



MSc. Applied Economics

presentation of

CREDIT RATING AGENCIES AND EUROZONE CRISIS

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Thesis Structure

- ▶ Credit Rating Agencies (CRA) and earlier studies
- ▶ Data
- ▶ Methodology
- ▶ Empirical results
- ▶ Conclusions

Credit Rating Agencies (CRA) and earlier studies

- ▶ Credit rating agencies (CRAs) are private companies of financial interest that offer mainly "independent" consulting and reputable services in the secondary market.
- ▶ Assessing the creditworthiness of the borrowers (individuals, companies, states) as well as the bonds issued by the borrowers provide relevant information in favor of the interested parties in order to make safer financing decisions.
- ▶ Credit rating agencies affect both parts of a credit relationship (both the lender and the borrower). As for the lender, it provides information on the credit risk contained in the alternative investment opportunities and provides the borrower with the necessary information to adjust its internal procedures and activities according to the creditworthiness standards.
- ▶ The most important international credit rating agencies, as we said, are the so-called Big Three, which control about 95% of the ratings. Moody's Investors Service and Standard & Poor's (S&P) control a total of 80% of the global market, while Fitch Ratings controls an additional 15%.

Credit Rating Agencies (CRA) and earlier studies

- ▶ During this crisis, most of the attention has focused on the European countries. The three major credit rating agencies (CRAs), Moody's Investor Services, Standard & Poor's and Fitch Ratings monitored the significant deterioration of public finances post 2008.
- ▶ Many sovereign ratings, particularly for Greece, Ireland, Portugal and Spain became under persistent downgrade pressure, as a result of increased government deficits and debt levels, and weak economic growth.
- ▶ As a result, CRAs came under close scrutiny. Many policymakers and commentators, such as Jose Manuel Barroso (the EU Commission's former President), argue that the role played by CRAs in structured finance exacerbated the crisis.

Credit Rating Agencies (CRA) and earlier studies

Figure 2: Sovereign Rating Grades of Southern European Countries 2002-2019

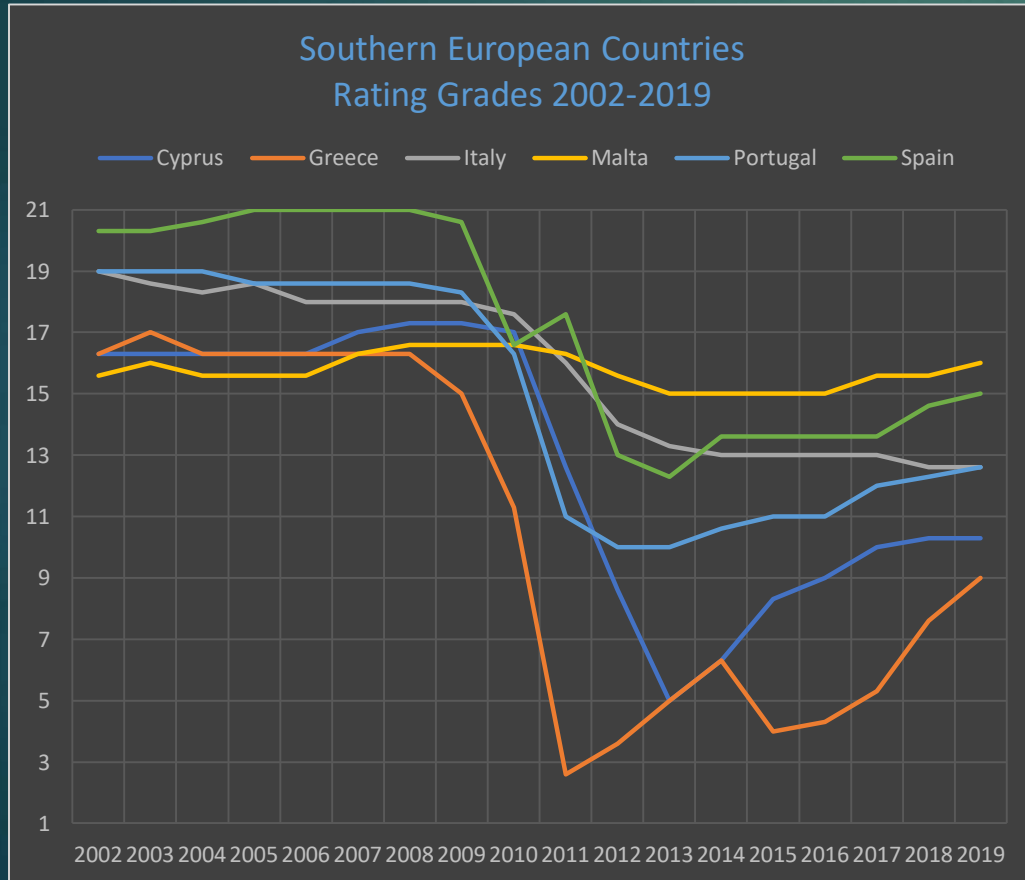
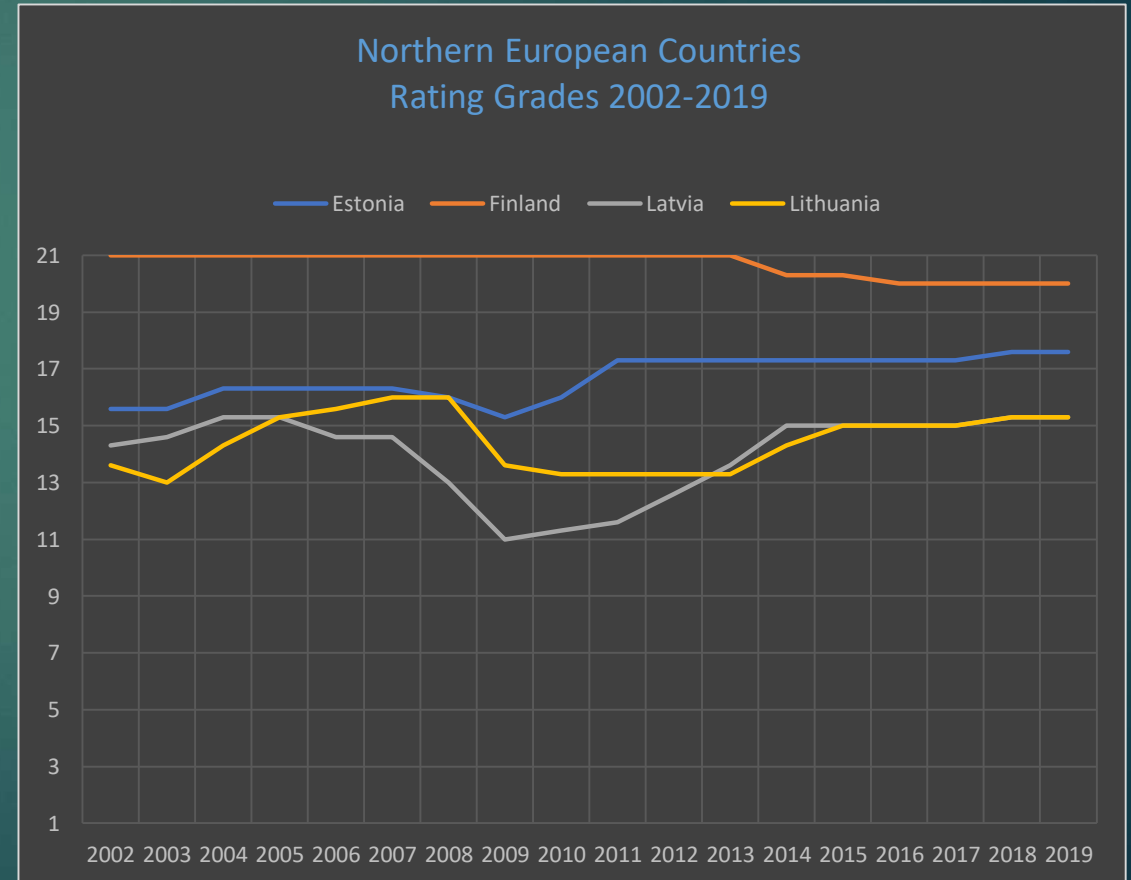


Figure 3: Sovereign Rating Grades of Northern European Countries 2002-2019



Credit Rating Agencies (CRA) and earlier studies

Following the existing literature, we use a set of macroeconomic variables often used in the previous studies, such as:

- ▶ GDP per capita – positive impact: 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. Also, countries high lower GDP per capita may be less able to solve debt service problems by implementing austerity measures. Therefore, the bigger GDP per capita the more likely is the attribution of a higher rating level.
- ▶ GDP growth rate – positive impact: A higher GDP growth rate decreases government debt, as percentage of GDP. Therefore, it suggests the country's ability to service dept becomes easier over time.
- ▶ Government debt – negative impact: The higher the stock of government debt, the higher interest rates should be paid to service it. Therefore, more resources are required. Moreover, a higher government debt corresponds to a higher risk of default.
- ▶ Cumulated current account balance – positive impact: It is the sum of current account surpluses and deficits. It is an alternative measure of external dept. A lower accumulated current account balance (a higher external debt) indicates a higher risk of default.

Credit Rating Agencies (CRA) and earlier studies

- ▶ Unemployment rate – negative impact: A country with lower unemployment has a well-functioning labor market. In addition, the lower is the unemployment, the greater is the number of the people with income. As a result, lower unemployment increases the potential tax base and reduces the fiscal burden for unemployment subsidies.
- ▶ Inflation rate – uncertain impact: Inflation rate has two opposite effects on the existing stock of government debt. On the one hand, an increase of inflation improves the public debt dynamics by reducing the real value of government debt, on the other hand a rise in inflation contributes negatively to the debt dynamics because it makes it necessary for the government to pay higher nominal interest rates.
- ▶ External balance – uncertain impact: On the one hand, a higher external deficit could reflect a country's tendency to over-consume, undermining long-term prosperity. On the other hand, it could signal rapid accumulation of fixed investment, which should lead to higher growth and improved prosperity over the short term.
- ▶ Regulatory Quality – positive impact: A higher value of regulatory quality index reflects the ability of the government to formulate and implement regulations that private sector development and increase investments and as a result of GDP. Moreover, it is qualitative measure of government's willingness to repay its debt.
- ▶ Reserves – positive impact: Total reserves includes gold.

Data

- ▶ Our database includes annual data from 2002 to 2019 for 19 Eurozone countries, such as Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Slovak Republic, Slovenia, Spain (342 observations in total).
- ▶ The data on GDP per capita, external balance, total reserves and regulatory quality are obtained from World Bank Open Data. The data on GDP growth rate, government debt, current account, unemployment rate and inflation rate are obtained from International Monetary Fund.

Data

Table 1: Data definitions

<u>Variable</u>	<u>Description</u>	<u>Source</u>
Fitch rating	Sovereign rating attributed at 31st December of each year	Fitch
S&P rating	Sovereign rating attributed at 31st December of each year	S&P
Moody's rating	Sovereign rating attributed at 31st December of each year	Moody's
GDP per capita	Log GDP per capital, US dollars, constant 2010 prices	World Bank
GDP growth rate	Annual percent change of GDP	IMF WEO
Government debt	General government gross debt as a percent of GDP	IMF WEO
Accumulated current account	Sum of current account balances as a percent of GDP from 1995	IMF WEO
Unemployment rate	Unemployment rate as a percent of total labor force	IMF WEO
Inflation rate	Annual growth rate of Consumer Price Index	IMF WEO
External Balance	External balance on goods and services as a percent of GDP	World Bank
Reserves	Log of total reserves (includes gold, constant 2005 prices)	World Bank
Regulatory Quality	Aggregate Government Indicator	World Bank

Data

- ▶ For the purpose of analysis, it was required to convert the ratings of these agencies into the numeric form.
- ▶ The numeric conversion starts from the lowest level rating as theoretically defined by the three agencies, i.e., 'C', 'SD' and 'DDD' for Moody's, S&P and Fitch respectively. These ratings are equated to 1 and moving on to the highest rating for 'Aaa' (Moody's), 'AAA' (Standard and Poor's) and 'AAA' (Fitch) which would be equivalent to 21.

Data

Table 2: Rating Scales/Grades used by credit rating agencies

	<u>Fitch</u>	<u>Moody's</u>	<u>S&P</u>	<u>Rating grades (1-21)</u>
Highest quality	AAA	AAA	Aaa	21
High quality	AA+	AA+	Aa1	20
	AA	AA	Aa2	19
	AA-	AA-	Aa3	18
Strong payment Capacity	A+	A+	A1	17
	A	A	A2	16
	A-	A-	A3	15
Adequate payment Capacity	BBB+	BBB+	Baa1	14
	BBB	BBB	Baa2	13
	BBB-	BBB-	Baa3	12
Likely to fulfill obligations, ongoing Uncertainty	BB+	BB+	Ba1	11
	BB	BB	Ba2	10
	BB-	BB-	Ba3	9
High credit risk	B+	B+	B1	8
	B	B	B2	7
	B-	B-	B3	6
Very high credit Risk	CCC+	CCC+	Caa1	5
	CCC	CCC	Caa2	4
	CCC-	CCC-	Caa3	3
Non default with possibility of recovery	CC C	CC	Ca	2
Default	DDD DD	SD D	C	

Methodology

- ▶ The general model to estimate is as follows:

$$CRA_{it} = \alpha_0 + \mu_i + \alpha_i * x_{it} + b_{i*j} + c_j * D_{crisis} * x_{jt} + error_{it}$$

- ▶ CRA_i is the dependent variable.
- ▶ x_i includes nine explanatory variables such as GDP per capita, growth rate of GDP, government dept, inflation rate, unemployment rate, current account, external balance, log reserves and regulatory quality.
- ▶ $_i$ includes the cross-section averages (cavg) of these variables.
- ▶ D_{crisis} takes the value of 1 for years 2009 to 2013 and 0 otherwise.
- ▶ Government dept, current account and external balance interact with the crisis dummy.

Methodology

The model is estimated using:

- ▶ **pooled OLS** (ordinary least square) method
- ▶ **fixed effects**
- ▶ **random effects**

The **Perasan cross-sectional independence test** can provide evidence that cross sectional dependence exists in model without the cross-section averages (: cavg). In fact, cross sectional dependence would point to the existence of spill-over effects between the Eurozone countries.

In this way we examine whether CRA have changed their behavior during the crisis

Empirical Results

Table 3: Credit rating models-Fitch

Variable	<u>Pooled OLS</u> Coefficient	Prob.	<u>Fixed Effects</u> Coefficient	Prob.	<u>Random Effects</u> Coefficient	Prob.
Log GDP per capita	7.86E-05	0.0000	-6.18E-05	0.0396	2.33E-05	0.2557
Log GDP per capita cavg	0.000442	0.0278	0.000379	0.0192	0.000311	0.1097
GDP growth rate	0.031967	0.4285	0.023113	0.3175	0.003617	0.8955
GDP growth rate cavg	-0.087890	0.2317	-0.088387	0.0305	-0.072333	0.1418
Government debt	-0.020539	0.0000	-0.060747	0.0000	-0.041189	0.0000
Government debt cavg	-0.167400	0.0723	-0.118230	0.0221	-0.140674	0.0249
Inflation rate	-0.173498	0.0337	-0.185817	0.0001	-0.199556	0.0004
Inflation rate cavg	0.247224	0.1964	0.154414	0.1716	0.187200	0.1733
Unemployment rate	-	0.0000	-	0.0000	-	0.0000

Table 4: Credit rating models-S&P

Variable	<u>Pooled OLS</u> Coefficient	Prob.	<u>Fixed Effects</u> Coefficient	Prob.	<u>Random Effects</u> Coefficient	Prob.
Log GDP per capita	8.52E-05	0.0000	-4.88E-05	0.0899	2.42E-05	0.2312
Log GDP per capita cavg	0.000400	0.0463	0.000342	0.0275	0.000280	0.1185
GDP growth rate	0.029800	0.4597	0.011971	0.5894	-0.004006	0.8748
GDP growth rate cavg	-0.066685	0.3632	-0.066664	0.0887	-0.051791	0.2536
Government debt	-0.023591	0.0000	-0.045299	0.0000	-0.033007	0.0000
Government debt cavg	-0.161663	0.0820	-0.140181	0.0048	-0.152608	0.0084
Inflation rate	-0.217490	0.0078	-0.238752	0.0000	-0.247662	0.0000
Inflation rate cavg	0.318122	0.0962	0.253383	0.0198	0.273603	0.0312
Unemployment rate	-	0.0000	-	0.0000	-	0.0000

Empirical Results

Table 5: Credit rating models-Moody's

Variable	<u>Pooled OLS</u> Coefficient	Prob.	<u>Fixed Effects</u> Coefficient	Prob.	<u>Random Effects</u> Coefficient	Prob.
Log GDP per capita	9.69E-05	0.0000	-3.57E-05	0.2662	4.13E-05	0.0491
Log GDP per capita cavg	0.000400	0.0505	0.000387	0.0255	0.000330	0.1096
GDP growth rate	0.059286	0.1494	0.039964	0.1070	0.022608	0.4394
GDP growth rate cavg	- 0.179680	0.0166	- 0.166031	0.0002	- 0.153665	0.0035
Government debt	- 0.029104	0.0000	- 0.075049	0.0000	- 0.052738	0.0000
Government debt cavg	- 0.240864	0.0112	- 0.188588	0.0007	- 0.216021	0.0012
Inflation rate	- 0.072045	0.3846	- 0.123221	0.0123	- 0.137201	0.0205
Inflation rate cavg	0.080859	0.6776	0.050026	0.6787	0.086786	0.5519
Unemployment rate	- 0.231153	0.0000	- 0.308768	0.0000	- 0.323671	0.0000
Unemployment rate cavg	1.264017	0.0021	1.140217	0.0001	1.208349	0.0007
Current account	0.185809	0.0000	- 0.103912	0.0031	- 0.032685	0.4076
Current account cavg	- 0.028397	0.9539	0.150348	0.6029	0.096956	0.7814
External balance	- 0.231504	0.0000	0.051714	0.1551	- 0.031555	0.4345

Table 6: Credit rating models-Average Rating

Variable	<u>Pooled OLS</u> Coefficient	Prob.	<u>Fixed Effects</u> Coefficient	Prob.	<u>Random Effects</u> Coefficient	Prob.
Log GDP per capita	8.67E-05	0.0000	-4.87E-05	0.0735	2.71E-05	0.1665
Log GDP per capita cavg	0.000408	0.0344	0.000336	0.0220	0.000275	0.1243
GDP growth rate	0.041228	0.2881	0.025832	0.2184	0.008966	0.7233
GDP growth rate cavg	- 0.116947	0.0980	- 0.114439	0.0021	- 0.100156	0.0272
Government debt	- 0.024091	0.0000	- 0.059183	0.0000	- 0.042810	0.0000
Government debt cavg	- 0.179597	0.0449	- 0.137311	0.0035	- 0.155694	0.0070
Inflation rate	- 0.155103	0.0480	- 0.183324	0.0000	- 0.194410	0.0002
Inflation rate cavg	0.220284	0.2308	0.147689	0.1496	0.174381	0.1674
Unemployment rate	- 0.245002	0.0000	- 0.350138	0.0000	- 0.352890	0.0000
Unemployment rate cavg	1.041043	0.0072	0.876962	0.0005	0.910709	0.0031
Current account	0.187072	0.0000	- 0.080648	0.0067	- 0.025043	0.4685
Current account cavg	0.170085	0.7138	0.279346	0.2543	0.239151	0.4286
External balance	- 0.0000	0.0000	0.056000	0.0551	- 0.0000	0.8615

Empirical Results

- ▶ Table 3 to 5 provide the empirical results for each one of the three main Credit Rating Agencies.
- ▶ In each model, the first two columns repost all estimated coefficients and associated p-value (full model with cavg) using pooled OLS, the next two columns using fixed effects and the third using random effects.
- ▶ At a first glance, we can see that GDP per capita, GDP growth rate, current account and total reserves have positive impact on all agencies. Notice also the positive impact of World Bank's regulatory quality index.
- ▶ To the other hand, government debt, inflation rate, unemployment rate and external balance have negative impact for all agencies.

Empirical Results

Our further results (based on the interaction of the post 2008 dummy variable with the regressors) suggests that, for all CRAs, government debt developments and the current account weigh more on credit rating decisions post rather than pre-crisis.

- ▶ The S&P random effects model suggests that the impact of government debt increases from an estimate -0.033 to an estimate of $-0.033-0.011=-0.044$.
- ▶ The fixed effects model suggests, for S&P, an increase in the government debt impact from -0.045 pre-crisis to $-0.045-0.010=-0.055$ afterwards.
- ▶ For Moody's, the fixed effects model suggests an increase in the debt impact from -0.075 pre-crisis to $-0.075-0.017=-0.092$ afterwards.
- ▶ Finally, the impact of the external balance appears insignificant (pre- or post-crisis) based on the fixed effects model.

Conclusions

- ▶ Our analysis provides evidence that government debt and current account exert stronger impact, than the external balance, on credit ratings post rather than pre-crisis.
- ▶ The present results raise doubts regarding the consistency of the rating decisions by the credit rating agencies. Even in terms of communication of facts, the reliability of these ratings is questionable.
- ▶ Finally, given that this small-scale research focus on Credit Rating Agencies in Eurozone countries pre- and post-crisis, it may prompt exploration of CRAs impact using this examined model with more reliable variables and extended data.

"You could almost say that we live again in a two-superpower world. There is the U.S. and there is Moody's. The U.S. can destroy a country by leveling it with bombs; Moody's can destroy a country by downgrading its bonds".

Thomas L. Friedman 22/2/1995 New York Times

*Thank you for
your time*