HOW TO IMPROVE YOUR SOVEREIGN RATING? – A CASE STUDY ON HUNGARY

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ABSTRACT

Credit rating agencies are often regarded as one of the key contributors to the recent financial crisis. Regulatory authorities have expanded the regulation of the sector, which lead to more transparency of decision-making processes, allowing us to reconstruct the model calculations of Fitch. When substituting the relevant data into the model, it returns the same result as the one maintained by the agency for Hungarian sovereign rating. Using one- and two-dimensional sensitivity analyses, we investigated – considering realistic scenarios – whether selected variables can improve the rating further. We found that in the current economic environment, the management of the selected macro indicators (GDP, inflation, broad money supply, gross government debt, foreign currency denominated debt) could not trigger the upgrade of the rating. When considering simultaneous changes of certain pairs of drivers, boosting economic growth financed through increasing government debt seems to offer the only way to move the rating upward. Although it is doubtful whether that could or should be done.

INTRODUCTION

Since the financial crisis of 2008, many have criticised and questioned the role of the credit rating agencies in financial markets. As a response to the methodological errors and moral hazard that rating institutions made before the crisis, investors started demanding stricter regulation of these agencies, as well as more substantial transparency of their rating processes, i.e. how exactly ratings are calculated. By now, rating agencies are subject to some new regulatory requirements (see IMF 2010; European Council 2009, 2011). Owing to regulatory efforts, credit rating agencies make their decision making processes more transparent and publish more detailed documentation on their models. However, the reproduction of the actual rating of a sovereign may still not be possible because of several reasons, which will be reviewed at a later part of this paper. Nevertheless, the methodologies (issued in 2016/17 or later) are detailed enough to offer better insight into how the main rating variables affect the ratings of sovereigns. The information obtained from such an analysis may even be helpful for policymakers when considering how various measures would influence the country's credit rating.

A sovereign's credit rating incorporates an assumed probability of default (PD) that drives the interest rate marge applied when valuing the sovereign bonds. Thus, the rating affects the costs of refinancing debt as well. An even more fundamental question is whether bonds issued by the sovereign are classified as investment-grade (BBB- or higher), because many institutional investors, such as mutual funds and pensions funds are not allowed to hold non-investment-grade securities. This is why a potential downgrade to non-investment grade may have negative impacts on the issuer, as the sovereign may lose a considerable part of its market. Inversely, an upgrading entails positive macroeconomic effects. This is one of the reasons why policymakers generally investigate which macroeconomic fundamentals will most probably cause a change in the rating. This is especially the case when an upgrade by only one notch (from BB+ to BBB-) migrates the sovereign from non-investment-grade to investment-grade category.

Amongst the recent methodological documentation, it is the model description of Fitch Ratings that is the most detailed; therefore, in the present paper, we analyse the sovereign rating model (SRM) of this institution. Instead of building our own model, we examine the sensitivity of the rating to changes made to specific variable values. From a mathematical point of view, the task goes beyond partial derivation, since the function is continuous. Despite its simplicity, the problem at issue is new in the literature as SRMs have been considered black boxes until recently. This is why, as an initial step of further research, we aim to investigate what kind of policy actions are necessary for an upgrade of the Hungarian sovereign rating from BBB- to BBB. We restrict the analysis to a one-notch upgrade from the given rating since we recognise that there might be substantial differences for such positive rating action to take place at other rating grades. The sensitivity analysis is based on the 9 March 2018 credit rating review on Hungary's long-term foreign currency-denominated

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debt, which was the latest available rating decision by the agency at the time of our analysis[1].
Next, we first describe the general methodology of the credit rating of sovereign issuers, putting a particular emphasis on the SRM of Fitch. After that, we define the key variables that serve as the basis of the sensitivity analysis. Then, we interpret the obtained mathematical results from the point of view of economic policymaking. Finally, we summarise our findings.

THE METHODOLOGY OF SOVEREIGN CREDIT RATING

A sovereign credit rating is an opinion on the loan repayment capacity and willingness of the respective state (IMF 2010). A sovereign state can be deemed insolvent if it is unable to discharge its principal or interest payment obligations towards the investors on the due date (IMF 2010). Credit rating agencies rank the default risk on a scale, where the sovereign states allocated into the same category show similar credit risk (Ligeti and Szőrfi 2016). The sovereign issuers with the best rating receive three "As", while those with the worst rating receive a "D" rating on the credit rating scale.
The three big rating agencies typically allocate the indicators considered for a sovereign rating to four or five groups of variables, i.e. dimensions. At all three rating agencies, most of the dimensions cover distinct variables that are similar in terms of magnitude. All three institutions use the macroeconomy and the general government dimensions, while institutional efficiency is used in the model of two actors, Moody's and S&P. External balance indicators are used by two rating agencies (Fitch and S&P). S&P, contrary to the other two institutions, assesses the effectiveness and flexibility of the sovereigns' monetary policy in a separate dimension. Moody's and Fitch created a separate dimension for event risk and structural features, respectively.
The transparency of the rating methodology – especially the possibility of SRM reconstruction – bears particular importance in our paper. In recent works, several authors tested whether the reconstruction of SRM models is possible (Ligeti and Szőrfi 2016; Hajnal and Szűcs 2018). The results of the cited papers show that the latest methodological documentation published by the rating agencies proved to be adequate for a sufficient level of reconstruction.
The potential difference between the ratings obtained by the reconstruction of the model calculations and the real ratings maintained by the agencies may be attributable to three factors. Firstly, the published methodological documentation is not fully transparent at any of the institutions. Secondly, two of the three rating agencies do not publish information on all the data they consider, and thus, the different result may also be attributable to the difference in the data used as input. Finally, in their methodological documentation, all three rating agencies point out that the rating committee may also approve a rating that somewhat differs from the result calculated by the base model.
Also, very rich literature is available on the topic of quantitative economic variables explaining the ratings. Typically, the indicators with explanatory power include GDP per capita, real GDP growth, level of external debt, level of government debt, fiscal balance, GDP growth, inflation, foreign exchange reserves, economic development and the number of years elapsed since the last default (Bruha et al. 2017; Afonso et al. 2011).

THE SOVEREIGN RATING METHODOLOGY OF FITCH

In contrast to the other two dominant rating agencies, Fitch uses a multivariate regression model for the sovereign rating rather than predefined scales, based on which the methodology allocates weights to the individual variables (Fitch 2017). The weights are defined objectively, solely from the regression model's coefficients. This also means that the institution regularly reviews the weights allocated to the variables and modifies them as necessary. The weights show what percentage of the variance of the rating is explained by the variance of the respective group of variables. According to Fitch's latest analytical framework, the model rating consists of four dimensions and four related weights as shown in Table 1.

Table 1: Dimensions included in the methodology of Fitch and their weights

Dimensions	Weights
Structural features	55.0%
External finances	17.3%
Public finances	17.3%
Macroeconomic performance	10.4%

The scores of the dimensions are obtained as the sum of the product of the variables included therein and the regression coefficient belonging to them. Fitch also publishes the constant value of the regression model (intercept term). Accordingly, the rating is obtained as a result of the published regression model, while the scores of the individual dimensions quantify the degree to which they contribute to the credit rating (Fitch 2017). Table 2 includes a description of the rating variables grouped into the above mentioned four dimensions.
To make the rating calculated by the model more accurate, the institution also considers from time to time less quantifiable variables (qualitative overlay (QO)), which, based on a comparison with sovereign issuers with identical credit ratings (peer analysis), may shift the rating of the sovereign issuer under review both up- and downwards by as many as three grades (Fitch 2017). In the report on the particular review, Fitch regularly mentions the modifying factors considered for

[1] Since the paper was first submitted to the conference, Fitch has reviewed Hungary's sovereign rating.

the rating, which may help to reconstruct the model calculation more accurately.
For the reconstruction of Fitch's model calculation, we made attempts to use the data of institutions specified in the methodology, i.e. the International Monetary Fund (IMF), the World Bank (WB) and the national statistical offices. However, despite our efforts, for some of the indicators, we were compelled to refer to the reports of Fitch, i.e. full reconstruction of the inputs cannot be achieved. For half of the rating variables, the model considers a three (historical, current, expected) year centred average of the data. Because the institution does not publish regular information on the estimated data in its credit rating reports (Fitch 2017), in instances where no estimations are available, we only rely on previous and current year data.

ANALYTICAL FRAMEWORK

In our study, we examine the effects of some selected variables on the sovereign rating of Hungary. We call these variables *key drivers* and – in this first stage of our research – limit their number to five. We emphasise that our question is not "What are the most important factors in the rating?", but "What are the effects of some factors that are usually treated in the literature as significant factors?". We admit that more inclusive analysis can be carried if allowing for more/other key drivers.
Hence, in accordance with the literature cited before, we choose the gross domestic product (*GDP*), the broad money supply (*M*), the inflation (π), the gross government debt (*D*) and the foreign currency government debt (*FD*).

Table 2: The description of the rating variables of Fitch's sovereign rating model and their values for Hungary

Structural features	Description of variable	Value
Composite governance indicator	Simple average percentile rank of World Bank governance indicators: "Rule of Law"; "Government Effectiveness"; "Control of Corruption" and "Voice & Accountability"; "Regulatory Quality"; "Political Stability & Absence of Violence"	66.4
GDP per capita	Percentile rank of GDP per capita in USD at market exchange rates across all Fitch-rated sovereigns	56.5
Share in world GDP (USD)	Natural logarithm of % share in world GDP in US dollars at market exchange rates	0.2
Years since default	Non-linear function of the time since the last default; the indicator is zero if there has been no default after 1980. For each year that elapses, the impact on the model output declines.	-
Log Broad money supply	Natural logarithm of broad money (% of GDP)	4.1
Macroeconomic performance	Description of variable	
Real GDP growth volatility	Natural logarithm of the trailing 10-year standard deviation of average annual change in real GDP	2.9
Consumer price index	Three-year centred average of the average annual % change in consumer price index (CPI)	1.7
Real GDP growth %	Three-year centred average of the average annual % change in real GDP	3.1
Public finances	Description of variable	
Gross general government debt	Three-year centred average of gross (general) government debt (% of GDP)	72.8
Interest payments	Three-year centred average of gross government interest payments (% of general government revenues)	6.8
General government fiscal balance	Three-year centred average of general government (budget) balance (% of GDP)	-2.1
Public foreign-currency debt	Three-year centred average of public foreign-currency-denominated (and indexed) debt (% of general government debt)	23.5
External finances	Description of variable	
Reserve currency flexibility	Reserve currency flexibility based on the natural logarithm of the share of that country's currency in global foreign-exchange reserve portfolios (plus a technical constant), as reported by the IMF in its COFER database (updated quarterly with a four-month lag)	-
Sovereign net foreign assets	Three-year centred average of sovereign net foreign assets (% of GDP)	2.5
Commodity dependence	Non-manufactured merchandise exports as a share of current account receipts (CXR)	10.0
Official international reserves for non-reserve currency sovereigns	Year-end stock of international reserves (including gold) expressed as months' cover of import payments	2.6
External interest service	Three-year average (centred on current year) of external interest service expressed as a share of CXR (current account receipts)	4.3
Current account balance plus net foreign direct investment	Three-year centred average of current account balance (CAB) plus net FDI (% of GDP)	5.1

Source: Fitch, 2017: 29

In the case of each chosen key driver, we examine the effect of one- and two-dimensional, *ceteris paribus*, permanent shocks in their value. In a one- and two-dimensional sensitivity analysis, only one or two key drivers are shocked at the same time. *Ceteris paribus* means "all other things held constant"; hence, we assume that the shift(s) in the given (one or two) key driver(s) occur without a change in any other variables. This approach helps us to identify the clear, direct mechanisms by which these variables influence the rating. The term permanent means that the shocks hit each year considered for the rating. So, for example, when altering the GDP, those rating variables that include either last year's GDP or its three-year average are shocked by the same amount.

THE EFFECTS OF THE KEY DRIVERS

Though we analyse *ceteris paribus* effects, it is easy to see that changing a given key driver may influence more variables in the rating mechanism. Next, we detail the spillover effects of changing a given key driver.

GDP

We assume that the GDP changes by a given *percentage*. Let us denote this by *g*. Modifying the GDP affects eight rating variables, in the following way.

The rating variables *gross general government debt*, *general government fiscal balance* and s*overeign net foreign assets* are expressed as a percentage of the GDP. When shocking the GDP with *g*, the previous value of these variables is divided by (1+*g*).

The *current account balance plus net foreign direct investment* variable is also used in the rating mechanism as a percentage of the GDP, so we divide this variable by (1+*g*) as well. However, since the current account is a component of the GDP, it is not trivial how the *ceteris paribus* logic works here. We decided to interpret *g* as some growth in the GDP that comes from other components than the current account. The main reason behind this – besides simplicity – is that we try to avoid ambiguous assumptions. Should the growth come partly from the current account, we had to estimate its portion in it, and the ratio between CA and FDI as well.

The rating variable *log broad money supply* is the natural logarithm of the money supply per GDP ratio. When the GDP changes by *g*, the term ln(1+*g*) is subtracted from the value of this rating variable.

In case of the rating variable *GDP per capita*, the rating depends on the percentile rank of the country across all Fitch-rated sovereigns. When accounting for this, we assume that the GDP/capita of all these countries remain unchanged and check whether the percentile rank of Hungary altered.

The *real GDP growth* variable is calculated based on the three-year average of annual percentage change in real GDP. Since we assume that the GDP changes by g in all years, this rating variable is modified by adding one-third of g to its value.

Finally, the country's *share in world GDP* is also affected by *g*. With some calculations, one can derive that the *ceteris paribus* connection between the initial and the modified share (*s* and *s'* respectively) is the following:

$$s' = \frac{s*(1+g)}{s*(1+g)+(1-s)} \quad (1)$$

Inflation

In case of inflation, we examine the effects of a given *percentage point* change in all the years relevant for the rating. Let us denote this change by *p*. This change will have an impact on two rating variables; we add it to the *consumer price index* and subtract it from the *real GDP growth*. This means that we ignore the possible difference between the CPI and the GDP-deflator.

Money supply

We shock the money supply by a given *percentage* change, which is denoted by *m*. As a consequence, ln(1+*m)* is added to the *log broad money supply* rating variable, while the others are left unchanged.

Gross government debt

The key driver *gross government debt* will be shocked in all the relevant years by a percentage change, denoted by *d*. This shock will modify three rating variables.

The *gross general government debt* and the *interest payments* variables are multiplied by (1+*d*). Hence, we assume that the change in the debt amount does not influence the average interest rate.

Here *ceteris paribus* should be interpreted in the following way: the change in the debt stock does not influence its structure; therefore, the proportion of the foreign currency government debt is unchanged. This means that the *external interest service* rating variable is multiplied by (1+*d*) as well.

Foreign currency government debt

We examine the impacts of a given *percentage point* change in the *foreign currency government debt* ratio, while the amount of the total debt and, consequently, the total interest payment is unchanged. (For simplicity, we do not account for any possible difference in the interest rates paid on domestic and foreign currency debt.) We denote the shock by *fd*.

This change affects the *public foreign currency debt*, so we add *fd* to this rating variable. Furthermore, the *external interest service* variable is also modified by the change, and thus it is multiplied by (1+ *fd* / *f*), where *f* is the original foreign currency debt ratio.

The relationship between the key drivers and the rating variables is illustrated in Figure 1.

ONE-DIMENSIONAL CETERIS PARIBUS EFFECTS

Our first results are shown in Table 6, which presents the extent to which key drivers can influence the rating in the *ceteris paribus* case. From a mathematical point of view, *ceteris paribus* shifts given by *g*, *d* and *p* can lead to an upgrade by one category. However, from the point of view economics, neither a 56 per cent decrease in government debt nor a decrease in the inflation which would be identical to a deflation of 4.5-5.4 per cent on a three-year basis is a realistic scenario. As a benchmark to our results, minimum, maximum and average yearly changes of key drivers are also presented in Table 6. Also, a downgrade to rating BB+ can be explained by *ceteris paribus* changes in GDP, inflation, broad money supply and gross government debt, but in this case, *ceteris paribus* scenarios are more realistic for the GDP and the inflation than in the opposite direction. Based on our calculations, only changes in GDP and inflation would move the rating down to default category (CCC-D). The highest rating possible (AAA) could be calculated at a level of 71.5-72.4 per cent deflation. Overall, we found that the calibration of the SRM model allows quite large *ceteris paribus* effects of some key variables (GDP and inflation), but also considering the economic background, the ratings are robust to one-sided effects without structural changes and movements of other macro indicators.

TWO-DIMENSIONAL CETERIS PARIBUS EFFECTS

As the third step of our analysis, we identify how simultaneous movements of two key variables would influence the rating. We examined all the possible combinations but we only present those that were considered as the most relevant: the gross government debt-GDP, the gross government debt-foreign currency debt/gross government debt and the inflation-broad money supply pairs.

In all three cases, our results relate to changes form the initial levels described in Tables 4, 5 and 7. Thus, our conclusions are state dependent. When substituting the initial status into the SRM model, it leads to a score of 6.693, while the interval from 6.5 to 7.5 belongs to the rating level BBB-. (See Table 3 for details.) That means that our score is in the lower third of the rating range.

Table 3: Ratings and the related SRM scores of Fitch

Long term foreign currency rating	SRM score	Long term foreign currency rating	SRM score
AAA	16	**BBB−**	**7**
AA+	15	BB+	6
AA	14	BB	5
AA−	13	BB−	4
A+	12	B+	3
A	11	B	2
A−	10	B−	1
BBB+	9	CCC-D	0
BBB	8		

Source: Fitch, 2017: 7

Gross government debt – Public foreign currency government debt/Gross government debt

The model seems to show little sensitivity to the decrease of the foreign currency debt ratio. Even if the foreign currency denominated debt would be repaid entirely, the current level of the general government debt would still need to be halved for a potential one-notch upgrade. Nevertheless, an increase in the ratio and the volume of the foreign currency debt could put a downward pressure on the rating.

If the general government debt was to stay constant, even a 4 per cent increase in the foreign currency debt could result in a downgrade. On the other hand, a 20 per cent increase in the general government debt and a stagnation or a decrease of 15 per cent in the foreign currency debt would trigger a downgrade. Apparently, the smaller the indebtedness of the sovereign, the more the SRM tolerates a larger foreign currency ratio.

The country's current position is far from being symmetric: while an increase of 14 per cent in the total debt may lead to the worsening of the rating, an improvement of 56 per cent is necessary for improvement.

To summarise, now that the grade BBB- has been achieved, larger debt burdens could easily trigger a downgrade on their own, while the management of these two variables cannot lead to any further improvement under realistic scenarios.

Table 4. Cross-table gross debt vs. foreign currency debt

BBB-		Foreign currency gov.debt/gross gov.debt						
		-0,3	-0,2	-0,1	0	0,1	0,2	0,3
Gross government debt	-0,6	BBB	BBB	BBB	BBB	BBB	BBB-	BBB-
	-0,5	BBB	BBB	BBB-	BBB-	BBB-	BBB-	BBB-
	-0,4	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-
	-0,3	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-
	-0,2	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-
	-0,1	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-
	0	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-
	0,1	BBB-	BBB-	BBB-	BBB-	BB+	BB+	BB+
	0,2	BBB-	BBB-	BB+	BB+	BB+	BB+	BB+
	0,3	BB+	BB+	BB+	BB+	BB+	BB+	BB+
	0,4	BB+	BB+	BB+	BB+	BB+	BB+	BB+
	0,5	BB+	BB+	BB+	BB+	BB+	BB+	BB+

Table 5. Cross-table money supply vs. inflation

BBB-		Inflation						
		-0,05	-0,03	-0,01	0	0,01	0,02	0,04
Broad money supply	-0,4	BBB-	BBB-	BBB-	BBB-	BB+	BB+	BB+
	-0,35	BBB-	BBB-	BBB-	BBB-	BB+	BB+	BB+
	-0,3	BBB-	BBB-	BBB-	BBB-	BB+	BB+	BB+
	-0,25	BBB-	BBB-	BBB-	BBB-	BB+	BB+	BB+
	-0,2	BBB-	BBB-	BBB-	BBB-	BBB-	BB+	BB+
	-0,15	BBB-	BBB-	BBB-	BBB-	BBB-	BB+	BB+
	-0,1	BBB-	BBB-	BBB-	BBB-	BBB-	BB+	BB+
	-0,05	BBB-	BBB-	BBB-	BBB-	BBB-	BB+	BB+
	0	BBB-	BBB-	BBB-	BBB-	BBB-	BB+	BB+
	0,05	BBB-	BBB-	BBB-	BBB-	BBB-	BB+	BB+
	0,1	BBB-	BBB-	BBB-	BBB-	BBB-	BB+	BB+
	0,15	BBB-	BBB-	BBB-	BBB-	BBB-	BB+	BB+
	0,2	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BB+
	0,25	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BB+
	0,3	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BB+
	0,35	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BB+
	0,4	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BB+

Inflation - Broad money supply

The first result of the two-dimensional sensitivity analysis (Table 5) is that given the initial level of inflation (1.7 per cent) the rating is not sensitive to further decrease of the ratio. Even some decline in broad money supply would be tolerated. An interesting phenomenon is that the model does not punish deflation itself. Also, a significant drop in M parallel with deflation seems to be indifferent: when inflation decreases by 3 or 5 percentage points and the broad money supply by 50 per cent, the rating remains unchanged.

At the same time, even a single percentage point increase in inflation significantly restricts M from helping to avoid a downgrade.

A possible interpretation of the latter finding is that Hungary at the given date had just enough level of broad money supply to avoid a downgrade. The theoretical background of the inflation-broad money supply relationship is the Fisher equation of exchange. (see equation 2), where M stands for money supply, P for the price level, Y for national output and V for the velocity of circulation.

$$PY=MV \quad (2)$$

This core concept of Quantity Theory of Money initially used T (transactions) instead of national output, but transactions are difficult to measure. Hence the broad money supply over GDP ratio equals the reciprocal of the velocity of circulation.

Considering this concept and recalling that GDP is constant due to the *ceteris paribus* setting, we see that assuming a moderate change in inflation and M, policymakers have some room in all directions from our initial state.

Gross government debt - GDP

Our results indicate that at the current level of the gross general government debt/GDP ratio, even if a moderate decrease in GDP occurred, it could be offset by a larger decrease in gross government debt, leaving our rating unchanged. However, even a constant debt over GDP ratio would not be sufficient to maintain the rating during a recession. For example, a 10 per cent drop in GDP could eliminate the effects of a less significant decrease in the debt ratio. The bottom right side of the cross-table shows an interesting result: a 12 per cent increase in GDP coupled with a 20 per cent higher than the current gross government debt triggers an upgrade of the rating. This means that the SRM favours growing economies, even if the growth is financed through a debt level higher than our input data.

CONCLUSIONS

Owing to regulatory efforts, credit rating agencies have made their decision-making processes more transparent and published more detailed methodologies than before. This allowed us to reconstruct the model calculation of Fitch. After finding that our model calculations for the Hungarian sovereign rating returned the same result as the one maintained by the agency, we performed sensitivity analyses to identify possible development paths for the Hungarian economic policymakers. Based on our results, assuming realistic macro trends and conditions, it was hardly possible for the country to improve its credit rating further based on the data available at the date of Fitch's report (data from 2017). While even small deteriorations in certain variables may lead to a downgrade of the rating, the results suggest that only boosting economic growth through increasing public debt may offer a way upwards. However, such an action would not only be hazardous, but may also lead to worsening in factors not considered in the given two-dimensional analysis, e.g. inflation. These negative trends may even eliminate the ones having positive effects on the rating, and navigate the country into a worse economic status. A possible direction of further research could be to use the model for seeking development opportunities in other countries. Such analyses may help us to improve our model and clarify whether the model of Fitch is fair with emerging economies.

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Table 6: One-dimensional *ceteris paribus* constraints

Variable	Rating				Yearly changes (2000-2017)		
	CCC-D	BB+	BBB	AAA	Average	Maximum	Minimum
GDP (%)	-68%	-4%	14%	-	6.90%	15.50%	-2.80%
Broad money supply	-	-51%	-	-	10.30%	22.20%	-4.60%
Inflation rate (%point)	52%	2%	-7%	74%	-0.42%	4.03%	-3.92%
Gross government debt (%)	-	14%	-56%	-	7.50%	25.10%	-7.90%
Foreign currency gov. debt / Gross gov. debt (%)	-	-	-	-	-0.40%	8.87%	-8.65%

Source: Statistics of World Bank, Eurostat, Government Debt Management Agency

Figure 1: The relationship between key drivers and rating variables

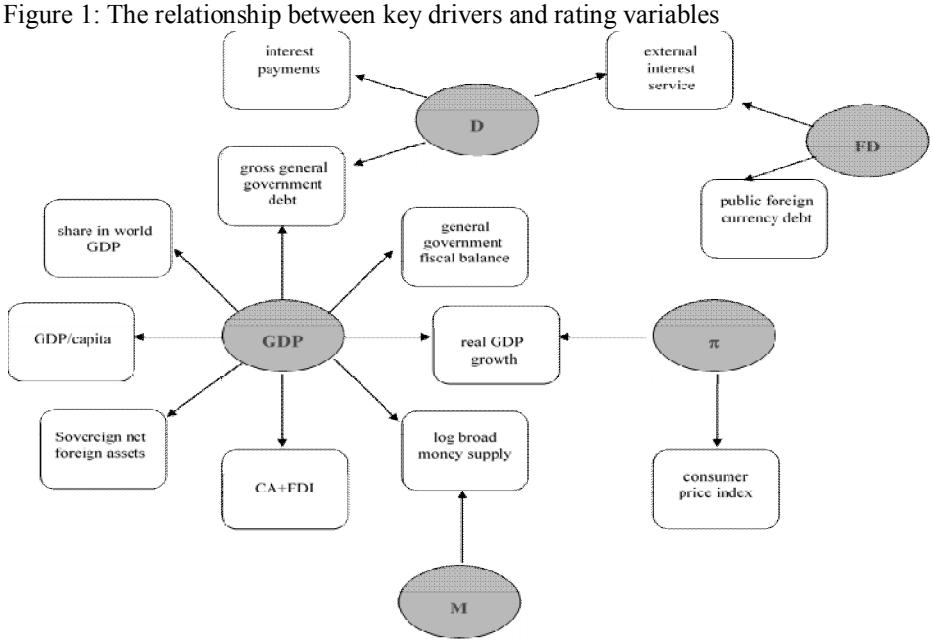

Table 7: Cross-table Gross government debt vs. GDP

BBB-		Gross government debt												
		-0.15	-0.1	-0.08	-0.06	-0.04	-0.02	0	0.02	0.04	0.06	0.08	0.1	0.15
GDP	-0.15	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+
	-0.1	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+
	-0.08	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+
	-0.06	BBB-	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+
	-0.04	BBB-	BBB-	BBB-	BBB-	BBB-	BB+	BB+	BB+	BB+	BB+	BB+	BB+	BB+
	-0.02	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BB+	BB+	BB+	BB+
	0	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BB+
	0.02	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-
	0.04	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-
	0.06	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-
	0.08	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-
	0.1	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-	BBB-
	0.15	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB	BBB-	BBB-	BBB-	BBB-