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DETERMINANTS OF SOVEREIGN CREDIT RATINGS – EXAMPLE OF LATVIA

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Abstract. Countries can borrow from foreign and domestic creditors by issuing bonds, but two countries will rarely pay the same interest, even if they are similar. The usual explanation is that investors demand an additional risk premium, so long-term interest rates vary because countries are perceived to have different probabilities of default or different credit risk.

The paper investigates the determinants of sovereign credit risk ratings of Latvia from 1997 to 2012 assigned by the three leading credit rating agencies, Moody's Investment Service, Fitch and Standard and Poor's. Conducted analysis of sovereign credit ratings, by using first, an alignment and transformation of the rating scales into values and second, ordinary least squares regression, indicates key rating determinants. From the initial number of variables that can be used according to previous studies on the topic, GDP growth rate and unemployment are used in the model to explain actual credit ratings of Latvia in 1997-2012 and predict future ones in 2013-2014. According to the model, long-term foreign currency rating of Latvia is predicted to improve by the end of 2014 from currently assigned rating levels by two notches either by a single credit rating agency or by one notch by two rating agencies, but still being in the lower medium grade category.

Collected data on the changes of the Latvia's credit ratings can be used to forecast the sovereign borrowing costs of Latvia, after joining to euro-zone.

Key words: *credit rating, sovereign debt, GDP, unemployment*

JEL code: C41, H30

Introduction

Countries can borrow from foreign and domestic creditors by issuing (often, but not always, long-term) bonds, but no two countries pay the same interest, even if they are economically and politically similar. Conversely, countries with different historical experiences and unequal macroeconomic conditions sometimes borrow at similar rates. The usual explanation is that investors demand payment for additional risk, so long- term interest rates vary because countries have different probabilities of default or different credit risk. This paper investigates the determinants of country risk premiums, which usually are measured by sovereign credit risk ratings (Zilinsky J., 2009).

The relevance of rating the creditworthiness of sovereign borrowers arises from the fact that national governments are by far the largest issuers on capital markets and also because those country ratings are seen as a ceiling to public and private sector issues.

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This paper studies the factors that seem to play an important role in determining sovereign debt rating. For that purpose, we collected information concerning several quantitative variables for Latvia and also the ratings assigned to those countries by Standard & Poor's, Fitch and Moody's from 1997 till 2012. With this sectional sample an attempt is made to replicate the effective ratings given by those 3 agencies. This is done using both a linear and a logistic transformation of the rating levels.

The purpose of the research presented in the paper is to understand, which variables appear to be the most relevant to determine a Latvia's credit rating and forecast possible credit ratings for 2013-2014.

The authors of the paper define the following objectives to achieve the purpose of the study: (1) To understand the determinants of country's credit rating; (2) To test ratings determinants against Latvian actual ratings; (3) To identify possible development of Latvian credit ratings in 2013-2014.

To achieve the purpose of the research the authors used a systematic, logical and comparative analysis, analysis of statistical data and generalization as well as ordinary least squares regression.

The paper consists of 3 sections. Section 1 focuses on the background of the research – other research findings and conclusions. Section 2 deals with the case study of Latvia, its credit ratings determinants and it further development. Section 3 presents the conclusions.

1. Background of the research

Different authors have approached this question of credit ratings determinants in different ways. For instance, Edwards (1984), Cline (1995), and Cline and Barnes (1997) find that domestic variables such as GDP growth and export growth are significant determinants of country spreads in developing countries. Other studies have documented that higher credit ratings translate into lower country spreads (Cantor and Packer, 1996; Eichengreen and Mody, 2000). In turn, credit ratings have been found to respond strongly to domestic macroeconomic conditions. For example, Cantor and Packer (1996) estimate that about 80% of variations in credit ratings are explained by variations in per capita income, external debt burden, inflationary experience, default history, and the level of economic development. Cantor and Packer conclude, based on their own work and the related literature extant, that there exists significant information content of macroeconomic indicators in the pricing of sovereign risk.

On the other extreme of the spectrum, a number of authors have assumed that country spreads are exogenous to domestic conditions in emerging countries. For instance, Neumeyer and Perri (2001) assume that the country spread and the US interest rate follow a bi-variate, first-order, autoregressive process. They find that interest rate shocks explain 50% of output fluctuations in Argentina, and conclude, more generally, that interest rate shocks are an important factor for explaining business cycles in emerging countries.

Another important issue in understanding the macroeconomic effects of movements in country interest rates in emerging economies is the role of world interest rates. Understanding the contribution of world interest rate shocks to aggregate fluctuations in developing countries is complicated by the fact that country interest rates do not respond one-for-one to movements in the world interest rate. In other words, emerging country spreads respond to changes in the world interest rate. This fact has been documented in a number of studies (some of which are referenced above).

Economists R.Cantor (1996) and F.Packer (1996) presented the first systematic analysis of the determinants and impact of the sovereign credit ratings assigned by the two leading U.S. agencies, Moody's Investors Service and Standard and Poor's. Like other credit ratings, sovereign ratings are assessments of the relative likelihood that a borrower will default on its obligations. They find that the ordering of risks they imply is broadly consistent with macroeconomic fundamentals. Of the large number of criteria used by Moody's and Standard and Poor's in their assignment of sovereign ratings, six factors appear to play an important role in determining a country's rating:

1) per capita income;
2) GDP growth;

3) inflation;
4) external debt;
5) level of economic development;
6) default history.

- *Per capita income*. The greater the potential tax base of the borrowing country, the greater the ability of a government to repay debt. This variable can also serve as a proxy for the level of political stability and other important factors.
- *GDP growth*. A relatively high rate of economic growth suggests that a country's existing debt burden will become easier to service over time.
- *Inflation*. A high rate of inflation points to structural problems in the government's finances. When a government appears unable or unwilling to pay for current budgetary expenses through taxes or debt issuance, it must resort to inflationary money finance. Public dissatisfaction with inflation may in turn lead to political instability.
- *External debt*. A higher debt burden should correspond to a higher risk of default. The weight of the burden increases as a country's foreign currency debt rises relative to its foreign currency earnings (exports).
- *Economic development*. Although level of development is already measured by our per capita income variable, the rating agencies appear to factor a threshold effect into the relationship between economic development and risk. That is, once countries reach a certain income or level of development, they may be less likely to default. They proxy for this minimum income or development level with a simple indicator variable noting whether or not a country is classified as industrialized by the International Monetary Fund.
- *Default history*. Other things being equal, a country that has defaulted on debt in the recent past is widely perceived as a high credit risk. Both theoretical considerations of the role of reputation in sovereign debt (Eaton 1996) and related empirical evidence indicate that defaulting sovereigns suffer a severe decline in their standing with creditors (Ozler 1991). They factor in credit reputation by using an indicator variable that notes whether or not a country has defaulted on its international bank debt since 1970.

More surprising, however, is the lack of a clear correlation between ratings and fiscal and external balances. This finding may reflect endogeneity in both fiscal policy and international capital flows: countries trying to improve their credit standings may opt for more conservative fiscal policies, and the supply of international capital may be restricted for some low-rated countries.

Portugal economist A.Afonso (2002) studied the factors that seem to play an important role in determining sovereign debt rating. For that purpose he collected information concerning several quantitative and qualitative variables for a universe of 81 developed and developing countries, and also the ratings assigned to those countries by Standard & Poor's and Moody's in June 2001. The rating classification of sovereign public debt is, somehow, an assessment of the economic, financial and political situation of an economy, giving also a measure of the country development.

To assess the credit risk of governments is not an easy task. One must take into account both solvency facts and aspects such as the stability of the political system, social cohesion and the degree of interdependence with international economic and financial systems.

After a first analysis, the following variables were selected:

1) per capita GDP;
2) inflation rate;
3) GDP real growth rate;
4) development indicator;
5) default indicator;
6) external debt-exports ratio (this variable is only relevant for developing countries);
7) government deficit as a percentage of GDP.

GDP per capita is supposedly a measure of the country development and can be seen as an indicator of the tax basis available in the economy. Therefore, the bigger GDP per capita the more likely is the attribution of a higher rating level. Regarding inflation everyone should expect to see a negative relation between the level of the rating and inflation rate. Economy real growth should positively correlated with the rating levels. The degree of development is an indicators which has one of the highest correlations with the rating level, around 0.85 for the country sample used in A.Afonso (2002) research. Obviously, a history of partial or total defaults ends up being penalized with lower rating levels. A country where external debt-to-export ratio is high is more likely to be adversely affected by changes in the terms of trade or a decrease in foreign demand. Budget surpluses should be positively correlated with higher ratings, but the model without the budget balance variable and with GDP real growth rate seem to be statistically more adequate. A.Afonso study finalized with the finding, that the variables that seem to have statistically significant explanatory power for the rating levels are: GDP per capita, external debt as a percentage of exports, the level of economic development, default history, real growth rate and the inflation rate.

2. Research

2.1. Current rating systems

The conventional opinion is that there are three leading and worldwide recognized rating agencies- Moody's Investment Service, Standard and Poor's and Fitch.

Table 1

Alignment and Transformation of Rating Variables

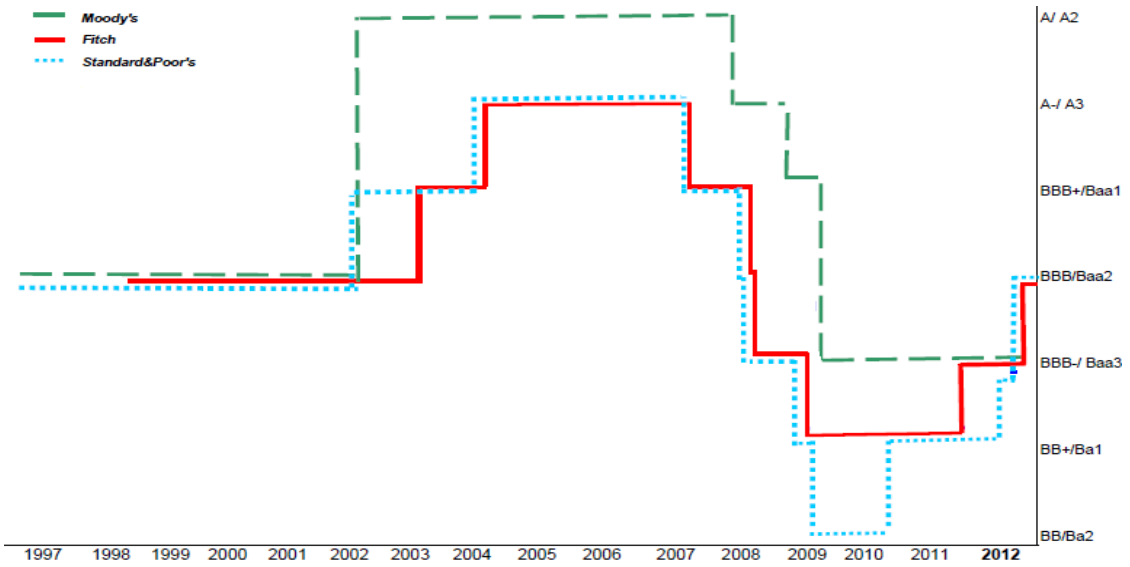
Moody's	S&P	Fitch	Explanation	Rank
Aaa	AAA	AAA	Prime	1
Aa1	AA+	AA+	High grade	2
Aa2	AA	AA		3
Aa3	AA-	AA-		4
A1	A+	A+	Upper medium grade	5
A2	A	A		6
A3	A-	A-		7
Baa1	BBB+	BBB+	Lower medium grade	8
Baa2	BBB	BBB		9
Baa3	BBB-	BBB-		10
Ba1	BB+	BB+	Non-investment grade	11
Ba2	BB	BB	Speculative	12
Ba3	BB-	BB-		13
B1	B+	B+	Highly speculative	14
B2	B	B		15
B3	B-	B-		16
Caa1	CCC+	CCC	Substantial risks	17
Caa2	CCC		Extremely speculative	18
Caa3	CCC-		In default with little prospects for recovery	19
Ca	CC			20
	C			21
C	C	DDD	In default	22

Source: Standard & Poor's, Moody's Investment Service and Fitch Rating Agency

Their role and credibility has been discussed a lot in the light of the recent financial crisis, when a number of top-rated financial institutions failed to meet their debt obligations. In their recent paper, McClintock Ekins and Calabria (2012) argue that the financial markets would have been better served during the financial crisis 2007-2009, if the credit rating agency industry had been more competitive. In fact, there is an oligopoly among credit rating agencies, which, according to the above-mentioned article, was caused by the regulatory framework and will stay till major reforms are implemented. Therefore, for the purpose of this study long-term foreign currency rating variables assigned by three leading rating agencies Moody's Investment Service, Standard and Poor's and Fitch are going to be assessed. To enable further analysis of factors impacting rating variables, they are aligned and transformed into numbers, which are shown in the Table 1.

2.2. Latvian economy and credit ratings

The Republic of Latvia has a track record of credit ratings assigned by the international rating agencies since 1997. Its fast economic development started in 2004, which can be explained by a membership in the European Union. In particular, there was a spectacular growth of foreign trade volumes facilitated by the trade integration while financial integration boosted capital inflows into the country. During 2004-2008 Latvia experienced acceleration of the economic growth, which, unfortunately also created substantial imbalances. For instance, debt driven investments outpaced savings, which contributed to a growth of an external debt to unsustainable levels. Also current account deficit rose sharply and inflation accelerated. In 2008-2009 Latvia faced a major economic crisis, which was caused by both fall of the internal consumption and decrease of the external demand. Even though major economic imbalances were corrected as a result of the crisis, it caused a massive contraction of the GDP and pushed Latvia to engange into the international financial aid programme. During the period from 1997 to 2012 Latvia has gone through both an economic boom and hard lending, which also had a substantial impact on country's credit rating variables (Figure 1).



Source: Author's construction based on State Treasury of the Republic of Latvia on 2012.12.25 (http://www.kase.gov.lv)

Fig. 1. **Long Term Foreign Currency Rating Developments of Latvia**

In 2010 Latvia returned to an economic growth and managed to put its fiscal balance under control. Thus it regained trust from the financial markets and started to enjoy credit rating upgrades. In 2012 Latvia had similar credit ratings as back in 1997 (except one assigned by Moody's, which was one notch higher than in 2012), however at much stronger levels of macroeconomic indicators and positive growth prospects.

2.3. Credit rating determinants

Following macroeconomic indicators are being analysed for the purpose of the study of the country's long term credit rating in foreign currency: GDP per capita; inflation rate; GDP real growth rate; development indicator; default indicator; external debt-exports ratio; government deficit as a percentage of GDP. The impact of these indicators on country's long-term credit rating in foreign currency is assessed by using the ordinary least squares regression:

$$RATING_i = \alpha_0 + \alpha_1 GDPPC_i + \alpha_2 INFL_i + \alpha_3 GDPGR_i + \alpha_4 DEVELOP_i + \alpha_5 DEBTX_i + \alpha_6 DEF_i + \\ + \alpha_7 BUDGET_i \quad (1)$$

where:
RATING – quantitative variable, obtained by the ordinary least squares regression,
GDPPC – GDP per capita,
INFL – inflation rate,
GDPGR – real GDP growth rate,
DEVELOP – indicator of developed country ={0, developing country; 1, developed country},
DEBTX – external debt-to-exports ratio,
DEF – indicator of default ={0, without default; 1, with default}
BUDGET – budget balance as a percentage of GDP.

2.4. Estimates for Latvia

To assess the impact of macroeconomic indicators on Latvia's long-term credit rating in foreign currency, average long term foreign currency credit rating is calculated by assigning equal weighs to corresponding rating variables of S&P, Moody's and Fitch from 1997 to 2012 in accordance to ranking in the Table 1 – Alignment and Transformation of Rating Variables. Provided that Latvia in the period from 1997 to 2012 has been classified as a developing country and has no default history, both the indicator of a developed country and indicator of default are not included into the ordinary least squares regression model of Latvia's average credit rating variables. Thus, the initial equation for the Latvia's average long-term credit rating variables in foreign currency is stated as:

$$RATING_i = \alpha_0 + \alpha_1 GDPPC_i + \alpha_2 INFL_i + \alpha_3 GDPGR_i + \alpha_4 DEBTX_i + \alpha_5 BUDGET_i \quad (2)$$

where:
RATING – quantitative variable, obtained by the ordinary least squares regression,
GDPPC – GDP per capita,
INFL – inflation rate,
GDPGR – real GDP growth rate,
DEBTX – external debt-to-exports ratio,
BUDGET – budget balance as a percentage of GDP.

The estimation of equation is stated in the Table 2.

Table 2

Estimation of Equation of Average Long Term Foreign Currency Rating Variables of Latvia

	Coefficient	Std. Error	t-ratio	p-value	Sign.
Const	8.4572	0.808681	10.4580	<0.00001	99%
GDPPC	0.000417383	0.000116522	3.5820	0.00500	99%
GDPGR	-0.0690874	0.0585097	-1.1808	0.26501	-
INFL	0.0615455	0.0725816	0.8479	0.41630	-
BUDGET	-0.403843	0.189781	-2.1279	0.05923	90%
DEBTX	-2.47759	0.532941	-4.6489	0.00091	99%

R-squared	0.873061	Adjusted R-squared	0.809591

Source: Author's calculations

The estimation provides to some extent contradictory results because, according to the equation, higher GDP per capita contributes to a weaker credit rating while higher external debt-to-exports ratio improves credit rating. Both are in conflict with the common logic, which assumes that higher GDP per capita should improve credit rating because of more space for austerity measures, if needed, while higher external debt-to-exports ratio should mean lesser ability of a country to meet its foreign debt obligations. Other findings are considered to be logical – higher GDP growth and fiscal surplus improves credit rating while inflation has a negative impact on it. It is important to note that there are sixteen observations (1997-2012) while the given equation has six variables, including a constant. In order to make an equation statistically more reliable, only two variables and a constant will be assessed in further analyses. Furthermore, two more variables are included for the purpose of the analysis:

1. Unemployment (UNEMPL). For instance, studies by Bayoumi et al. (1995) suggest a positive correlation between the unemployment rate and the credit spreads of US public debt;
2. External Government Debt to Exports Ratio (GDEBTX). Study by Kumhof et al. (2004) provides valuable insights into importance of the external government debt especially for developing countries.

Thus, Latvia's average long-term credit rating variables in foreign currency are assessed by choosing two variables from the list below, which produce an ordinary least squares regression with the highest explanatory power:
RATING – quantitative variable, obtained by the ordinary least squares regression,
GDPPC – GDP per capita,
INFL – inflation rate,
GDPGR – real GDP growth rate,
DEBTX – external debt-to-exports ratio,
BUDGET – budget balance as a percentage of GDP,
UNEMPL – unemployment,
GDEBTX – external government debt-to-exports ratio.

The equation below proved to provide the highest explanatory power for the Latvia's average long-term credit rating variables in foreign currency:

$$RATING_i = 6.04 - 0.0863495 * GDPGR_i + 0.236117 * UNEMPL_i \quad (3)$$

Statistical indicators for the equation are summarized in the Table 3.

Table 3

Equation of Impact of GDP Growth and Unemployment of Average Long Term Foreign Currency Rating Variables of Latvia

	Coefficient	Std. Error	t-ratio	p-value	Sign.
const	6.04027	0.669013	9.0286	<0.00001	99%
GDPGR	-0.0863495	0.0252577	-3.4187	0.00457	99%
UNEMPL	0.236117	0.0470762	5.0156	0.00024	99%

R-squared	0.831289	Adjusted R-squared	0.805333

Source: Author's calculations

All variables of the equation are statistically significant at 99% confidence level while adjusted R-squared coefficient is 0.805. The equation says that a GDP growth of 1% point per year improves an average credit rating by 0.086 units (according to the ranking in the Table 1 – Long Term Foreign Currency Rating Developments of Latvia.) while 1% point increase in unemployment makes an average credit rating worse by 0.236 units according to the same table. The constant variable of 6.04 places Latvia at the single "A" rating category (upper medium grade), provided that both GDP growth and unemployment are zero value or compensate each other. The equation logic and its variables make a clear economic sense because both GDP growth and unemployment have a direct impact on tax collections while tax collections for Latvia have been the main source of state revenues and thus constitute a capability to meet government liabilities, including its foreign currency denominated debt.

2.5. Constructing the rating curve

The regression equation (3) obtained in the previous section enables us to model the average credit rating variables for Latvia for 2013 and 2014 provided that there are estimates for the unemployment and GDP growth. Macroindicator forecasts are summarized in the Table 4.

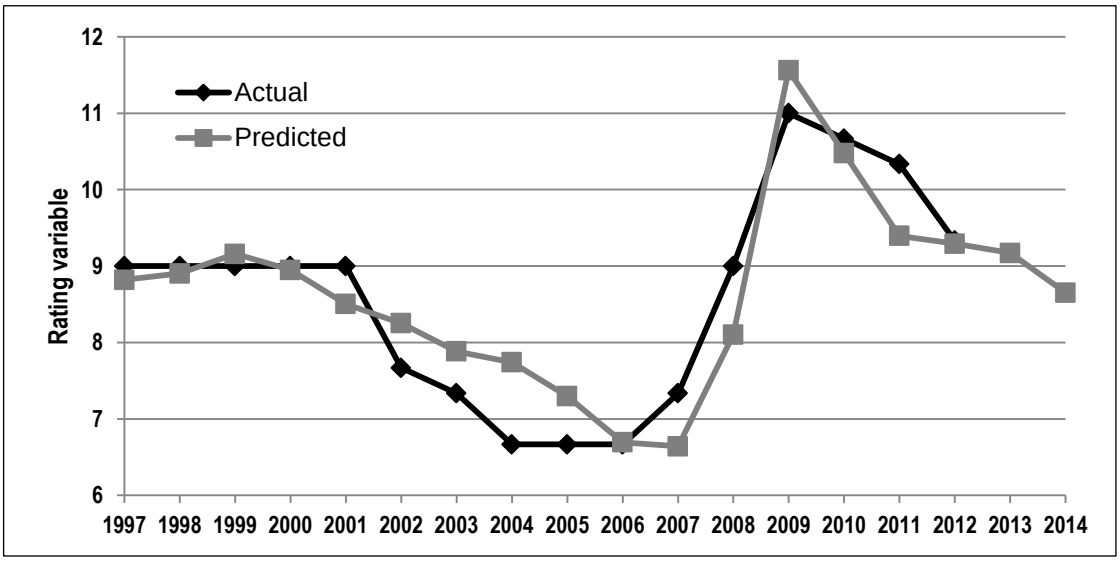
Table 4

Macro Indicator Forecasts for 2013 and 2014

Source of Estimate	GDP Growth		Unemployment	
	2013	2014	2013	2014
Nordea Bank AB	2.50%	3.90%	14.50%	12.80%
DNB Bank ASA	3.00%	3.00%	12.00%	9.50%
Citadele Bank AS	1.50%	3.00%	17.00%	15.50%
Swedbank AB	3.50%	5.20%	13.70%	11.50%
Ministry of Finance (LR)	3.70%	4.00%	14.30%	13.00%
Average	2.84%	3.82%	14.30%	12.46%

Source: Author's calculations based on forecasts of these credit institutions

By using the regression equation (3), Latvia's average long-term credit rating variables in foreign currency are calculated and compared to actual ones on the figure 2.



Source: Author's construction

Fig. 2. **Actual vs. Predicted Average Credit Rating of Latvia 1997-2013**

According to the regression equation (3) and data from macro indicator forecasts from the Table 4, predicted average long-term foreign currency rating of Latvia is estimated at 9.17 in 2013 and 8,65 in 2014. The difference of 0.68 rating points between the average credit rating in 2012 and predicted one in 2014 translates into credit rating upgrades by two notches by one rating agency in the next two years. Mathematically, the model predicts a 50% chance of one notch credit rating upgrade in 2013 by one rating agency (i.e. placing the average credit rating close to Baa2/BBB or assigning 9.17 points according to the model) while the rest 50% chance is transferred to 2014. In addition, there is 100% chance of one notch credit rating upgrade in 2014 by one rating agency (~ one rating agency upgrades its credit rating to Baa1/BBB+ while two others leave at Baa2/BBB placing the average credit rating still close to Baa2/BBB or assigning 8.65 points according to the model). Despite both recent and predicted rating improvements, the average long-term credit rating in foreign currency of Latvia by the end of 2014 is forecasted to stay within the lower medium investment grade category.

Conclusions

This study aims to figure out determinants of the Latvia's long-term credit rating in foreign currency assigned by three major agencies: Moody's, Fitch and S&P. According to previous studies, such determinants normally are GDP per capita, external debt as a percentage of exports, real growth rate, fiscal deficit, unemployment rate and the inflation rate.

The initial estimation provided to some extent contradictory results because higher GDP per capita contributed to a weaker credit rating while higher external debt-to-exports ratio improved one. The regression was adjusted to an actual number of (smaller in case of Latvia than for other countries) by choosing only two most important variables and a constant in further analyses. The derived equation with a high explanatory power suggested that these two variables are GDP growth and unemployment. Furthermore, the equation stated that GDP growth of 1% point per year improves an average credit rating

by 0.086 units of while 1% point increase in unemployment makes an average credit rating worse by 0.236 units. For instance, assuming a natural unemployment level of 5% and GDP growth of 3%, the equation produces a credit rating variable of 6.96, which puts Latvia into an upper investment grade of A3/A-, which Latvia enjoyed from 2004 till 2007.

According to the equation and based on macro forecasts of leading institutions, long-term foreign currency rating of Latvia is predicted to improve by the end of 2014 from currently assigned BBB-/Baa3 (one agency) and BBB/Baa2 (two agencies) to BBB+/Baa1 (one agency) and BBB/Baa2 (two agencies) while still being in the lower medium grade category. Possible Latvia's joining of Eurozone in 2014 can additionally influence the credit ratings, as it can work-out as an accelerator for all macroeconomic indicators, if this event is not already included in banks economic forecasts for the years 2013-2014.

Future analysis could take into consideration the problem of determining factors with an impact on long-term local currency credit ratings of Latvia. The paper focuses only on the regression equation with two macroeconomic variables, which provides the highest explanatory power. However, it is still can be useful to study other regression equations, which demonstrated lower explanatory power in case of Latvia, by testing them on countries with a low two-digit number years of economic track record. Besides, it is worth attempting to elaborate the regression by smoothening input data in a logical way, for instance, by replacing annual ones by average ones for medium term periods (e.g., three year average rolling inflation instead of one year inflation etc.).

The Latvian case is also interesting because all three major credit rating agencies provided sovereign credit rating coverage for already fifteen years. One of the problems for further researches can be studying the difference in the explanatory power of the regression model if only one of credit rating agencies is taken into account and to what extent adding one more agency improves the explanatory power of the model.

Finally, as we collected data on the changes of the Latvia's credit ratings, we can pursue next research regarding the sovereign borrowing costs of Latvia, based on possible credit rating development, after joining to euro-zone.

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