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Karel Janda and David Moreira

Charles University, University of Economics, Prague

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Karel Janda[*] David Moreira[**]

Abstract. This paper investigates whether the economic adjustment program and post-program surveillance contributed positively to the structural recover of the Portuguese economy. This examination was conducted observing evidences related to several objectives included in the programs and on a sample of data collected from local defaulted and non-defaulted municipalities. Our results confirm that the financial aid provided by EC, ECB, and IMF had a small impact on the internal economic adjustment. There is a residual positive impact from the implemented reforms to promote growth, jobs, public debt, deficit, and stability of the country's financial sector. The evidence is revealed by the measurement of the key program achievements and by the indicators related to the current high default probabilities of a large number of local municipalities.

[*] Prof. Ing. Karel Janda, M.A. Dr. Ph.D.: Department of Banking and Insurance, University of Economics, Prague, W. Churchilla 4, 130 67 Praha 3, Czech Republic and Institute of Economic Studies, Charles University, Opletalova 26, 110 00 Praha 1, Czech Republic, Karel-Janda@seznam.cz.
[**] Ing. David Moreira: Department of Banking and Insurance, University of Economics, Prague, W. Churchilla 4, 130 67 Praha 3, davidmoreiragaia@gmail.com.

1. Introduction

In the aftermath of the world economic crisis in 2009 (Izák, 2015), Portugal requested financial assistance from the International Monetary Fund (IMF), the euro member states, and European Union. The Portuguese government negotiated an economic adjustment programme with the European Central Bank (ECB), the European Commission (EC), and the IMF. The agreement adopted in 2011 includes a memorandum of understanding and a loan agreement with a financing package of €78 billion, €26 billion of which provided by the EU, €26 billion by the European Financial Stabilisation Mechanism (EFSM), and about €26 billion provided by the IMF. The implementation of this aid programme covered a period between 2011 and 2014 and had the following main objectives:

- Structural reforms to improve the national competitiveness, economic growth, and job creation.
- Fiscal consolidation to reduce the deficit to a level below 3% of GDP, and to diminish the ratio of gross public debt-to-GDP in the medium term.
- Deleverage of the financial sector through recapitalization, and governmental instruments supported by backstop facilities.

The core of this paper is the examination of these objectives, and the respective impact on the municipal accounts after the end of this adjustment programme and financial aid.

Portugal may be considered a European economy comparable with Czech Republic and Slovakia due the similar geographic size, number of inhabitants, GDP, growth rate, and social progress index (Pavel and Vítek, 2014). Relevant financial restructuring events at the level of governmental policy making that have happened in Portugal, will be analysed across this paper and may be used as a learning example to other similar countries to avoid falling in the same economic situation.

From 2014, the previous Portuguese economic adjustment programme was substituted by the post-programme surveillance which is being applied with the objective of measuring the capacity of Portugal to repay its outstanding loans to EFSM and other international creditors. The European Commission (EC) with the European Central Bank (ECB), have a mandate to review the national financial, economic, and fiscal developments. Furthermore, these institutions in liaison with the government are responsible to monitor, report, and if needed recommend further structural measures.

In this paper we conduct an observation comparing several objectives of the financial-

economic restructuring plan, and the respective reality after its full implementation. We identified relevant findings such as imbalances across important areas such as GDP growth, competitiveness measured by international investment, national debt, and unemployment. In this context, this paper finds enough evidences that the €78 billion along with the austerity measures had very small positive impact on the Portuguese economy.

The progress of some key metrics included in the examination are stated below:

Figure 1: Real GDP growth rate - % volume
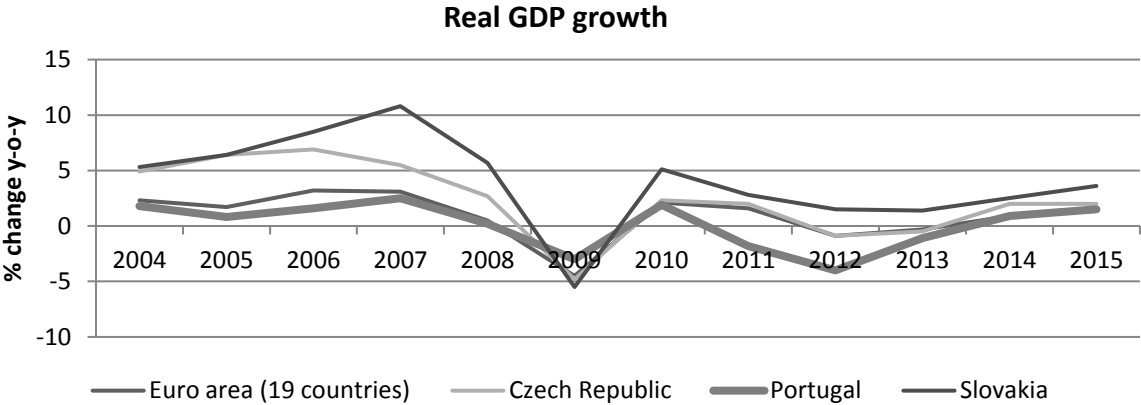
Real GDP growth

Source: Eurostat, DG ECFIN

The *x* axis of this linear graph shows the years between 2004 and 2015, while on the *y* axis appears the % of real GDP growth y-o-y. In this graph we see that the overall GDP rose steadily in the second part of the last decade before dropping off in 2008 and 2009. Then while the average of GDP growth in the Euro area (19 countries), Czech Republic, and Slovakia kept being between 0% and 5% (Teplý, Tripe, 2015), Portugal had another dramatic fall in 2012. Although in 2015 the Portuguese GDP had a slight recovery, it just reached the pre-crises values in 2005.

Figure 2: Aggregate view of the net international investment

Net international investment position - annual data
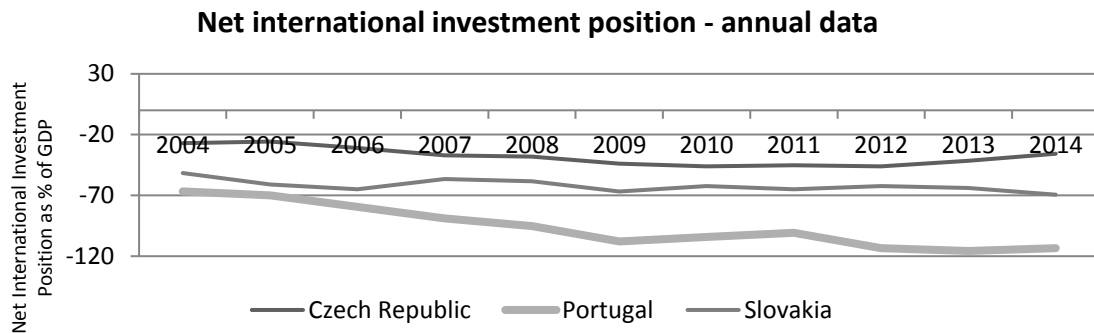
Source: Eurostat, DG ECFIN

The trend lines observed in the Figure 2 show that the net international investment as % of GDP in Portugal fell significantly from 2004 till 2014, while in Czech Republic and Slovakia the foreign investment trends show a stable line during the same 10 years period.

Figure 3: Comparison of unemployment rates since 1998

Total unemployment rate

Source: Eurostat, DG ECFIN

The unemployment rate of Portugal between 1998 and 2008 was one of the lowest in Europe however after the crisis it reached a steady peak above its peers, and the Euro area. Czech Republic remained during almost 20 years with one of the most stable and low unemployment rates (Potluka, Klazar, 2013). Slovakia, even though it had during the first 10 years in analysis the higher unemployment rate, at this moment it already stabilized at the level of the Euro area, and it is even performing positively under the Portuguese rate.

The government debt is defined as the total consolidated gross debt at nominal value at the end of the year in the following categories of government liabilities: currency and deposits, debt securities, and loans. The governmental debt in Czech Republic has been consistently lower than the average of Euro area (Janda, Zetek, 2014), while the Portuguese debt rate remained chronically at the largest levels throughout the time bottoming out with a considerable

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downward movement.

In order to achieve the proposed goals stated in the abstract, the article is structured as follows. The next section summarizes the general overview of the municipal default probability in all Portuguese regions and the selection of the financial and macroeconomic indicators. Section 3 characterizes the selected panel data and methodology more closely. Our results are given in Section 4. The research findings are summarized in the conclusion.

2. Assessing the local municipal default probability

Our study examines the outcome of the governmental structural measures taken in the aftermath of the financial crisis, and the related economic adjustments supported by the international financial aid packages. We analyse the impact of these measures from the microeconomic perspective and we assess the likelihood of default based on data for all the Portuguese municipal regions.

The Portuguese municipal local entities have faced strong stress during the application of the austerity measures enforced by new public finance policies. Several cities have declared emergency situation or have filed for default on payments against their creditors, however most of the municipal cities kept being able to meet their debt obligations. The default troubles that individual regions encountered usually received considerable publicity by the media and population. This publicity related to eventual default events strengthen the alarming predictions that a governmental financial crisis is approaching. This situation results typically in an external economic negative outlook according to Ang & Green (2011), which may exacerbate the country illiquidity in international financial markets. This topic is also analysed by Stadnik & Miecinskiene (2015). After the collapse of the Portuguese economy, the municipal creditworthiness and its financial strength may be assessed applying the statistical methods herewith suggested predicting their default risk.

We have created an empirical methodology to score the municipalities according to their probability of default. This predictive modelling procedure is applied also by several financial institutions to evaluate their borrowers. Using this econometric model, we evaluated the default probability across 308 municipal regions. The term default is commonly used as the inability of a borrower to pay the interest or principal on a debt when it is due, or it is an estimate of the likelihood that a borrower will be unable to meet its debt obligations. (Roger, 2002). Default is more likely to happen in recessions because it is when it becomes more costly for a risk averse

borrower to repay non-contingent debt (Cristina, 2008).

The framework of the conceptual default status in this paper is related to the failure of a municipality to carry on paying its debt obligations to employees, beneficiaries, suppliers, contractors, among other senior creditors. Even though it is considered a distressful indicator when there happens an event of payment delinquency among a governmental institution, there is also a small incentive to publish publicly the governmental default on payments (Stadnik 2014). Several evidences showed that most of these defaulted cities had a period before this event when they renegotiated the payment terms with their debtors to longer maturities. This information may be found observing the increasing number of days to pay above the market trend year-over-year. This is typically an external sign that the creditors prefer to extend the payment terms before consider the debt uncollectable (Holian, Joffe, 2013).

We also observed the yearly balance sheets and profit & loss statements of each municipality. Reading the respective accounts, we discovered that there are regular transfers of money from the government directly to the local municipalities. In this respect, taking in consideration that they are mostly governed by political parties from different wings there is not enough available information to conclude if the amounts transferred are following the strict legal obligations. Therefore, this unclear observed topic may serve as a moto for a future paper research related to public policies addressing the need of more specific legislation to clarify the transparency of governmental financial transfers to local regions.

The relevant existing literature contains many efforts to model the likelihood of default using logit and probit, however Ohlson (1980) was acknowledged as the first researcher applying logistic regression approach to model the probability of defaults. Shumway (2001) developed a new model from previous logit models by using panel rather than cross sectional data. This approach addresses the fact that most bankrupted firms were solvent for many years before going into bankruptcy. The RiskCalc methodology document written by Falkenstein, Boral & Carty (2000) suggests that the choice of probit over logit was not significant, as the two models usually produce similar results. On the other hand, Altman & Sabato (2007) identified that logit models have outperformed probit models in the financial default and bankruptcy field. A logit model was already applied by Bialaszewski (1985) to a set of municipal revenue bonds. Bialaszewski collected financial, economic and demographic inputs to include in the model as independent predictor variables. She reported that one year prior to default, the model accurately classified 87% of the observations into defaulting and non-defaulting categories. These categories were defined in terms of a "cut point" in the calculated probabilities. The cut point that she has set was 65.8% to produce the highest degree of accurate

classification. It also may be more appropriate to use a fixed cut point of 50%, since probability estimates over that level could be reasonably characterized as default predictions, while probabilities under this level could be seen as predictions of non-default (Bialaszewski, 1985). The logit methodology was also applied by Jakubík & Teplý (2011), who constructed a new indicator (named the JT index) evaluating the Czech economy's financial stability.

3. Data and Methodology

We have chosen default probability modelling using logistic regression because it has the advantage of having a dependent variable restricted to the amplitude between 0 and 1. The logistic model is extensively applied in the financial corporate field to classify subjects based on values of a set of predictor variables, however very few attempts were made in the field of public financial municipalities. The predictive probability of bankruptcy using the logistic model is expressed with this formula:

(1)

$$P(X) = \frac{1}{1 + e^{-(\propto \, + \, \beta_1 X_1 + \, \beta_2 X_2 + \, \beta_3 X_3 + \cdots . \, \beta_\infty X_\infty)}}$$

This predictive model developed in this paper is based on 22 initial variables collected from three main sources. The 1st source used to classify the dependent variable municipalities as defaulted or non-defaulted, was the Portuguese "Public budgeting" website. There was possible to find a list of the defaulted entities in governmental areas such as municipal regions, central administration, and social security sectors. The 2nd main source addressing the selection of independent variables or predictors, was the Portuguese governmental website called "Portal Autarquico", from where it was possible to find the balance sheet, and profit & loss yearly statements of all municipal regions. The 3rd main source also used to find significant macroeconomic predictors to the model, was the governmental bureau of statistics named "Pordata", which has a systematization of data on municipal, country, and European areas. The independent variables which included number of inhabitants, active population, and the accounting ratio "tax revenues of total municipal revenue in 2014", were obtained from this statistical database. Since the model shall include solely the independent variables that are significant to the prediction, the final determinants applied in the log equation were: expenditures with municipal employees, sales of services and goods, taxes paid, governmental

transfers and subsidies obtained, total debt to third parties, population in 2014, ratios between tax revenues collected and total municipal revenues, and active population in 2014.

Table 1: General description of variables

Step 1a	B	S.E.	Wald	df	Sig.	Exp (B)	95% C.I.for EXP(B)	
							Lower	Upper
Expenditures with employees	.0000014	.000	9.056	1	.003	1.000	1.000	1.000
Sales of services and goods	-.0000013	.000	6.523	1	.011	1.000	1.000	1.000
Taxes paid	-.000001	.000	11.831	1	.001	1.000	1.000	1.000
Governmental transfers and subsidies obtained	-.000001	.000	8.260	1	.004	1.000	1.000	1.000
Total debt to third parties	.000000	.000	12.636	1	.000	1.000	1.000	1.000
Population 2014	-.0006472	.000	3.660	1	.056	.999	.999	1.000
Tax revenues of total municipal revenue in 2014	.0534122	.029	3.485	1	.062	1.055	.997	1.116
Active population 2014	.0012954	.001	3.778	1	.052	1.001	1.000	1.003
Constant	-3.024761	1.001	9.125	1	.003	.049		

Source: Authors' calculations

4. Results

Considering that the probability of bankruptcy must lie within 0 and 1, the final result is a probability between 1% and 100%. The test applied to the model to assess its statistical fit was the Hosmer-Lemeshow goodness-of-fit. We also made a diagnostic using a residual plot to observe the change in deviance versus the predictable probabilities, and the Cook's test to observe the distances versus predicted probabilities. The Hosmer-Lemeshow statistical analysis is considered to have a good fit if the significance value is more than 0.05. Therefore, as this test had the result value of 0.996, the model is considered adequately fitting the data. The statistical test Cox & Snell based on the log likelihood has a value of 0.203, and the Nagelkerke test of parameter estimates has the value of 0.594. These two results suggest that the dataset included in the model is useful to explain the bankruptcy probability.

Our predictions using the logistic model were achieved with a cutting level of 50%, and they showed a likelihood range of default from 67% up to 99% among the following cities:

Sines, Portimao, Faro, Aveiro, Cartaxo, Vila Real de Santo Antonio, and Santa Comba Dao. These results are considered significant taking in consideration that the total number of municipalities that effectively defaulted in 2015 were 16, therefore the model was able to accurately predict defaulted municipalities with 44% of success. The final population sample used in this analysis had included 299 different municipal regions across Portugal, out of the existing number of 308. This sample is also significant because it covered the whole country at the level of 97%. If the modelling cutting level would have been 40% there were two more municipal regions also with a correct default prediction – Santiago do Cacem and Vila nova de Poiares, therefore the overall predictive likelihood of default would be at the level of 56%.

Table 2: Assessing the default prediction of Portuguese municipal regions

Rank	Municipalities	2015 Financial report 0=NOT DEFAULT 1=YES DEFAULT	% Probability of Default	Classification output after logistic regression (SPSS)
1	Sines	1	99.990%	1
2	Portimao	1	99.961%	1
3	Faro	1	98.893%	1
4	Aveiro	1	95.264%	1
5	Cartaxo	1	94.294%	1
6	Vila Real de Santo Antonio	1	93.226%	1
7	Santa Comba Dao	1	67.058%	1
8	Evora	0	57.011%	1
9	Santarem	0	55.897%	1
10	Porto Santo	0	50.350%	1

5. Conclusions

The aim of our research was to verify whether the economic adjustment program and post-program surveillance contributed positively to the structural recovery of the Portuguese economy. The assessment of the probability of default among the municipal regions in Portugal confirmed the previous findings about the small impact of the implemented programmes. To be more precise, if more than 5% of the largest municipalities are likely to default after the application of economic measures and financial aid, the conclusion is that the whole adjustment programme was not sufficient to recover the economic growth, the financial stability, and the

national wealth.

We also conducted an examination on several observations from a sample data collected from Eurostat, comparing the peer economies of Czech Republic, Slovakia, Portugal, and as a benchmark the Euro zone (19 countries). The observation of this comparative data has confirmed that the financial aid package provided to Portugal of €78 billion, along with the austerity measures applied by local governmental had a very small positive impact on the Portuguese economy. This outcome is relevant for the transition peer economies like Czech Republic and Slovakia to provide them with the lessons learned from the Portuguese experience during its international assistance. In conclusion, considering a hypothetic future scenario of a governmental default in Czech Republic or Slovakia, there would have to be applied other than just austerity measures with a financial aid to recover more efficiently their economies. Our recommendation to the international financial institutions (ECB, IMF, EC) supports the inclusion of financial and fiscal stimulus in any future European sovereign economic adjustment programmes.

Acknowledgements

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