

## ONLINE APPENDIX

The appendix gives indications of the model's solution, including the derivations of the lemma and proposition. It also presents descriptive statistics and additional empirical results.

### A PROBABILITY OF AN INDIVIDUAL TO VOTE FOR THE INCUMBENT

First, we consider an individual who votes in period  $t$  for the politician who can deliver the highest level of expected overall utility in  $(t + 1)$ . It consists of utility from consumption, utility from the provision of local public goods, and utility from the ideological alignment with the politician. The individual votes for incumbent  $a$ , if

$$\underbrace{E_t[u(c_{t+1}^a) + L_{t+1}^a + \alpha\theta^i(-\frac{1}{2})]}_{\text{exp. utility when } a \text{ in power}} > \underbrace{E_t[u(c_{t+1}^b) + L_{t+1}^b + \alpha\theta^i(+\frac{1}{2})]}_{\text{exp. utility when } b \text{ in power}}. \quad (\text{A.1})$$

Obviously, voters differ in their preference  $\theta^i$  for party  $a$  and  $b$ . Expected consumption is identical under both politicians, whereas the expected provision of local public goods is affected by the policymakers' competence  $\eta_{t+1}^j$  and individuals' expectations thereof:

$$E_t^i[u(c_{t+1}^a)] = E_t^i[u(c_{t+1}^b)] = E_t^i[u((1 - \tau)\epsilon_{t+1})]; \quad (\text{A.2})$$

$$E_t^i[L_{t+1}^j] = E_t^i[\tau_t\epsilon_{t+1} - D_{t+1} + \eta_{t+1}^j]; \quad j = a, b; \quad (\text{A.3})$$

$$E_t^i[D_{t+1}] = E_t^i[D_{t+1}^a] = E_t^i[D_{t+1}^b]. \quad (\text{A.4})$$

Equation (A.3) says that voters base their expectation of the provision of local public goods in period  $(t + 1)$  on their belief of the tax revenue in  $(t + 1)$  on the one hand and the deficit making and competence attributed to the government in power in  $(t + 1)$  on the other hand. Deficit in  $(t + 1)$  is the same under either government, since each one wants to repay as much as possible of debt (left by incumbent  $a$ ) above the debt target in year  $(t + 1)$ . The reason is that there is no election at the end of that period and

each government wants to start with a clean slate into the next election year ( $t + 2$ ). See also footnote ???. As for the skills shock, individuals have no idea about either potential policymaker's skills in ( $t + 1$ ). Nor do they know the skills shock of the challenger in period  $t$ , and, therefore, expect 0. However, they can use the incumbent's period  $t$  fiscal policy to draw conclusions about her skills shock in period  $t$ . The expected level of local public goods of the challenger differs from what is know of the incumbent:

$$E_t[L_{t+1}^b] = E_t[\tau_t \epsilon_{t+1} - D_{t+1}]; \quad (\text{A.5})$$

$$E_t[L_{t+1}^a] = E_t[\tau_t \epsilon_{t+1} - D_{t+1}] + E_t[\mu_t^a]. \quad (\text{A.6})$$

Combining equations (A.1) to (A.6) we can obtain a condition for an individual to vote for incumbent  $a$  (which corresponds to condition (11) in the main text):

$$E_t[\mu_t^a] > \alpha \theta^i. \quad (\text{A.7})$$

Using the distribution of the skills shock we can determine the probability ( $Pr$ ) of any voter to vote for incumbent  $a$ :

$$Pr[E_t[\mu_t^a] - \alpha \theta^i \geq 0] = \frac{E_t[\mu_t^a] - (-\alpha)}{\alpha - (-\alpha)} = \frac{E_t[\mu_t^a]}{2\alpha} + \frac{1}{2}. \quad (\text{A.8})$$

## B PROBABILITY OF THE INCUMBENT TO WIN

Now, we can determine the probability  $Prob$  that incumbent  $a$  obtains 50% of the votes in the period  $t$  elections. It is the probability that mass 1 of voters, i.e., all voters times their individual probability  $Pr$  to vote for incumbent  $a$  (as determined in equation A.8) is greater or equal to  $\frac{1}{2}$ . The probability for the incumbent to win the election – equation (12) in the main text – is repeated here:

$$\text{Prob} \left\{ \left[ \frac{E_t[\mu_t^a]}{2\alpha} + \frac{1}{2} \right] \geq \frac{1}{2} \right\} \quad (\text{B.1})$$

*Competence extraction mechanism:* Voters' expectation of government competence  $\mu_t^a$  can be obtained by studying the voters' perception of the government budget constraint (9) from the main text which is repeated here:

$$L_t = \tau_t \epsilon_t + D_t + \mu_t^a + \mu_{t-1}^a. \quad (\text{B.2})$$

The true competence is:

$$\mu_t^a = L_t - \tau_t \epsilon_t - D_t - \mu_{t-1}^a. \quad (\text{B.3})$$

Voters can observe the level of local public goods  $L_t$ , previous period competence  $\mu_{t-1}^a$ , and the tax rate  $\tau_t$ . Their perception of government competence is, however, also affected by their expectation of growth and the government deficit policy (which can be concealed, for instance, by using special government funds and accounting tricks). Hence we obtain what corresponds to equation (14) in the main text:

$$\begin{aligned} E_t[\mu_t^a] = \widehat{\mu}_t^a &= L_t - \tau_t \widehat{\epsilon}_t - \widehat{D}_t - \mu_{t-1}^a \\ &= \underbrace{L_t - \tau_t \epsilon_t - D_t - \mu_{t-1}^a}_{\mu_t^a \text{ from (13) or (B.3)}} + [\tau_t(\epsilon_t - \widehat{\epsilon}_t)] + [D_t - \widehat{D}_t]; \\ E_t[\mu_t^a] = \widehat{\mu}_t^a &= \mu_t^a + [\tau_t(\epsilon_t - \widehat{\epsilon}_t)] + [D_t - \widehat{D}_t]. \end{aligned} \quad (\text{B.4})$$

Hence the incumbents' probability of winning becomes (equation 15 in the main text):

$$\begin{aligned} \text{Prob}^{win} &= \text{Prob} \left\{ \left[ \frac{\mu_t^a + [\tau_t(\epsilon_t - \widehat{\epsilon}_t)] + [D_t - \widehat{D}_t]}{2\alpha} + \frac{1}{2} \right] \geq \frac{1}{2} \right\} \\ &= \text{Prob} \left\{ \mu_t^a \geq [\tau_t(\widehat{\epsilon}_t - \epsilon_t)] + [\widehat{D}_t - D_t] \right\} \end{aligned} \quad (\text{B.5})$$

$$= 1 - F[\tau_t(\widehat{\epsilon}_t - \epsilon_t) + \widehat{D}_t - D_t], \quad (\text{B.6})$$

where  $F(\bullet)$  is the distribution function of the skills shock.



FIGURE B.1: BELL-SHAPED COMPETENCE DENSITY FUNCTION AS AN EXAMPLE

The marked area towards the right (light grey or yellow [if in colour]) under the density function depicted in Figure B.1 corresponds to the probability described by equation (B.5) and by the distribution function representation in equation (B.6). Consider a recession which is underestimated by voters. Then, the expected competence overall can be greater than actual competence only if the government's deficit makes up for the voters' underestimation of the shortfall in tax revenue ( $\tau_t(\widehat{\epsilon}_t - \epsilon_t) < 0$ ), plus the voters' expected deficit  $\widehat{D}_t$ . Then the probability (see equation (B.6) or the light grey [or yellow] area under the density function) is always greater than  $\frac{1}{2}$  and the government's chance to be re-elected is increased. The competence perception of voters would also be increased, if voters fully knew of and believed in the (forecasted) recession and the government increased the deficit beyond what voters expect. However, if voters could rationally foresee the recession *and* the deficit manipulation by the government, then the manipulation would turn out to be ineffective at the equilibrium.

Using equation (7) of the main text we can relate period  $t$  deficit to the  $(t - 1)$  debt level:

$$D_t = (\delta - (1 + r))B_{t-1}^* + D_t^{free}. \quad (\text{B.7})$$

The winning probability becomes:

$$\text{Prob}^{win} = 1 - F[\tau_t(\widehat{\epsilon}_t - \epsilon_t) + \widehat{D}_t - (\delta - (1 + r))B_{t-1}^* + D_t^{free}]. \quad (\text{B.8})$$

## C THE INCUMBENT'S MAXIMISATION PROBLEM

Prior to elections, incumbent  $a$  would like to maximize her utility over periods  $t$  and  $(t + 1)$  by determining  $D_t$  (see the timing of events in Table 1 of the main text). She can, however, only decide on the free component of the deficit  $D_t^{free}$ . Period  $(t + 1)$  utility is the sum of the utilities for winning and losing the election weighted by the just determined probability. ( $X_s$  is kept constant and discount factor  $\beta$  is set to 1 because it is irrelevant for the qualitative properties of the results.) Hence, incumbent  $a$ 's decision problem:

$$\begin{aligned}
 \max_{D_t^{free}} V &= \max_{D_t^{free}} V_t^a = \max_{D_t^{free}} W_t^a + W_{t+1}^a \\
 &= \max_{D_t^{free}} E_t^a \{ u((1 - \tau)\epsilon_t) + L_t + X \} \\
 &\quad + E_t^a \{ \text{Prob}^{win} [u((1 - \tau)\epsilon_{t+1}) + L_{t+1} + X - (B_t^* - B_t)^2] \} \\
 &\quad + E_t^a \{ (1 - \text{Prob}^{win}) [u((1 - \tau)\epsilon_{t+1}) + L_{t+1}] \} \tag{C.1}
 \end{aligned}$$

$$\begin{aligned}
 &= \max_{D_t^{free}} u((1 - \tau)\epsilon_t) + L_t + X \\
 &\quad + u((1 - \tau)\epsilon_{t+1}) + L_{t+1} + \text{Prob}^{win} [X - (\delta B_{t-1}^* - B_t)^2]. \tag{C.2}
 \end{aligned}$$

where

$$\begin{aligned}
L_t &= \tau\epsilon_t + D_t + \eta_t^j; \\
L_{t+1} &= \tau\epsilon_{t+1} + D_{t+1} + \eta_{t+1}^j; \\
D_t &= (\delta - (1+r))B_{t-1}^* + D_t^{free}; \\
D_{t+1} &= B_{t+1} - (1+r)B_t \\
&= B_{t+1} - (1+r)[(1+r)B_{t-1} + D_t] \\
&= B_{t+1}^* - (1+r)^2B_{t-1} - (1+r)D_t \quad [\text{government goes for lower limit,} \\
&\hspace{20em} \text{Footnote 5 of the main text}] \\
&= \delta^2B_{t-1}^* - (1+r)^2B_{t-1}^* - (1+r)D_t \quad [\text{use equation (5) of the main text}] \\
&= (\delta^2 - (1+r)^2)B_{t-1}^* - (1+r)D_t.
\end{aligned}$$

The first order condition (FOC) is:

$$\begin{aligned}
V_{D_t^{free}} &= \frac{dV}{dD_t^{free}} = 1 - (1+r_t) + F'[\tau(\widehat{\epsilon}_t - \epsilon_t) + \widehat{D}_t - (\delta - (1+r))B_{t-1}^* + D_t^{free}] \\
&\hspace{15em} [X - (\delta B_{t-1}^* - B_t)^2] = 0; \\
\Leftrightarrow \quad r_t &= F'[\bullet] [X - (\delta B_{t-1}^* - B_t)^2]. \tag{C.3}
\end{aligned}$$

The second order condition for a well-behaved maximisation problem is satisfied.<sup>1</sup> So the FOC determines the government's optimal deficit  $D_t^{free*}$ .

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<sup>1</sup>  $V_{D_s^{free} D_s^{free}} = -F''[\bullet] [X - (B_t^* - B_t)^2] < 0$ . The manipulation pushes the critical value of the  $F$  function below mean 0, so that  $F''[\bullet] > 0$ . Then the sufficient condition  $X > (B_t^* - B_t)^2$  must, obviously, be satisfied for a maximising government because winning the elections only makes sense when the ego rent is not totally eaten up by the reputation loss.

## D PERTURBATION RESULTS

The Implicit Function Theorem is used for obtaining perturbation results. Derivatives with respect to any variable  $x$  of the FOC around the optimal value  $D_t^{free*}$  will be denoted  $\frac{d \frac{dV}{dD_t^{free}} |_{D_t^{free*}}}{dx} =: V_{D_t^{free} x}$ . The derivations of the marginal effect of changes in exogenous variables *on* the equilibrium value of the government's optimal choice of deficit  $D_t^{free*}$  are specified below.

**For Lemma 1:**

$$\begin{aligned} \frac{dD_t^{free*}}{d\epsilon_t} &= -\frac{V_{D_t^{free} \epsilon_t}}{V_{D_t^{free} D_t^{free}}} \\ &= -\frac{-F''[\bullet] [\tau(B_{t-1}^*)\epsilon_t] [X - (\delta B_{t-1}^* - B_t)^2]}{-F''[\bullet] [X - (\delta B_{t-1}^* - B_t)^2]} = -\tau(B_{t-1}^*)\epsilon_t < 0. \end{aligned} \quad (D.1)$$

$$\frac{dD_t}{d\epsilon_t} = \frac{d[(\delta - (1+r))B_{t-1}^*]}{d\epsilon_t} + \frac{dD_t^{free*}}{d\epsilon_t} = 0 - \tau(B_{t-1}^*)\epsilon_t < 0. \quad (D.2)$$

**For Proposition 1:**

$$\frac{d \frac{dD_t}{d\epsilon_t}}{dB_{t-1}^*} = -\tau'(B_{t-1}^*)\epsilon_t < 0. \quad (D.3)$$

## E PRELIMINARY RESULTS ON THE EMPIRICAL MODEL AND DESCRIPTIVE STATISTICS

This section presents the results of the ARMAX models for the NUTS III regions, of descriptive statistics, and of estimations for the relation between initial debt and growth in fiscal revenues.

TABLE E.1: ARMAX ESTIMATION RESULTS

| Region                       | National Forecast<br>of GDP growth | AR(1)     | AR(2)     | MA(1)     | Obs. | Log<br>likelihood | P-value |
|------------------------------|------------------------------------|-----------|-----------|-----------|------|-------------------|---------|
| Alto Minho                   | 1.004***                           | -0.170    | -0.228    | 0.049     | 23   | -56.27            | 0.000   |
| Cávado                       | 1.336***                           | 0.338     | 0.148     | -0.103    | 23   | -53.31            | 0.000   |
| Ave                          | 0.983***                           | -0.021    | 0.179     |           | 23   | -53.40            | 0.002   |
| Área Metropolitana do Porto  | 1.569***                           | 0.940***  | -0.137    | -1.000*** | 23   | -51.38            | 0.000   |
| Alto Tâmega                  | 0.996***                           | 0.424*    | -0.112    | -1.000*** | 23   | -52.65            | 0.000   |
| Tâmega e Sousa               | 1.569***                           | 0.318     | -0.177    | -1.000*** | 23   | -55.81            | 0.000   |
| Douro                        | 0.735**                            | -1.160*** | -0.686*** | 1.000***  | 23   | -56.52            | 0.012   |
| Terras de Trás-os-Montes     | 1.409***                           | -0.091    | -0.269    |           | 23   | -55.80            | 0.008   |
| Oeste                        | 1.534***                           | -0.446    | -0.215    | 0.529*    | 23   | -53.30            | 0.000   |
| Região de Aveiro             | 1.418***                           | -0.148    | 0.042     |           | 23   | -53.26            | 0.000   |
| Região de Coimbra            | 1.701***                           | -0.240    | -0.094    | -0.056    | 23   | -53.38            | 0.000   |
| Região de Leiria             | 1.715***                           | 0.600***  | 0.204     | -1.000*** | 23   | -54.75            | 0.000   |
| Viseu Dão Lafões             | 1.769***                           | 0.473***  | -0.253    | -1.000*** | 23   | -55.90            | 0.000   |
| Beira Baixa                  | 1.047***                           | 0.820***  | -0.157    | -1.000*** | 23   | -60.68            | 0.000   |
| Médio Tejo                   | 1.448***                           | -0.330    | -0.361*   | 0.417***  | 23   | -54.70            | 0.000   |
| Beiras e Serra da Estrela    | 1.391***                           | 0.425**   | -0.279    | -1.000*** | 23   | -50.55            | 0.000   |
| Área Metropolitana de Lisboa | 2.042***                           | 1.135***  | -0.369*   | -1.000*** | 23   | -59.81            | 0.000   |
| Alentejo Litoral             | 2.657***                           | 0.717***  | -0.157    | -1.000*** | 23   | -72.71            | 0.000   |
| Baixo Alentejo               | 1.670***                           | 0.395*    | -0.137    | -1.000*** | 23   | -65.50            | 0.000   |
| Lezíria do Tejo              | 1.563***                           | 0.735***  | -0.406    | -1.000*** | 23   | -68.36            | 0.000   |
| Alto Alentejo                | 1.129***                           | 1.022***  | -0.660*** | -1.000*** | 23   | -53.50            | 0.000   |
| Alentejo Central             | 1.253***                           | 1.087***  | -0.301    | -1.000*** | 23   | -56.92            | 0.000   |
| Algarve                      | 2.311***                           | 0.758***  | -0.400**  | -1.000*** | 23   | -49.56            | 0.000   |
| Região Autónoma dos Açores   | 2.150***                           | 0.483***  | -0.520*** | -1.000*** | 23   | -43.41            | 0.000   |
| Região Autónoma da Madeira   | 3.423***                           | 0.622***  | 0.122     | -1.000*** | 23   | -74.13            | 0.000   |

Notes: ARMAX(2,1) estimations for each region, except for three for which this specification did not converge, and an ARMAX(2,0) was used instead. Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .



TABLE E.2: DESCRIPTIVE STATISTICS

| VARIABLES   | Observations | Mean   | St.Dev. | Min.    | Max.     |
|---|--------------|--------|---------|---------|----------|
| Primary deficit (real euros per capita)               | 4,002        | -6.05  | 166.84  | -745.00 | 3,616.92 |
| Election year   | 4,002        | 0.23   | 0.42    | 0.00    | 1.00     |
| GDP Forecast (regional)                               | 4,002        | 0.31   | 2.34    | -9.46   | 6.61     |
| Dependency ratio                                      | 4,002        | 35.65  | 4.18    | 26.43   | 51.83    |
| Population density                                    | 4,002        | 297.49 | 817.42  | 4.41    | 7,530.69 |
| Mayor left  | 4,002        | 0.49   | 0.50    | 0.00    | 1.00     |
| Mayor independent                                     | 4,002        | 0.02   | 0.14    | 0.00    | 1.00     |
| Years mayor   | 4,002        | 8.96   | 7.01    | 1.00    | 37.00    |
| Majority  | 4,002        | 0.79   | 0.41    | 0.00    | 1.00     |
| Debt ratio (Gross debt over average current revenues) | 4,002        | 1.58   | 1.16    | 0.00    | 11.49    |
| Excess debt (Debt ratio > 1.5)                        | 4,002        | 0.42   | 0.49    | 0.00    | 1.00     |
| Excess debt 2 (Debt ratio > 2)                        | 4,002        | 0.27   | 0.44    | 0.00    | 1.00     |
| Excess debt 3 (Debt ratio > Median debt ratio (1.3))  | 4,002        | 0.50   | 0.50    | 0.00    | 1.00     |

Sources: DGAL, Ministry of Finance, Ministry of Internal Affairs, and INE.

TABLE E.3: GROWTH IN FISCAL REVENUES EXPLAINED BY INITIAL DEBT

| VARIABLES                         | (1)<br>1 year         | (2)<br>1 year         | (3)<br>2 years        | (4)<br>2 years        | (5)<br>3 years        | (6)<br>3 years        | (7)<br>4 years        | (8)<br>4 years        |
|-----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Debt ratio<br>(initial)           | 0.023**<br>(2.081)    |                       | 0.016***<br>(2.680)   |                       | 0.012**<br>(2.313)    |                       | 0.011**<br>(2.141)    |                       |
| Excessive debt dummy<br>(initial) |                       | 3.853*<br>(1.961)     |                       | 1.975*<br>(1.909)     |                       | 1.995**<br>(2.172)    |                       | 1.986**<br>(2.021)    |
| Regional GDP<br>growth (average)  | 0.417*<br>(1.701)     | 0.401*<br>(1.650)     | 0.499**<br>(1.998)    | 0.489*<br>(1.961)     | 1.230***<br>(3.116)   | 1.213***<br>(3.101)   | 1.433***<br>(3.205)   | 1.418***<br>(3.200)   |
| Population growth<br>(average)    | -0.854***<br>(-6.487) | -0.864***<br>(-6.521) | -0.845***<br>(-6.239) | -0.855***<br>(-6.350) | -1.262***<br>(-7.294) | -1.269***<br>(-7.377) | -1.351***<br>(-5.456) | -1.353***<br>(-5.479) |
| Mayor left (average)              | 3.130<br>(1.292)      | 3.270<br>(1.324)      | 2.675<br>(1.649)      | 2.761*<br>(1.684)     | 1.423<br>(1.292)      | 1.481<br>(1.342)      | 0.304<br>(0.240)      | 0.337<br>(0.266)      |
| Majority (average)                | 0.090<br>(0.103)      | 0.038<br>(0.044)      | 0.865<br>(0.857)      | 0.804<br>(0.801)      | 0.484<br>(0.494)      | 0.390<br>(0.397)      | 0.626<br>(0.572)      | 0.517<br>(0.467)      |
| Observations                      | 3,696                 | 3,696                 | 3,388                 | 3,388                 | 3,080                 | 3,080                 | 2,772                 | 2,772                 |
| R-squared                         | 0.078                 | 0.077                 | 0.174                 | 0.171                 | 0.202                 | 0.201                 | 0.238                 | 0.236                 |

Notes: The dependent variable is the annual average growth rate of fiscal revenues over the time horizon indicated at the top of each column. Regressions with fixed effects for municipalities and years. T-statistics based on standard errors robust to heteroskedasticity and autocorrelation, clustered by municipality, are in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . The time horizon considered for the initial values and the averages in each estimation is indicated in the title of the respective column.

## F ADDITIONAL RESULTS AND ROBUSTNESS AND SENSITIVITY TESTS

This subsection presents the average marginal effects of the election year on the primary deficit when performing estimations for total expenditures and for fiscal revenues, the results obtained when using alternative definitions of excessive debt, and those of robustness tests and of the sensitivity analysis.

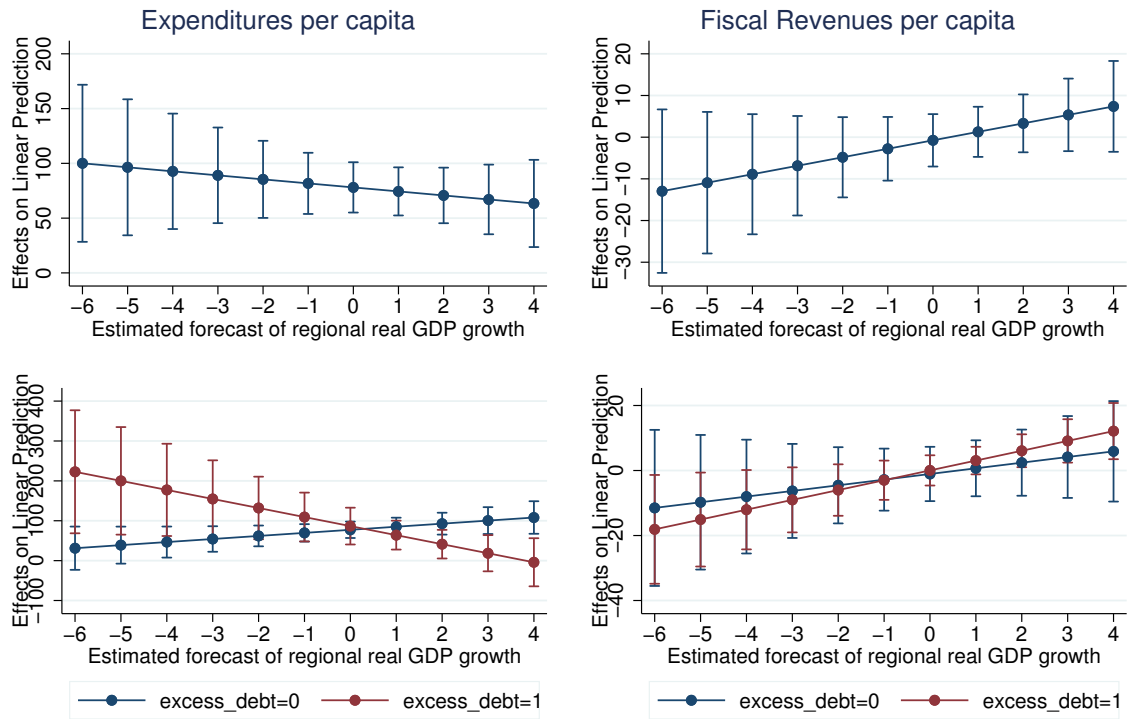


FIGURE F.1: AVERAGE MARGINAL EFFECTS OF THE ELECTION YEAR - EXPENDITURES AND FISCAL REVENUES

TABLE F.1: ALTERNATIVE DEFINITIONS OF EXCESSIVE DEBT

| VARIABLES  | (1)                           | (3)  |
|--|-------------------------------|--|
|  | Excess debt 2<br>Debt ratio>2 | Excess debt 3<br>Debt ratio>median(Debt ratio) |
| Election year  | 64.822***<br>(9.672)          | 64.418***<br>(7.679)                           |
| Real GDP growth forecast (NUTS 3 region)                               | 2.048<br>(1.205)              | 0.668<br>(0.416)                               |
| Election year * Real GDP growth forecast (NUTS 3 region)               | -10.042***<br>(-3.650)        | -7.601**<br>(-2.209)                           |
| Excess debt  | 27.557***<br>(2.702)          | 21.235**<br>(2.425)                            |
| Election year * Excess debt  | -6.050<br>(-0.283)            | -2.676<br>(-0.180)                             |
| Excess debt * Real GDP growth forecast (NUTS 3 region)                 | 10.661***<br>(3.251)          | 8.619***<br>(3.775)                            |
| Election year * Excess debt * Real GDP growth forecast (NUTS 3 region) | -18.430**<br>(-2.467)         | -14.470***<br>(-2.656)                         |
| Mayor left   | -12.853<br>(-1.128)           | -12.486<br>(-1.094)                            |
| Mayor independent  | 32.899<br>(1.164)             | 34.568<br>(1.212)                              |
| Years mayor  | -0.864<br>(-1.472)            | -0.792<br>(-1.336)                             |
| Majority   | -0.285<br>(-0.025)            | 0.265<br>(0.023)                               |
| Dependency ratio   | -4.896*<br>(-1.718)           | -4.526<br>(-1.560)                             |
| Population density   | 0.039<br>(1.021)              | 0.028<br>(0.786)                               |
| Observations   | 4,002                         | 4,002  |
| R-squared  | 0.124                         | 0.123  |

Notes: Regressions with fixed effects for municipalities, 5-year period dummies, and standard errors clustered by NUTS III region and year. The definition of excessive debt used in each estimation is indicated at the top of the respective column. T-statistics based on standard errors robust to heteroskedasticity and autocorrelation are in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

TABLE F.2: ROBUSTNESS TESTS

| VARIABLES   | (1)<br>Excluding<br>Vector X | (2)<br>4-Year<br>Dummies | (3)<br>Clustering by<br>municipality | (4)<br>National<br>forecasts |
|---|------------------------------|--------------------------|--------------------------------------|------------------------------|
| Election year   | 61.367***<br>(8.688)         | 45.846***<br>(5.819)     | 62.903***<br>(8.569)                 | 63.297***<br>(8.998)         |
| Real GDP growth forecast (NUTS 3 region)                                  | 24.899***<br>(2.805)         | 25.548***<br>(2.716)     | 23.219**<br>(2.574)                  | 5.705<br>(0.531)             |
| Election year * Real GDP growth forecast (NUTS 3 region)                  | 3.419<br>(0.210)             | 8.014<br>(0.491)         | 2.732<br>(0.149)                     | 20.214<br>(0.897)            |
| Excess debt   | 1.730<br>(1.119)             | 4.902***<br>(3.244)      | 1.166<br>(0.734)                     | -3.725<br>(-0.807)           |
| Election year * Excess debt   | -8.128***<br>(-2.623)        | -7.479**<br>(-2.331)     | -7.974**<br>(-2.284)                 | -6.473<br>(-1.229)           |
| Excess debt * Real GDP growth forecast (NUTS 3 region)                    | 8.936***<br>(3.427)          | 7.957***<br>(3.099)      | 8.976***<br>(3.734)                  | 22.111***<br>(4.015)         |
| Election year * Excess debt * Real GDP growth<br>forecast (NUTS 3 region) | -17.241***<br>(-2.959)       | -17.438***<br>(-2.968)   | -17.149***<br>(-2.717)               | -37.701***<br>(-3.033)       |
| Mayor left  |                              | -4.919<br>(-1.559)       | -4.307<br>(-1.637)                   | -4.108<br>(-1.494)           |
| Mayor independent   |                              | 0.045<br>(1.295)         | 0.035<br>(1.102)                     | 0.029<br>(1.032)             |
| Years mayor   |                              | -10.570<br>(-0.908)      | -12.258<br>(-1.127)                  | -10.667<br>(-0.978)          |
| Majority  |                              | 40.526<br>(1.406)        | 34.976<br>(1.229)                    | 37.948<br>(1.348)            |
| Dependency ratio  |                              | -1.019<br>(-1.531)       | -0.825<br>(-1.307)                   | -1.065<br>(-1.618)           |
| Population density  |                              | 2.697<br>(0.239)         | 0.477<br>(0.048)                     | 0.715<br>(0.073)             |
| Observations  | 4,002                        | 4,002                    | 4,002                                | 4,002                        |
| R-squared   | 0.121                        | 0.122                    | 0.124                                | 0.122                        |

Notes: Regressions with fixed effects for municipalities, 5-year period dummies (columns 1 and 3), and standard errors clustered by NUTS III region and year in columns 1 and 3, and by municipality in column 3. Excessive debt is defined as in Table 2. T-statistics based on standard errors robust to heteroskedasticity and autocorrelation are in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

TABLE F.3: SENSITIVITY ANALYSIS

| VARIABLES  | (1)<br>Excluding<br>Azores and<br>Madeira | (2)<br>Excluding<br>formula grants<br>> 50% TotRev | (3)<br>Excluding<br>term-limited<br>mayors |
|--|---|--|--|
| Election year  | 64.939***<br>(8.645)                      | 44.821***<br>(5.653)                               | 65.663***<br>(6.953)                       |
| Real GDP growth forecast (NUTS 3 region)                               | 1.086<br>(0.666)                          | 3.118*<br>(1.924)                                  | 2.329<br>(1.172)                           |
| Election year * Real GDP growth forecast (NUTS 3 region)               | -6.807**<br>(-2.234)                      | -11.738***<br>(-3.319)                             | -8.569**<br>(-2.090)                       |
| Excess debt  | 22.991**<br>(2.402)                       | 24.115**<br>(2.473)                                | 20.509***<br>(2.661)                       |
| Election year * Excess debt  | 4.991<br>(0.286)                          | 6.973<br>(0.394)                                   | 1.033<br>(0.058)                           |
| Excess debt * Real GDP growth forecast (NUTS 3 region)                 | 7.605**<br>(2.512)                        | 7.201***<br>(2.750)                                | 6.201**<br>(2.163)                         |
| Election year * Excess debt * Real GDP growth forecast (NUTS 3 region) | -20.011***<br>(-3.077)                    | -11.893*<br>(-1.869)                               | -15.341**<br>(-2.305)                      |
| Mayor left   | -4.119<br>(-0.338)                        | -27.101**<br>(-2.050)                              | -9.012<br>(-0.809)                         |
| Mayor independent  | 43.817<br>(1.540)                         | -21.768<br>(-0.994)                                | 44.870<br>(1.321)                          |
| Years mayor  | -1.124*<br>(-1.895)                       | -0.153<br>(-0.262)                                 | -1.528*<br>(-1.941)                        |
| Majority   | -0.588<br>(-0.052)                        | 9.528<br>(0.849)                                   | -5.936<br>(-0.563)                         |
| Dependency ratio   | -5.187*<br>(-1.689)                       | 3.196<br>(0.960)                                   | -1.959<br>(-0.589)                         |
| Population density   | 0.030<br>(0.900)                          | 0.038<br>(1.105)                                   | 0.026<br>(0.667)                           |
| Observations   | 3,612                                     | 2,704  | 3,349                                      |
| R-squared  | 0.122                                     | 0.120  | 0.147                                      |

Notes: Regressions with fixed effects for municipalities, 5-year period dummies, and standard errors clustered by NUTS III region and year. Excessive debt is defined as in Table 2. T-statistics based on standard errors robust to heteroskedasticity and autocorrelation are in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .