financial balance to GDP, ratio of government primary balance to GDP, ratio of government revenue to GDP, have mostly the highest in value in B1, Ba3 and Ba2 categories. That is to say, a point increase in these indicators increases the probability of a country being in B1, Ba3 and Ba2 countries by the highest probabilities. For example, a point increase in the ratio of government expenditure to GDP in low-middle income countries, increases the probability of that country being in the B1 category by around 5 percentage

[19]Marginal effects are not reported in this study to save space. Figures could be obtained from the author on request.

Table 2: Estimations for low-middle and high income countries

Variables	Ordered Probit		Random Effects Ordered Probit	
	Low-middle income	High income	Low-middle income	High income
Current account balance / GDP	-0.006	-0.007	-0.026**	-0.011
	(0.010)	(0.009)	(0.011)	(0.014)
Current account balance	-0.015**	0.007**	-0.009	0.006
	(0.006)	(0.003)	(0.006)	(0.004)
Nominal exchange rate	-0.124***	-2.558***	-0.237***	-2.392***
	(0.022)	(0.341)	(0.024)	(0.378)
Government expenditure / GDP	-0.310	0.870	-0.078	1.068
	(0.238)	(1.011)	(0.272)	(1.075)
Government financial balance / GDP	-0.310	0.663	0.102	1.196
	(0.204)	(1.027)	(0.231)	(1.098)
Government interest payment / Revenue	0.042*	-0.309***	0.056**	-0.148**
	(0.022)	(0.056)	(0.026)	(0.061)
Government primary balance / GDP	-0.058	0.149	-0.213*	-0.229
	(0.103)	(0.160)	(0.119)	(0.183)
Government revenue / GDP	0.329	-0.805	0.047	-0.942
	(0.240)	(1.010)	(0.274)	(1.074)
Exports, % change	-0.002	-0.012*	0.007	-0.008
	(0.006)	(0.007)	(0.006)	(0.008)
GDP	0.520	3.362***	3.172***	3.901***
	(0.451)	(0.313)	(0.494)	(0.404)
GDP per capita	-0.002	-0.010***	0.012***	0.005
	(0.003)	(0.004)	(0.003)	(0.004)
GDP, % change	-0.021**	0.002	-0.026***	0.009
	(0.009)	(0.013)	(0.010)	(0.014)
Imports, % change	0.008	0.014**	-0.003	0.023***
	(0.005)	(0.006)	(0.006)	(0.006)
Inflation	-0.052***	-0.019	-0.037***	-0.008
	(0.011)	(0.023)	(0.012)	(0.025)
Gross investment / GDP	0.018*	0.031**	0.079***	0.062***
	(0.010)	(0.015)	(0.012)	(0.020)
Domestic saving / GDP	0.043***	0.007	0.041***	-0.011
	(0.007)	(0.009)	(0.007)	(0.013)
Net FDI / GDP	-0.021	-0.028***	-0.009	-0.046***
	(0.016)	(0.007)	(0.018)	(0.012)
Foreign exchange reserves	3.811**	3.873***	1.091	7.658***
	(1.914)	(1.270)	(2.034)	(1.562)
Government debt	-1.488**	-2.613***	-1.883**	-2.810***
	(0.685)	(0.246)	(0.751)	(0.307)
Government debt / GDP	-0.014	0.004	-0.030***	-0.044***
	(0.009)	(0.010)	(0.010)	(0.012)
Government debt / Revenue	-0.003*	0.009***	-0.003	0.012***
	(0.002)	(0.003)	(0.002)	(0.003)
Rho			0.795***	0.861***
			(0.015)	(0.014)
N	495.000	514.000	495.000	514.000
ll	-985.682	-756.177	-687.111	-555.175
chi2	341.572	527.869	342.533	286.342

Notes:
* p<0.10, ** p<0.05, *** p<0.01
Standard errors are reported in parentheses

points and by 3 percentage points for being in the B2 category. A point increase in this ratio decreases the probability of a low-middle income country being in the Baa3 and Baa2 categories, respectively, by around 3.3 and 3 percentage points. In developing/emerging country sphere, i.e. B1, Ba3 and Ba2 categories, the current account and fiscal balance indicators are the most sensitive macroeconomic dynamics. In the same way, inflation and government debt to GDP ratio have mostly the highest value in B1, Ba3 and Ba2 categories. Furthermore, in investment grade categories and Ba1 category, the sign for aforementioned indicators change and gain negative value in line with the expectation. That is to say, as far as fiscal and current account dynamics of a country worsen, the country is highly likely to locate in "speculative grade" rather than investment grade.

As for the marginal effects in the high income country group, the results suggest non-existence of a regular approach in CRAs towards high income country group. That is also very much compatible with the origin of the paper. CRAs rating behavior is more or less systematic towards developing countries, while the result for high income group is not so much systematic. It is hard to assert that CRAs behave advanced countries systematically. That is to say CRAs rating approach is much more benign to advanced countries.

4.2. *Credit Rating Predictions*

After estimation of the models, a few approaches have been followed in order to validate the goodness-of-fit for the estimated models and to compare the rating structures for two country groups:

1. Using the model estimation results, the probabilities of being in each rating category are calculated for all country and years. The sample means for these predicted probabilities are then calculated and compared with the actual rating distribution in the data. This approach originates from the frequency interpretation of probability. The model has a

Table 3: Mean predicted probabilities

	Pooled sample			High income		Low income	
RATING	Actual	Prediction 1†	Prediction 2††	Actual	Prediction	Actual	Prediction
B3	2.41	2.83	2.66			4.92	5.12
B2	4.25	3.90	3.88			8.66	8.58
B1	6.76	6.14	6.34			13.78	13.20
Ba3	3.38	3.04	3.30			6.89	6.53
Ba2	5.69	5.44	5.97			11.61	11.66
Ba1	8.01	8.00	8.58	1.33	1.80	14.96	15.34
Baa3	7.72	8.47	8.50	2.84	2.22	12.80	13.93
Baa2	6.27	6.70	6.31	4.55	4.14	8.07	8.70
Baa1	5.89	6.10	5.40	4.92	4.35	6.89	7.15
A3	4.73	4.98	4.10	6.06	5.84	3.35	3.10
A2	7.82	7.91	7.10	8.71	8.83	6.89	6.07
A1	5.98	5.77	5.78	10.61	11.17	1.18	0.61
Aa3	3.28	3.51	3.52	6.44	7.12		
Aa2	5.12	5.29	5.69	10.04	10.82		
Aa1	2.61	2.36	2.70	5.11	4.78		
Aaa	20.08	19.56	20.17	39.39	38.92		
Total	100	100	100	100	100	100	100

† Obtained from the pooled sample estimations of Model 1
†† Obtained from the pooled sample estimations of Model 2, i.e. Model 1 + income level dummies

perfect fit if the mean predictions and the actual ratios are equal.

2. After calculating the predicted probabilities, a country's credit rating for that particular year is predicted as the category with the highest predicted probability. One disadvantage with this approach is that the calculated probabilities might be very close to each other for some categories. The approach chooses one category over the others even if there is not a significant difference between the predicted probabilities.

3. The proportion of correct predictions based on the calculations at item 2 are calculated.

Table 3 compares the actual rating distribution with the mean predicted probabilities from the pooled sample as well as income disaggregated estimations. The mean predicted probabilities are very close to the actual ratios. The models for pooled regression, high income and low income are very encouraging in terms of robustness of the models. In each groups, the ratio of actual and predicted ratings are closely similar that the models have a favourable predictive power.

The model estimations show that for developed countries, the models assign good rating to developed countries with higher probabilities, such as Australia, USA, and many EU member countries. For the Eastern European countries such as Greece, the model predicts in line with the actual. Yet the probabilities assigned to categories are very close to each other especially after 2008. In other words, the models' certainty to give good ratings to the Eastern European countries is not so robust in comparison to the Western European countries, USA, Australia etc. The predictions are not as straightforward for developing countries. Ratings for some countries are estimated to be lower than their actual ratings such as Chile, Egypt, and Mexico. However Colombia, for instance, is estimated to be in line with the actual rating for almost all years. An interesting case is Turkey. The models predict Turkey's rating during the 2000s lower than the actual rating. Yet in recent years, Turkeys rating is predicted higher than its actual rating.[20]

5 Conclusion

In this study, we aimed to shed light on the rating behavior of the CRAs. The basic argument of the paper is that the CRAs give higher ratings to developed countries regardless of their macroeconomic fundamentals. However as an SCR indicates the capacity and willingness to pay of that country, macroeconomic fundamentals should be of core importance. In recent years, great importance has been attached to the credit rating phenomenon in the global regulatory fora. However, it has not been paid much attention to the sovereign credit rating issue. As SCRs determine the availability and cost of finance for not only the sovereign itself but also for other borrowers in that national economy, the deficiencies in the process of rating assignment need to be addressed.

[20]Here we give comments on the general country groups. For each country cases, detailed comments need further information on their economies.

Summary statistics for the income disaggregated samples

	Low & Middle Income Countries					High Income Countries				
Variable	Mean	Median	Std. Dev.	Min	Max	Mean	Median	Std. Dev.	Min	Max
Current account balance / GDP	-2.4572	-2.7	7.8962	-36.2	35.6	3.2475	1.1	13.2110	-39.6	131.7
Current account balance	0.7456	-0.67	15.0898	-41.81	160.82	-3.9403	1.46	96.5773	-803.55	329.11
Nominal exchange rate	0.6343	0.0077	2.3790	0.0005	18.5	0.0441	0.0014	0.1761	0.0003	1.3135
Government expenditure / GDP	28.8782	27.9	9.2653	12.1	55.5	39.2979	41	10.3298	12.4	58.6
Government financial balance / GDP	-2.7430	-2.6	3.5867	-23.1	11.2	0.2673	-1.15	7.4237	-14.7	48.4
Government interest payment / Revenue	12.5703	9.7	12.8580	0.6	92.8	5.7784	5.2	4.0959	0	20.7
Government primary balance / GDP	0.0747	0	2.9738	-8.4	11.6	2.5588	1.5	6.9609	-11.4	48.8
Government revenue / GDP	26.1129	24	9.2423	11	50.9	39.5685	40.7	10.3709	12	76.8
Exports, % change	11.1729	11.4	15.7889	-42.7	74.3	10.4191	10.75	14.2605	-39.3	67.4
GDP	0.1707	0.0365	0.3294	0.0006	2.2784	0.7696	0.1816	1.9795	0.0025	14.588
GDP per capita	14.8783	6.562	18.4056	0.37	118.566	14.8142	7.294	17.1268	0.275	96.593
GDP, % change	11.8232	10.3	10.1421	-29	83.4	6.7047	5.4	7.7160	-21.7	44.4
Imports, % change	11.1255	12.1	16.4728	-44.6	57.2	9.5951	10.35	13.1978	-52.2	59.4
Inflation	6.44	4.9	7.0854	-2.7	68.8	2.7130	2.3	2.5896	-4	18.1
Gross investment / GDP	23.4612	22.1	6.4115	11.4	43.2	22.3636	21.8	4.6049	7.9	38.6
Domestic saving / GDP	21.1689	19.8	11.3620	-12	56.9	28.3685	25.8	11.8375	8.8	71.5
Net FDI / GDP	3.8345	3.1	3.8418	-15.2	28.7	0.8839	0.5	9.5909	-127.4	42.5
Foreign exchange reserves	0.0308	0.0075	0.0757	0.00001	0.8189	0.0415	0.0140	0.0981	0	0.9480
Government debt	0.0687	0.0111	0.1553	0.0003	1.2369	0.5669	0.0770	1.6524	0	14.4823
Government debt / GDP	43.3386	39	27.7598	4.1	170.9	47.2615	43.5	32.0138	0	191.6
Government debt / Revenue	185.88	162.6	133.6118	13.4	851.6	123.0477	113.55	92.3265	0	651.7

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