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## Article

# Examining the behavior of credit rating agencies post 2008 economic turmoil

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## **Examining the Behavior of Credit Rating Agencies Post 2008 Economic Turmoil**

### **Abstract**

The demand for sovereign ratings has increased throughout last decades. Until the 1990's, credit rating agencies (CRAs) did not rate most of the emerging markets and the focus was almost only on developed countries, however, during this decade the number of sovereigns rated increased dramatically due to addition of emerging markets to the portfolio. The global financial crisis in 2008 led to the loss of credibility of these major credit rating companies. None of these three agencies showed any signal of macroeconomic problems in countries where the financial crisis created devastating macroeconomic results. It is believed that this failure has led credit rating agencies to behave more conservatively. This paper aims to determine whether CRAs tend to behave conservatively after the 2008 global financial crisis. If the downgrading is greater than the worsening of the economic situation in the given economies, then we can infer that CRAs tend to behave more conservatively. The good working model in estimating ratings assigned by CRAs before the crisis failed to estimate the ratings after 2008 crisis. This may have happened due to two reasons. First, as experienced in the aftermath of the former crisis, credit rating agencies may have added new macroeconomic variables in the process of assigning ratings or change the weight assigned to the already existing macroeconomic variables. Second, it is a known fact that ratings emerge from the combination of two distinct information; the quantitative part reflected by macroeconomic indicators and the qualitative judgements of the agency about the sovereign.

**Keywords:** Credit Rating Agencies, 2008 economic crisis, Turkey

**JEL:** F34, F63, E44, E47

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## Introduction

In the last couple of decades, the demand for sovereign ratings has increased substantially. Since the first publication of manuals of statistics related to evaluating the risks of stocks and bonds by John Moody in 1909, corporate ratings have played a key role in measuring credit risk information and distributing this information to counterparts in markets. While corporate ratings have been used for over a century, demand for and supply of sovereign ratings have also increased dramatically. For instance, the number of sovereigns rated by Standard and Poors increased from 7 in 1975 to 131 in 2015 (including the European Union, which is independently treated as a sovereign). Without a doubt, the need for sovereign ratings has emerged from the increasing volume of international borrowings; either by governments with greater default risk or companies in riskier host countries [Al-Sakka, Gwilym, 2009]. Yet the increase in importance of sovereign credit rating also caused credit rating agencies (CRAs) to be discussed both in the political and academic arena. At the academic plane, a vast number of empirical and theoretical studies conducted on predicting the credit rating process, sovereign credit migration, lead and lag in sovereign credit ratings [Alsakka, Gwilym, 2010; Cantor, Packer, 2010; Fuertes, Kalotychou, 2007]. The incompetence in anticipating the defaults on foreign currency denominated debt and economic crisis – the 1994 Mexican peso crisis, the 1997 Asian currency crisis, 1998 Russian ruble devaluation, 2001 credit failure in Argentina, 2008 global financial crisis triggered by sub-prime mortgage crisis – have even increased the interest in CRAs' work.

The volume of sovereign credit rating significantly increased by the early 1990's. Until the 1990's, CRAs did not rate most of the emerging markets and the focus was almost only on developed countries, however, during this decade the number of sovereigns rated by the three rating agencies, namely: Moody's, Standard & Poors (S&P) and Fitch increased dramatically due to the addition of emerging markets to the portfolio. The ratings assigned by these agencies played a key role not only in the cost of borrowings but also, indirectly, affected the macroeconomic variables via an upgrade or downgrade in rating assigned to government bonds. As in the aftermath of previous foreign currency denominated debt crisis, the global financial crisis in 2008 led to the loss of credibility of these three credit rating companies. None of these three agencies showed any signal of macroeconomic problems in countries where the financial crisis created devastating macroeconomic results. This is unacceptable, since the reputation capital is one of the most important assets of these agencies. The natural outcome of the crisis are the massive downgrades in a group of emerging economies. However, it has been questioned whether it is due to macroeconomic necessities, or it is the result of CRAs becoming more conservative in order to maintaining their reputation power.

These massive downgrades increased the criticism against CRAs and they were accused for over-grading some economies before the crisis [Matousek, Stewart, 2015; Alsakka,

Gwilym, 2010; Skreta, Veldkamp, 2009; Becker, Milbourn, 2011; Bar-Isaac, Shapiro, 2011; Bolton, Freixas, Shapiro, 2012]. Most of these studies tried to explain the mismatch of ratings by putting a focus on the market structure of credit rating. Bolton et al. [2012] and Skreta and Veldkamp [2009] constructed a model for the credit rating market: “ratings shopping”, which is believed to be an inevitable situation in the credit rating market, since issuers can choose which credit rating to purchase after having an insight of ratings and thereby creating incentives to publish only the most favorable ratings [Anand, Thakor, 2011]. Matousek and Stewart [2015] argue that the market structure may affect decision making independence in ratings assignments of individual CRAs and that major three credit rating agencies operate in an oligopolistic market and their activities account for more than 90% of the market. This structure of the market could lead actors to be less concerned about the problems of protecting their long-run reputations.

Why is over- or under-rating important for a sovereign? Nevertheless, credit rating agencies are nothing but only private companies that indicate the risk of default, that is, the probability that debt will not be paid on time. Cantor and Packer [1996] have shown that sovereign yields tend to rise as ratings decline. Their analysis reveals that sovereign ratings effectively summarize and supplement the information contained in macroeconomic indicators and are therefore strongly correlated with market determined credit spreads. In other words, the cost of borrowing by the sovereign is highly sensitive to the credit rating of the sovereign. Although sovereign ratings are notional, the assigned rates have the potential to effect the investment decisions of investors.

This paper aims to determine whether CRAs tend to behave conservatively after the 2008 global financial crisis. If the downgrading is greater than the worsening of the economic situation in the given economies, then we can infer that CRAs tend to behave conservatively. The logic in revealing the behavior of CRAs is simple; first we build a model to estimate the weights assigned to some quantitative economic variables for the pre-crisis period. Second, these weights are employed to estimate the post-crisis ratings. The assumption is: if the behavior of the CRAs did not change, the post-crisis estimations should be as strong as the pre-crisis estimations. A reduction in power of estimation implicitly implies that either; (a) CRAs introduced new quantitative, macroeconomic variables to take a more reliable snapshot of the economy, and thus, the pre-crisis weights became incapable of estimating the post-crisis ratings (b) CRAs’ country specific, private, ad hoc, information gained more importance in assigning the rating.

## Literature Review

The corporate bond rating is a prolonged sector, thus, vast of the literature on credit rating deals with rating corporate bonds. Most studies concern estimating the rating

process, biases in ratings and results of assigned rates on issuer's cost of raising capital. On the other hand, sovereign rating is a relatively new phenomenon. The volume of sovereign rating has increased in the late 1980's and 1990's. During this period, some 90 countries have been started to be rated. Thus, the literature on dynamics of sovereign rating dates back to the late 1990's. The milestone in estimating sovereign ratings is the study of Cantor and Pecker [1996]. They argue that a rating can be decomposed into two separate parts. The first consists of quantifiable variables, of which most are macroeconomic variables. Without explicitly mentioning the weights assigned to these variables, all three rating agencies refer to the same variables. The second part is where unquantifiable variables are used. These variables can be interpreted as the "company view" or "private information" about the sovereign under question. Authors' estimations revealed that rating assignments can be explained by a small number of well-defined criteria. Furthermore, authors also investigated the role of credit rating on spreads and concluded that credit ratings are strongly correlated with market-determined credit spreads.

After the New Basel Accord (Basel II, 2001) that permits banks to use internal ratings to set the regulatory capital against their credit exposure, studies on rating the corporate risks again attracted scholars and thus the literature on sovereign credit rating could not find itself a room for development. Except some limited publications, most of the literature between 1996 and 2008 are devoted to corporate risk ratings. It was the 2008 sub-prime mortgage crisis in the US that eventually turned out to be a global financial crisis that affected the entire world, and gave impetus to studies related to sovereign credit rating. The global financial crisis have shattered the reputation of credit rating agencies. After the crisis, it became clear that these agencies systematically mispriced risk through inflated rating assignments [Matousek, Stewart, 2015].

In a consequence, most of the studies on sovereign credit rating, either implicitly or explicitly questioned facts like the disproportionate role of credit rating agencies, reputational issues, the oligopolistic character of these agencies and the outcomes changes in credit ratings on cost of borrowing.

In this regard, an important criticism raised against these agencies is the so-called "herding" which may simply be defined as a decision maker taking her own decisions by basically looking at the decisions made by previous decision takers [Banerjee, 1992]. Al-Sakka and Gwilym [2009], by using 90 emerging countries and six credit rating agencies, revealed that the three large agencies had the strongest influence of "Watchlist Status" on the monthly published sovereign rating changes. In a similar study, Lugo, Croce and Faff [2014] examined how credit rating agencies react to decisions of rival agencies in the aftermath of the 2008 global financial crisis. Authors concluded that the first credit rating agency to downgrade was Fitch and for Moody's and S&P it took relatively longer time to downgrade. An important result of the study is that these two agencies tend to downgrade, if one of them downgrades first, and it is these two agencies that Fitch is mostly influenced from. Authors conclude that results support the predictions on the role of "reputation"

in explaining the herding behavior among credit rating agencies. For further studies related to herding, see Lugo, Croce and Faff [2014], Guettler and Wahrenburg [2007].

Studies on “lead-lag” models are slightly different in nature. In this approach actors follow one leader, whereas in “herding” models all units collectively behave in the same manner. Al-Sakka and Gwilym [2010] found that it is S&P that acts as the most independent credit rating agency and Moody’s is the agency that has a tendency to upgrade sovereigns as early as possible. It was also found that the probability of a change in rating is much higher if there has already been a change in the rating by another agency in the same direction. The most important contribution of the paper is that it also includes Japanese agencies. The results indicated that these agencies tend to lag behind the major three agencies [Alsakka, Gwilym, 2010]. Matousek and Stewart [2015] also employed a lead-lag model; however, their model slightly differed from the Al-Sakka and Gwilym’s one [2010]. Instead of assuming homogenous lead-lag relation across countries, authors employ a heterogeneous lead-lag relation which leads them to conduct country-by-country time-series tests. Authors conclude that S&P is the leader agency in the market, it has the greatest reputational capital and other companies look after it when making decisions.

Another intensely studied aspect of the sector is the relation between competition, reputation and credit ratings. Becker and Milbourn [2011] argued that the credit rating industry was dominated by two agencies (Moody’s and S&P) until Fitch entered the market. The increase in number of competing agencies lowered the quality of ratings measured by the increase in levels of ratings, and decrease in correlation between the rating and market implied yields. Mariano [2012] argues that the desire for reputation in an increased competition may cause bias in ratings. The source of this bias is the information private to the agency. If this private information is precise, then ratings reflect the actual situation. However, if the private information is “noisy”, the quality of the rating depends on the market structure. There are two possibilities in this case: (a) in a monopoly, the rating agency simply ignores this noisy information and conforms to public information, (b) under competition the agency has an incentive to contradict public information and pretend that the private information is actually a precise one. Finally, it is even possible for the agency to issue good ratings in attempt to protect market power. Even though the main subject of Mathis et al. [2009] is not sovereign ratings, their analysis of the rating industry deserves mentioning. According to the authors, four facts about the credit rating sector are important in explaining the low quality of (corporate bond) ratings. First, revenues of credit agencies are generated from issuers. Some comment it as “it is as if the referee was paid by one of the teams”. Second, the creation of the status of Nationally Recognized Statistical Ratings Organizations (NRSROs) in 1975 has increased due to the fact that the number of issuers looking for good rating has increased considerably which eventually created a suitable environment for low quality ratings. Third, Basel II accord further increased the need for good ratings.

## Data

There are different levels of ratings issued at the sovereign level, namely: foreign currency ceilings for bonds and bank deposits and foreign and local currency government bonds. This paper covers ratings of foreign currency government bonds. Since S&P, Moody's and Fitch cover roughly 90% of the sector, the analyses are limited to these three major rating agencies. There are 83 sovereigns that are rated by all three major rating agencies, yet, our study covers 65 of them. 17 of the remaining ones were excluded due to lack of data, and China was excluded since it is a true outlier. Beside these gaps, the dataset covers all the EU and OECD countries and accounts for roughly 85% of the global GDP.

**TABLE 1. Definitions of variables used in estimating the ratings**

Variable name	Definition	Unit of measurement	Source	Anticipated sign
Per capita income	GNP per capita in 2007	Thousands of dollars	World Bank	+
GDP growth	Average annual real GDP growth on a year-over-year basis, 2005–2007	Percent	World Bank	+
Inflation	Average annual consumer price inflation, 2005–2007	Percent	Word Bank, IMF	–
Fiscal balance	Average annual central government budget surplus relative to GDP, 2005–2007	Percent	World Bank, OECD, Eurostat, CIA World Factbook	+
External balance	Average annual current account surplus to GDP, 2005–2007	Percent	World Bank, OECD, Eurostat, CIA World Factbook	+
External debt	Foreign currency debt relative to exports, 2007	Percent	OECD, Eurostat, CIA World Factbook	+
Indicator for economic development	IMF classification as a developed country as of 2007	1: developed 0: developing	IMF	+
Indicator for default history	Default on foreign currency debt since 1990	1: if defaulted at least once since 1990 0: otherwise		–

Notes: Definitions are for estimations of 2007 ratings. For the 2011 and 2014 estimations, similar aggregation methodology is employed.

Source: own study.

Our rating prediction relies on variables suggested by Cantor and Packer [1996], thus, we employ the same eight variables in estimating the foreign currency government bond

rates. Table 1 presents eight variables employed in estimating the ratings assigned by the CRAs. Most of the data is gathered from the World Bank data set. OECD, EuroStat, CIA World Factbook data are also used. Some missing data are calculated by “interpolation” conducted by the author.

Quantifying the ratings was the final step in data preparation. It was conducted by employing the conversion table of Ferri, Liu and Stiglitz [1999]. Beside other conversion tables, this conversion rate fits our study most, since the notches are quantified on a 100-point basis, and have three different correspondence columns: linear, non-linear calm and non-linear turbulent. By using these three correspondence values, estimations of different periods (i.e., pre-crisis, post-crisis) could be made more precisely. It is possible, in some cases that the quantitative correspondence of notches assigned by different agencies differs for some countries. In that case the quantitative value is just the average of quantitative correspondence of notches assigned by three agencies. Table 2 presents the conversion rates of rating agencies.

**TABLE 2. Legend for quantitative conversion of credit ratings**

Moody's	S&P	Fitch	Linear	Nonlinear (calm period)	Nonlinear (turbulent period)
Aaa	AAA	AAA	100	100	100
Aa1	AA+	AA+	95	98.7	99.1
Aa2	AA	AA	90	97.0	98.0
Aa3	AA–	AA–	85	95.2	96.9
A1	A+	A+	80	93.2	95.6
A2	A	A	75	91.7	95.2
A3	A–	A–	70	89.3	86.4
Baa1	BBB+	BBB+	65	87.1	85.8
Baa2	BBB	BBB	60	84.4	85.2
Baa3	BBB–	BBB–	55	79.5	71.1
Ba1	BB+	BB+	50	75.0	59.3
Ba2	BB	BB	45	65.4	40.9
Ba3	BB–	BB–	40	56.9	42.9
B1	B+	B+	35	54.3	35.0
B2	B	B	30	33.8	30.9
B3	B–	B–	25	25.0	25.0
Ca1	CCC+	CCC	20		
Ca2	CCC		15		
Ca3	CCC–		10		
Ca	CC		5		
	C				

Source: own study.



## Methodology

Rating agencies never reveal the exact quantitative methodology of assigning ratings to sovereigns; yet, they give clues by their publications on the industry every so often. Based on these publications, Cantor and Packer [1996] have mentioned eight macroeconomic criteria that are believed to play key role in assigned ratings. However, it is a well-known fact that agencies also employ qualitative judgements based on a set of country specific, ad hoc, information, rather than only employing quantitative variables [Ferri, Liu, Stiglitz, 1999]. Therefore, the actual rate of a sovereign is composed of two types of inputs. First, the rating based on quantitative variables, which monitors the current macroeconomic status of the sovereign, and second, the qualitative part which reflects the individual qualitative judgement of the rating agency. A formula with weights assigned to these two distinct parts may be written as follows:

$$Ratings = w_q Ratings_q + w_j Ratings_j \quad (1)$$

$$w_q + w_j = 1 \quad (2)$$

where, *Ratings* is the actual rating assigned to a sovereign by an agency,  $w_q$  and  $w_j$  are weights of quantitative variables and qualitative judgements assigned by the agency respectively, and  $Ratings_q$  and  $Ratings_j$  are ratings based on quantitative variables and qualitative judgement of the agency. The formula simply implies that the actual rating is nothing but just a weighted average of quantitative and qualitative ratings. Weights of quantitative variables and qualitative judgements are not disclosed by agencies; nevertheless, by comparing the assigned rating and estimated rating, it is possible to end up with an inference about the qualitative judgement of the agency. For instance, if the actual rating is greater than the estimated rating, we may infer that the qualitative judgement of the agency for that sovereign is negative and that the weight assigned to qualitative judgement is greater than the weight of the quantitative variables.

The econometric model to estimate the ratings is a multiple regression model where ratings are the endogenous variable and those eight variables mentioned above are the exogenous variables. The model can be written as:

$$Ratings_q = \alpha + \beta_i QV_i + \varepsilon_i \quad (3)$$

where  $\alpha$  is the intercept,  $\beta_i$  is the partial slope coefficient for the quantitative variable  $QV_i$ ,  $\varepsilon_i$  is the random error term, which can be interpreted as the qualitative judgement of the agency on that sovereign.

## Results

Our aim in this paper is to determine whether CRAs have behaved extremely conservative after the 2008 global financial crisis. This aim is achieved by comparing the change in the weight of qualitative judgements of agencies over time, and especially, between pre-crisis and post-crisis periods. The main question to be answered is how did the 2008 financial crisis change qualitative judgements? A subsequent question to be answered is: if the qualitative judgements were not to change, what should the ratings of the sovereigns be? In order to answer these questions, equation 3 was estimated in three different years, 2007 for the pre-crisis period and 2011 and 2014 for post-crisis period. Table 3 presents the results of 2007 estimation. In the second column of the table, results of the regression using linear conversion are presented. The third and fourth columns are devoted to the results of non-linear conversion with calm period and turbulent period correspondences.

**TABLE 3. Results of pre-crisis estimation**

	Dependent variable: average ratings in 2007		
	Linear conversion	Non-linear conversion (calm period)	Non-linear conversion (turbulent period)
Intercept	69.36315 (14.81)*	90.26973 (15.53)*	89.88263 (12.64)*
Per-capita income	0.000396 (3.21)*	0.00032 (2.08)*	0.000388 (2.07)*
GDP growth	-0.31818 (-0.49)	0.39751 (0.50)	1.197725 (1.23)
Inflation	-1.65896 (-2.85)*	-1.89303 (0.72)	-3.57399 (-4.04)*
Fiscal balance	43.88018 (2.41)*	21.33392 (0.94)	28.84115 (1.04)
External balance	-0.09708 (-0.67)	-0.28492 (-1.59)	-0.43997 (-2.01)*
External debt	-0.18687 (-0.41)	-0.53296 (-0.95)	-0.69536 (-1.016)
Development	14.91918 (3.49)*	0.707556 (0.133)	0.56136 (0.088)
Default	-7.38602 (-2.43)*	-8.74856 (-2.27)*	-10.3892 (-2.21)*
Adjusted R-squared	0.85	0.57	0.63
Number of Observations	65	65	65

Notes: t values are in parenthesis.

\* indicates significance at 5 percent.

Source: own study.

Results of the 2007 estimation reveal that it is the linear conversion that has the highest prediction precision ( $R\text{-squared} = 0.85$ ) of the individual slope coefficients per capita income, inflation and development and default are statistically significant. The remaining three variables, GDP growth, external balance and external debt are not statistically significant; yet the sign of GDP growth does not satisfy the anticipated sign. Our results are in line with Cantor and Packer's [1996]; thus, the authors' explanation for insignificant fiscal balance and external debt coefficients may be accepted as valid for our results. Cantor and Packer [1996] argue that in many cases the market forces poor credit risks into apparently strong fiscal and external balance positions, diminishing the significance of fiscal and external balances as explanatory variables.

How good is our pre-crisis model? Table 4 presents the estimation performance of the model. The regression does not yield any prediction errors that exceed two notches; furthermore, errors that exceed one notch occur in the case of only four countries. Forty-one grades out of sixty-five are an exact match<sup>2</sup>. These results indicate that for the post-crisis period, the model we built has considerable power in estimating the assigned rates, given that the 100-point basis conversion of credit ratings are performed by employing linear conversion correspondences.

**TABLE 4. Summary of 2007 estimates (Linear Conversion)**

	Exact match	One notch	Two notches
Exact match	41	---	---
Over-valued	---	9	2
Under-valued	---	11	2

Notes:

One notch under-valued countries: Bahrain, Brazil, Colombia, Croatia, Iceland, Israel, Norway, Philippines, Romania, Switzerland, Ukraine.

One notch over-valued countries: Bulgaria, Greece, Latvia, Lithuania, Morocco, New Zealand, Poland, Spain, Thailand.

Two notches under-valued countries: Korea, Turkey.

Two notches over-valued countries: Chile, Singapore.

S o u r c e : own study.

Regression results of the 2011 and 2014 estimations are presented in Table 5. Since the explanatory power of linear conversion is greater than that of the non-linear conversion rates, in the post-crisis period estimations are carried throughout linear conversion only.

The foremost result of post-crisis estimations is the decrease in the explanatory power of the quantitative variable on explaining the assigned rates. As stated earlier, the unexplained part of ratings may be interpreted as the qualitative judgements of the agency on the sovereign under question. The reduction in  $R\text{-squared}$ , thus, implies that after the crisis, credit rating agencies assign more weight to qualitative judgements.

Another interpretation of the decrease in the explanatory variable is that weights of other quantitative variables may have been increased. That is most probably because the credit rating agencies are highly criticized for not publishing reliable ratings before the crisis, and that these misleading ratings (presumably over-valued sovereigns) even further deepened the global crisis. The reason for misleading ratings, in some cases, was lacking to assign deserving importance to a quantitative (macroeconomic) variable. For instance, after the East Asian financial crisis, Fitch-IBCA, in an industry comment published in January 1998, admitted that they missed the importance of short-term debt associated with foreign currency lending. Although not officially published yet, the same result may have had occurred again, and credit rating agencies may be paying more attention to one or more other quantitative variables which they did not before the 2008 global financial crisis.

**TABLE 5. Results of post-crisis estimations (2011 and 2014)**

	Dependent variable: average ratings, linear conversion	
	2011	2014
Intercept	63.60098 (13.77)*	57.20229869 (9.48)*
Per-capita income	0.000651 (3.27)*	0.000985335 (5.43)*
GDP growth	0.511338 (0.87)	2.253252274 (2.42)*
Inflation	-1.90757 (-2.89)*	-2.436375575 (-2.58)*
Fiscal balance	-0.18926 (-0.0066)	38.51182081 (0.77)
External balance	0.453071 (1.41)	-0.349087567 (-1.04)
External debt	-1.78855 (-2.12)*	-2.802971539 (-4.16)*
Development	11.70472 (2.13)*	7.877180784 (1.32)
Default	-3.39947 (-0.822)	-5.742795769 (-1.16)
Adjusted R-squared	0.76	0.74
Number of observations	65	65

Notes: t values are in parenthesis.

\* indicates significance at 5 percent.

Source: own study.

Another point to mention in comparing the pre-crisis and post-crisis regressions is the change in significance of variables. Per capita income, inflation coherently preserved their significance in all three regressions. Development kept its significance in both pre-crisis and 2011 estimations; yet it lost its significance in 2014. On the contrary, GDP growth rate, which used to be insignificant in 2007 and 2011, became significant in the 2014 estimation. External balance is an insignificant variable in all three regressions. External debt, on the other hand, is an insignificant variable in 2007, however, in the post-crisis period, it gained significance in both 2011 and 2014 estimations.

Perhaps, the change in significance of the default factor is the most important in pre- and post-crisis periods. Apparently, the default history was a significant indicator of ratings before the 2008 global financial crisis; yet, the regression results indicate that the default is no more a significant variable in rating assignments. A plausible interpretation is that since most of the developing countries are downgraded without considering whether these countries advanced default or not, it lost its significance in rating assignments. Actually, credit rating agencies were criticized on the same aspect in the post-crisis periods of former dominant economic crises like East Asian crisis, Mexican currency crisis [Cantor, Packer, 1996; Ferri, Liu, Stiglitz, 1999; Guettler, Wahrenburg, 2007].

We have one more question to answer: what if the credit rating agencies did not behave as cautiously as they did after the 2008 crisis? More precisely, if we accept the 2007 estimation results as the true determinants with true weights in credit rating assigning, how would the ratings of sovereigns look like in 2014.

Table 6 presents the differences in estimated and true credit ratings. The second and sixth columns of the table represent the average of ratings of three major credit rating agencies on a linear 100-basis conversion. The third and seventh column are devoted to the estimated credit ratings by employing the values of 2014 and coefficients of 2007 estimation and finally, the fourth and eighth columns represent the difference in assigned rating and estimated rating in notches. The positive (negative) sign in these columns implies that the assigned rating is greater (lower) than the estimated rating, and zero indicates a correct match.

Apparently, twenty-nine out of sixty-five countries are graded below the estimated rate compared to only thirteen in 2007. There are only fourteen countries whose ratings are equal to the estimated ratings (exact match), and finally twenty-two countries are rated above the estimated rate. These preliminary summaries deserve deeper analysis. There are only eleven countries which are in the “developed countries” league; yet, the assigned rates are below the estimated rates<sup>2</sup>. The average under-rating in this group of countries is 4.81 notches. On the contrary, in the league of “developing countries”, there are 16 under-rated countries<sup>3</sup>. The average under-rating in these countries accounts to some 2.06 notches. The difference between under-ratings of developed and developing countries mainly originates from massive downgrading for Cyprus, Greece, Iceland and Italy, all of whom are in the developed countries league.

**TABLE 6. Differences between estimated and actual ratings**

Country	2014 assigned rating*	2014 estimated rating	Difference in notches	Country	2014 assigned rating	2014 estimated rating	Difference in notches
Argentina	20.00	47.30	-3	Kuwait	90.00	81.57	+2
Australia	100.00	92.64	+2	Latvia	70.00	69.76	+1
Austria	96.67	91.93	+1	Lithuania	70.00	66.57	+1
Bahrain	55.00	70.41	-3	Luxembourg	100.00	119.44	0
Belgium	88.33	95.01	-2	Malaysia	70.00	64.90	+2
Brazil	51.67	53.86	0	Malta	70.00	86.38	-3
Bulgaria	55.00	60.72	-1	Mexico	66.67	56.66	+2
Canada	100.00	95.04	+1	Mongolia	30.00	39.47	-1
Chile	83.33	59.25	+4	Morocco	53.33	58.75	-1
Colombia	60.00	62.50	0	Netherlands	100.00	95.36	0
Costa Rica	48.33	53.48	-1	New Zealand	93.33	91.55	0
Croatia	46.67	61.26	-2	Norway	100.00	111.50	0
Cyprus	36.67	89.79	-11	Peru	66.67	57.45	+5
Czech Rep.	81.67	85.49	-1	Philippines	58.33	61.12	0
Denmark	100.00	99.62	0	Poland	70.00	63.40	+2
Ecuador	28.33	54.71	-5	Portugal	50.00	86.65	+7
El Salvador	36.67	59.55	-1	Romania	55.00	65.13	-2
Estonia	81.67	84.43	+4	Russia	51.67	53.03	0
Finland	98.33	95.23	-1	Saudi Arabia	85.00	73.50	+3
France	90.00	88.48	+1	Singapore	100.00	92.23	+2
Germany	100.00	96.38	0	Slovak Rep.	78.33	84.82	-4
Greece	21.67	81.74	-12	Slovenia	63.33	86.77	+5
Guatemala	46.67	51.92	-1	Spain	63.33	87.80	+5
Hong Kong	96.67	89.99	+1	Sweden	100.00	100.10	0
Hungary	50.00	67.49	-3	Switzerland	100.00	106.61	0
Iceland	63.33	92.65	-7	Thailand	65.00	64.57	+1
Indonesia	53.33	50.37	0	Tunisia	40.00	59.30	-3
Ireland	71.67	94.46	-5	Turkey	53.33	50.42	0
Israel	78.33	88.65	-2	Ukraine	48.33	55.04	-2
Italy	60.00	91.60	-6	UK	96.67	91.81	+1
Japan	78.33	93.28	-2	United States	98.33	95.92	0
Kazakhstan	61.67	58.49	+1	Vietnam	38.33	54.53	-3
Korea Rep.	86.67	89.96	-1				

Notes: \* The average three credit rating agencies on a hundred-basis scale.

Source: own study.

When comparing the averages of under- and over-ratings, it becomes evident that the credit rating agencies tend to under-value sovereigns in the post-crisis period. In other words, credit rating agencies became excessively conservative in the post-crisis period. The averages of under- and over-ratings for the entire sample amount to 3.18 and 2.17 notches, respectively. Considering the above, it may be argued that if 2007 weights remained unchanged, the average rate of the sample of sixty-five sovereigns would have been almost one notch (3.18–2.17) above of what we have now. Furthermore, it is a fact that those countries which were severely affected by the 2008 global financial crisis were downgraded more than it would result from their worsening macroeconomic indicators [Ferri, Liu, Stiglitz, 1999].

Another possible reason for the extreme downgrading may be the change in either weight or combination of macroeconomic fundamentals that credit rating agencies consider in determining the rating of a country. Although not officially published by the agencies, it is known from past experience that when their ratings fail to reflect the economic fundamentals of a sovereign, they tend to add new variables or increase the weight of already existing macroeconomic variables in the equation.

## Conclusions

In this paper, we addressed the increasing conservative nature of the credit rating agencies after the 2008 global financial crisis. The economic model, as well as variables are inherited from previous studies on the issue. The model has been estimated for three periods; 2007 to represent the pre-crisis and 2011 and 2014 to represent the post-crisis behaviors of the three major credit rating agencies: Standard & Poors, Fitch and Moody's. Results indicated that in the pre-crisis period suggested macroeconomic variables explained the ratings of sovereigns to a considerable extent. With some exceptions, the model correctly estimated the ratings of sovereigns. On the contrary, the explanatory power of the previously used macroeconomic variables decreased considerably in the post-crisis period. This may have happened due to two reasons. First, credit rating agencies may have added new macroeconomic variables in the process of assigning ratings or changed the weight assigned to the already existing macroeconomic variables. Second, it is a known fact that ratings emerge from the combination of two distinct parts; the quantitative one reflected by macroeconomic indicators and the qualitative judgements of the agency about the sovereign. It is also possible that these qualitative judgements gained more importance in determining ratings assigned to the sovereigns. This may have occurred due to the fact that credit rating agencies tend to maintain their reputation capital, and that being more conservative in assigning the rates somehow secures it.

The conservative nature of credit rating agencies becomes visible by showing the difference in actual and estimated ratings which employ the coefficients of 2007 estimation. Results indicate that sovereigns would have been assigned higher average ratings if the 2007 weights were kept unchanged. In the sample of sixty-five countries, the average level of ratings would have been roughly one notch above what we actually have.

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## Notes

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<sup>2</sup> Belgium, Cyprus, Czech Republic, Greece, Iceland, Ireland, Israel, Italy, Japan, Malta and Slovak Republic.

<sup>3</sup> Argentina, Bahrein, Bulgaria, Colombia, Costa Rica, Croatia, Ecuador, El Salvador, Guatemala, Hungary, Mongolia, Morocco, Romania, Tunisia, Ukraine and Vietnam.

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