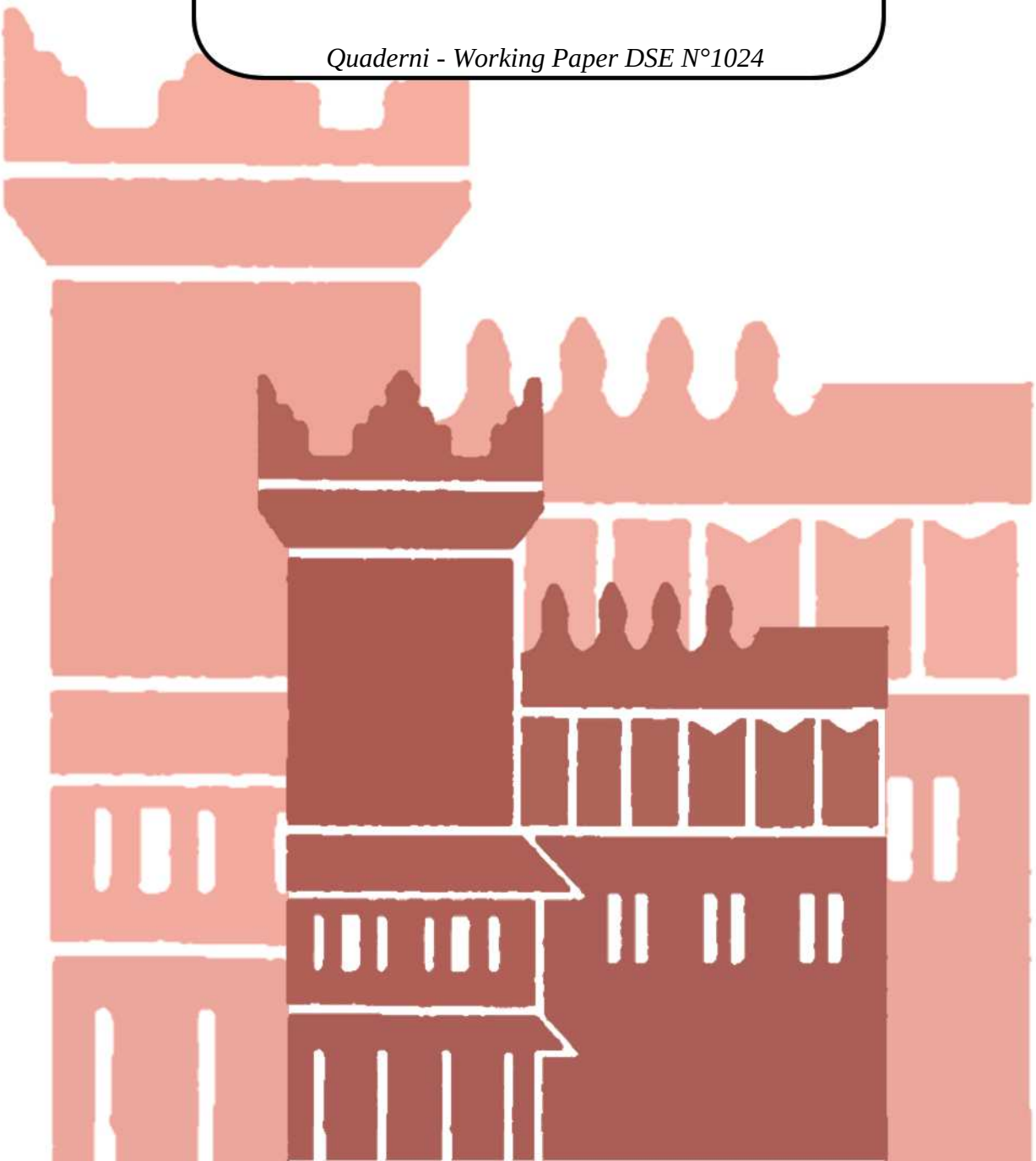
ISSN 2282-6483

Alma Mater Studiorum - Università di Bologna
DEPARTMENT OF ECONOMICS

Determinants of Fiscal Distress in Italian Municipalities

Wildmer Daniel Gregori
Luigi Marattin

Quaderni - Working Paper DSE N°1024



Determinants of Fiscal Distress in Italian Municipalities*

Wildmer Daniel Gregori† Luigi Marattin‡

September 2015

Abstract

Fiscal distress of local governments and municipalities is a non-negligible component of the public finance turmoil after the Great Recession. In this paper we consider a dataset of Italian municipalities over the period 2000-2012 and look for the main budget determinants of local default. According to our results the default probability is positively affected by the share of loan repayment over total spending. This result is robust to alternative model specifications as well as inclusion of fixed effects, time dummies and macroeconomic control variables.

JEL Classification: H72; H74.

Keywords: local government default, fiscal distress, panel regressions.

*We are grateful to Maria Elena Bontempi, Elena Giarda, Roberto Golinelli, Gloria Moroni and Chiara Toscano for useful comments and suggestions. Any errors remain our responsibility.

†Prometeia Associazione. Via Marconi 43 - 40122 Bologna (Italy). Email: wildmer.gregori@prometeia.com

‡Department of Economics - University of Bologna. Strada Maggiore 45 - 40126 Bologna (Italy). Email: luigi.marattin@unibo.it.

1 Introduction

In 2015 the Italian Government has increased from 8% to 10% the ratio between interest spending and total current revenue that local municipalities are allowed to maintain. This is only one of the many limits to budget variables - in addition to the balance budget constraint - that the Government imposes in order to prevent fiscal distress in local municipalities. To what extent those limits actually matter in preventing future defaults?

The issue is relevant as the deterioration of public finance occurred over the last years as a consequence of the long wave of the 2008 Financial Crisis does not involve solely state levels but it also includes local governments and municipalities both in US and EU. The 2013 default of Detroit the largest city in US history to file for bankruptcy is probably the most famous case, but by no means the only one. Famous episodes of fiscal distress in US municipalities or local governments over the years include New York, Cleveland, Miami, Pittsburgh, Philadelphia, Orange County.

Fiscal distress of sub-national authorities are observed also in Europe: the most visible episode has been Catalunia in 2012, but there have been some other significant cases in Portugal and Italy.[1] Local governments defaults can be either cause or consequence of national public finances tensions. Particularly in the former case, it is therefore important to understand their determinants in order to prevent negative spillovers on higher levels of governments. It is also crucial for the policy design of fiscal constraints that national authorities usually impose on local governments.

In this paper we empirically investigate the determinants of Italian local municipalities default using a panel dataset from 2000 to 2012. We apply binary regression models in the attempt to identify the most important variables leading to major fiscal distress episodes. Our results show that the most significant budget component increasing the probability of future default is the share of annual loan repayment over total spending. We also find evidence that an increase in fiscal revenue diminishes the probability of

[1] See Dexia (2006).

local municipalities fiscal distress; no evidence, on the other hand, is found relative to components that are often pointed out as dangerous indicators, such as residuals of the level of current spending.

The remainder of this paper is organized as follows. Section 2 offers some review of the relevant literature on local public finance. Section 3 presents the data set, the specification of the empirical model and our main result. Section 4 offers some concluding remarks.

2 Previous literature on local fiscal distress

Literature does not employ a unique definition of local fiscal distress. The definition is often country-specific: a local government is considered to default whenever it enters the conditions disciplined by national laws, which generally refer to the inability to fulfil its existing financial obligations (Lobo et al., 2011). However, there have been a few attempts to adopt a broader approach. Jones and Walker (2007) define distress as the failure of maintaining the pre-existed level of service. Kloha et al. (2005) work out a ten-point scale of fiscal distress, made of ten indicators: decrease in population growth, general fund operating deficit, long-term debt as a percentage of taxable values, and so on. From a theoretical point of view these attempts are noteworthy, as they can more thoroughly grasp the effective conditions of distress; however they present a few problems as far as the practical application is concerned, as they require a rigorous and time-invariant definition of the numerical thresholds for each indicator.

There is an extensive literature focusing on single aspects of local public finance, as potential determinants of default or at least serious deterioration of fiscal conditions. Two issues have received most of the attention: local debt management and the dynamics of fiscal adjustments in order to guarantee intertemporal solvency. The stock of local authorities liabilities (and the associated flow of debt services) is traditionally crucial in predicting or explaining fiscal distress. While Epple and Spatt (1986) discuss from a theoretical perspective the optimality and the implications of debt ceilings impositions on local authorities, a large literature has investigated empirically how borrowing costs are

affected by a number of factors: local governments fiscal decisions (Capeci, 1994), federal tax rates (Metcalf, 1993), legislation on debt and deficit rules (Poterba and Rueben, 1999) and liquidity and credit risks (Wang et al., 2008). Also the dynamics of fiscal adjustments has received some attention. Holtz-Eakin et al. (1989) investigate the dynamic interrelationship between expenditures, revenues and transfers in 171 US municipalities over the period 1972-1980. They find that such relationship are often confined between two years; moreover, they find that while past revenues help predict current expenditures, past levels of spending do not alter future revenue paths. In other words they find that the intertemporal causal relationship goes from revenue to spending, but not viceversa. Buettner and Wildasin (2006) tackle the same issue but focus on the timing and the modalities of the implementation of intertemporal fiscal adjustment paths after a fall in local revenue. They study 1270 local US municipalities over the period 1970-1997, using a vector-error correction approach, useful to catch both long-run dynamics and their deviations from it. Their findings particularly emphasize the role of public expenditure as "buffer" to preserve intertemporal solvency: an additional dollar of, alternatively, local tax revenue and transfers gives rise to a present value increase in public spending of, respectively, 78 and 64 cents. Skidmore and Scorsone (2011) look at the reaction of local municipalities in Michigan to declining tax revenue and state/federal transfers between 2005 and 2009. Their results show that given expenditure categories (parks and recreation, capital, other spending) were promptly cut in order to preserve solvency, while others (General Governments and Public Works) were much less so. Public Safety, Health and Welfare were found to be not responsive at all to the decline in revenue.

3 Empirical analysis

In this section we carry out the empirical analysis. First we illustrate the data source, the descriptive statistics and our binary dependent variable (3.1); then we proceed to model specification (3.2). After showing the main results (3.3), we implement a set of robustness tests to check their validity (3.4).

3.1 Data and the default indicator

Our analysis merges different source of information. The first one relies on an Italian database for public administration from the Ministry of the Interior,[2] which includes Municipalities budget data. We consider five indicators in order to take into account different features of local budgets, specifically: (i) principal index (=loan repayment over total spending) (ii) current revenues index (=the logarithm of current revenue per-capita), (iii) current spending index (=the ratio between current spending and total spending) (iv) autonomy index (=tax revenue over current spending) (v) residual index (=positive residuals over total revenues). Table 1 shows the main descriptive statistics. In addition to that, we use a set of regional macroeconomic variables obtained from the National Institute of Statistics (ISTAT): unemployment rate, per-capita GDP and inflation rate. The purpose is to control for time-varying effects.

[Table 1 about here]

We now need to define a local default indicator which serve as our dependent variable. We use data from the Ministry of the Interior and we build a binary default indicator D which assumes the following values:

$$D_{i,t} = \begin{cases} 1 & \text{when a Municipality } i \text{ has financial distress in year } t \\ 0 & \text{otherwise} \end{cases}$$

We establish that a municipality is in financial distress when its council votes a default resolution, an event which is specifically disciplined by Italian Law. Legislation on local defaults was introduced for the first time in 1989 (DL n.66 later converted into Law n.144/1989) but was permanently systematized only eleven years later with the *Testo Unico degli Enti Locali* (Dlgs 267/2000). It defines default as a contingency in which municipalities have definite and liquid liabilities they cannot cope with. The procedure is

[2]For further details, see http://finanzalocale.interno.it/.

the following: first, the City Council votes the default resolution, which includes the report by the Audit Committee. Afterwords, within five days these documents are officially transmitted to the Ministry of the Interior and to the local section of Accounting Judiciary and then officially published into *Gazzetta Ufficiale* (Italian Official Journal which includes new law and administrative acts). We focus the analysis on Municipalities that experiences the default event, and combining the available information, our final database riles on 32 cases of local default.

3.2 Model specification

Our goal is to investigate the probability of a local default, defined as in the previous subsection. We therefore need a model able to deal with a binary dependent variable, where the interest lies primarily in the response probability of the covariates included in the specification.[3] In the default probability literature, both logit and probit models have been used to serve this purpose (see Van Rijckeghem and Weder (2009)). As a baseline, we implement a logit model[4] specified as follows:

$$D_{i,t} = \alpha + \boldsymbol{\beta B_{i,t-1}} + \boldsymbol{\gamma C_{r,t}} + \tau T_t + \epsilon_{i,t}$$

where $D_{i,t}$ is the default indicator for municipality i at time t; α is a constant; B is a vector of five budget indicators and C is a vector of macroeconomic variables at the regional level r to control for time-varying effects, as specified in the previous subsection. T are time dummies and ϵ is the error term. In order to avoid simultaneity issues, budget indicators are lagged at $t-1$.

3.3 Results

Table 2 shows the result of the logit model as described in subsection 3.2. We first run a bivariate regression (column 1) and then add each independent variables one by one among

[3]For a detail explanation of binary models, see Wooldridge (2010); a "qualitative response models" survey is proposed by Amemiya (1981).

[4]As robustness checks, we include further specifications in subsection 3.4, such as a probit model.

the regressors. Variables are lagged to avoid simultaneity issues. In all specifications, the debt indicator (the annual loan repayment over total spending[5]) is significant in affecting the default probability: on average, a 10% increase in the principal index increases the default probability by a percentage ranging from 2.6% to 2.9% with a peak of 4.7% in the specification including both macroeconomic control variables and year dummies (column 7). Other than the debt indicator, we find (column 6) weak evidence, still considering a 10% increase, of statistical significance for the current spending index (with a positive average marginal effect of 1.2%) and for the current revenue index (-0.7%). This last effect is confirmed also in the most complete specification (column 7), with an higher coefficient and higher statistical significance.

[Table 2 about here]

3.4 Robustness checks

We now implement some alternative specification of the model so to test the robustness of our main results. Table 3 shows the results of a pooled logit model (columns 1-4) and a probit model (columns 5-8). We account for the presence of macroeconomic control variables, municipalities dummies and year dummies (all together or separately). Our result on the importance of the principal index in affecting the default probability turns out to be very strong: the coefficient is significant across all specifications, and the estimation of the average marginal effects is pretty solid and consistent with our baseline model. The most complete specification (column 8) reports a marginal effect on default probability of 4.4% in face of a ten percent increase in loan repayment index. The importance of adjusting on the revenue side is also confirmed, as a ten per cent increase in the current revenue index diminishes the default probability by 2.3%-3.4% (in the most significant specifications of the model).

Finally, we run a panel logit model with fixed effects (table 4 and 5). In these cases we lose the quantitative dimension for the coefficient, but retain the qualitative one. Table 4

[5]Since there are multiple budget indicators that can signal the presence of debt sustainability, we have run our model employing alternatively the following three indicators of debts burden: annual loan repayment, interest paid on debt and new principal. Results do not change significantly.

employs the very same model specification as in subsection 3.2. Table 5 includes also the lagged values (up to t_3) of most regressors. Once again, our main results are confirmed. The only variable which is robustly significant in affecting the default probability is the principal index, lagged one and two periods. Last period current revenue index keeps affecting negatively the default probability, but only in the most complete specification (with macroeconomic control variables and year dummies).

[Table 3 about here]

[Table 4 about here]

[Table 5 about here]

4 Conclusions

In this paper we empirically study the main determinants of Italian municipalities default using a panel dataset over the period 2000-2012. We build a binary local default indicator and we implement binary regression models to evaluate which budget components have a major impact on local default. Results show that the main variable affecting positively the default probability is the share of loan repayment over total spending, while the other budget components do not seem to be statistically significant. This evidence support the view that to maintain local debt under control should be a central goal for both local and national policy makers, in order to avoid local default episodes that generate economic and social instability.At the same time, the effectiveness of budget constraints other than the usual balanced-budget such as limitations in particular subcategories of spending in providing insurance against future default might be questioned.

References

Amemiya, T. (1981). Qualitative response models: A survey. *Journal of economic literature*, pages 1483–1536.

Buettner, T. and Wildasin, D. E. (2006). The dynamics of municipal fiscal adjustment. *Journal of Public Economics*, 90(6):1115–1132.

Capeci, J. (1994). Local fiscal policies, default risk, and municipal borrowing costs. *Journal of Public Economics*, 53(1):73–89.

Dexia (2006). Sub-national public finance in the european union.

Epple, D. and Spatt, C. (1986). State restrictions on local debt: Their role in preventing default. *Journal of Public Economics*, 29(2):199–221.

Holtz-Eakin, D., Newey, W., and Rosen, H. S. (1989). The revenues-expenditures nexus: Evidence from local government data. *International Economic Review*, pages 415–429.

Jones, S. and Walker, R. (2007). Explanators of local government distress. *Abacus*, 43(3):396–418.

Kloha, P., Weissert, C. S., and Kleine, R. (2005). Developing and testing a composite model to predict local fiscal distress. *Public Administration Review*, pages 313–323.

Lobo, F. C., Ramos, P., and Lourenco, O. (2011). Causes of financial distress of portuguese municipalities: empirical evidence. *International Journal of Monetary Economics and Finance*, 4(4):390–409.

Metcalf, G. E. (1993). Federal taxation and the supply of state debt. *Journal of Public Economics*, 51(3):269–285.

Poterba, J. M. and Rueben, K. (1999). State fiscal institutions and the us municipal bond market. In *Fiscal institutions and fiscal performance*, pages 181–208. University of Chicago Press.

Skidmore, M. and Scorsone, E. (2011). Causes and consequences of fiscal stress in michigan cities. *Regional Science and Urban Economics*, 41(4):360–371.

Van Rijckeghem, C. and Weder, B. (2009). Political institutions and debt crises. *Public Choice*, 138(3-4):387–408.

Wang, J., Wu, C., and Zhang, F. X. (2008). Liquidity, default, taxes, and yields on municipal bonds. *Journal of Banking & Finance*, 32(6):1133–1149.

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. MIT press.

Tables

Table 1: Summary statistics

	Mean	SD	Min.	Max.
Principal index	0.10	0.13	0	0.58
Current revenues index	6.69	0.38	6.06	8.43
Current spending index	0.51	0.20	0.05	0.88
Autonomy index	0.39	0.21	0.02	1
Residual index	1.52	1.74	0.13	21.88
Number of observations	416	416	416	416
Municipalities	32	32	32	32
Years	13	13	13	13

Notes: Data: 2000-2012.

Table 2: Results of the panel logit model, average marginal effects

	Default (1)	Default (2)	Default (3)	Default (4)	Default (5)	Default (6)	Default (7)
Principal index $(t-1)$	0.26***	0.26***	0.29***	0.29***	0.29***	0.27***	0.27***
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)
Current Revenues index $(t-1)$		-0.02	-0.03	-0.04	-0.04	-0.07*	-0.11**
		(0.04)	(0.03)	(0.04)	(0.04)	(0.04)	(0.05)
Current spending index $(t-1)$			0.10	0.11	0.11	0.12*	0.07
			(0.07)	(0.07)	(0.07)	(0.07)	(0.06)
Autonomy index $(t-1)$				-0.04	-0.04	-0.05	-0.10
				(0.06)	(0.06)	(0.07)	(0.09)
Residual index $(t-1)$					-0.00	-0.01	-0.01
					(0.01)	(0.01)	(0.01)
Macro-variables	No	No	No	No	No	Yes	Yes
Year dummies	No	No	No	No	No	No	Yes
Number of observations	384	384	384	384	384	384	320
Number of groups	32	32	32	32	32	32	32
Pseudo R-squared	0.14	0.15	0.16	0.16	0.16	0.19	0.20
Log-likelihood value	-96.41	-96.20	-95.07	-94.90	-94.88	-91.89	-80.22
Prob > Chi-square	0.00	0.00	0.00	0.00	0.01	0.02	0.23

Notes: The explanatory variables are lagged (t_{-1}) to avoid simultaneity issues. *** (**, *) indicates statistical significance at the 1 (5, 10) percent level.

Table 3: Results Pooled Logit and Probit, average marginal effects

	Default Logit (1)	Default Logit (2)	Default Logit (3)	Default Logit (4)	Default Probit (5)	Default Probit (6)	Default Probit (7)	Default Probit (8)
Principal index $(t-1)$	0.28***	0.27***	0.47***	0.37***	0.32***	0.30***	0.54***	0.44***
	(0.07)	(0.09)	(0.11)	(0.13)	(0.08)	(0.09)	(0.12)	(0.12)
Current Revenues index $(t-1)$	-0.05	-0.07*	-0.19**	-0.28***	-0.05	-0.08*	-0.23***	-0.34***
	(0.04)	(0.04)	(0.08)	(0.11)	(0.04)	(0.04)	(0.08)	(0.10)
Current spending index $(t-1)$	0.11	0.12*	0.07	0.07	0.11	0.12*	0.09	0.08*
	(0.07)	(0.07)	(0.06)	(0.05)	(0.07)	(0.07)	(0.06)	(0.05)
Autonomy index $(t-1)$	-0.04	-0.05	-0.04	-0.00	-0.06	-0.07	-0.04	-0.00
	(0.06)	(0.06)	(0.07)	(0.08)	(0.06)	(0.07)	(0.07)	(0.08)
Residual index $(t-1)$	-0.00	-0.01	-0.01*	-0.01*	-0.00	-0.01	-0.01	-0.01**
	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)
Macro-variables	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Municipalities' dummies	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes
Number of observations	384	384	348	290	384	384	348	290
Pseudo R-squared	0.08	0.11	0.20	0.27	0.08	0.11	0.20	0.27
Log-likelihood value	-94.88	-91.89	-80.22	-68.62	-94.78	-91.48	-80.28	-68.64
Prob > Chi-square	0.00	0.00	0.01	0.06	0.00	0.00	0.01	0.09

Notes: The explanatory variables are lagged (t_{-1}) to avoid simultaneity issues. Robust standard errors in parenthesis. *** (**, *) indicates statistical significance at the 1 (5, 10) percent level.

Table 4: Results Panel Logit fixed effect

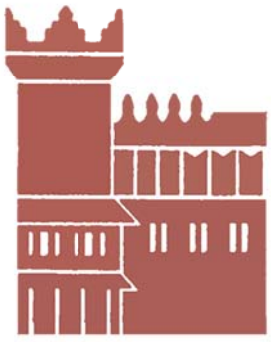
	Default (1)	Default (2)	Default (3)
Principal index $(t-1)$	10.68***	10.48***	9.965***
	(2.470)	(2.562)	(2.842)
Current Revenues index $(t-1)$	-2.381	-4.248**	-7.787***
	(1.455)	(1.876)	(2.581)
Current spending index $(t-1)$	2.045	1.587	1.944
	(1.352)	(1.454)	(1.585)
Autonomy index $(t-1)$	0.0759	-0.873	0.0575
	(1.585)	(1.774)	(2.348)
Residual index $(t-1)$	-0.194	-0.208	-0.238
	(0.183)	(0.173)	(0.183)
Fixed effects	Yes	Yes	Yes
Macro-variables	No	Yes	Yes
Year dummies	No	No	Yes
Number of observations	348	348	348
Number of groups	29	29	29
Pseudo R-squared	0.199	0.245	0.381
Log-likelihood value	-57.70	-54.40	-44.58
Prob > Chi-square	0.00	0.00	0.00

Notes: The explanatory variables are lagged (t_{-1}) to avoid simultaneity issues. *** (**, *) indicates statistical significance at the 1 (5, 10) percent level.

Table 5: Results Panel Logit fixed effects with lags

	Default (1)	Default (2)	Default (3)
Principal index $(t-1)$	12.7***	13.18***	12.66***
	(3.475)	(3.559)	(3.915)
Principal index $(t-2)$	7.279**	7.624**	9.713**
	(3.277)	(3.416)	(4.595)
Principal index $(t-3)$	2.212	2.489	1.337
	(3.138)	(3.115)	(3.754)
Current Revenues index $(t-1)$	-2.398	-3.724	-6.071**
	(2.071)	(2.417)	(3.056)
Current Revenues index $(t-2)$	-0.689	-2.404	-3.465
	(1.939)	(2.272)	(2.793)
Current Revenues index $(t-3)$	0.538	0.352	-0.217
	(1.749)	(1.755)	(2.406)
Current spending index $(t-1)$	2.353	1.692	1.437
	(1.754)	(1.837)	(2.116)
Autonomy index $(t-1)$	-0.587	-2.190	-1.058
	(1.829)	(2.059)	(2.620)
Residual index $(t-1)$	-0.135	-0.182	-0.166
	(0.149)	(0.178)	(0.196)
Fixed effects	Yes	Yes	Yes
Macro-variables	No	Yes	Yes
Year dummies	No	No	Yes
Number of observations	260	260	260
Number of groups	26	26	26
Pseudo R-squared	0.289	0.341	0.442
Log-likelihood value	-42.56	-39.45	-33.43
Prob > Chi-square	0.00	0.00	0.00

Notes: The explanatory variables are lagged (t_{-1}) to avoid simultaneity issues. Further lags (t_{-2} and t_{-3}) are inserted for the three debt variables (D^{α}) and current revenues index (B1). *** (**, *) indicates statistical significance at the 1 (5, 10) percent level.



Alma Mater Studiorum - Università di Bologna
DEPARTMENT OF ECONOMICS

Strada Maggiore 45
40125 Bologna - Italy
Tel. +39 051 2092604
Fax +39 051 2092664
http://www.dse.unibo.it