

Economic Determinants of Political Alternation: A Panel Data Analysis of OECD Countries *

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Abstract

This paper studies the relationship between economic performance and election outcomes in OECD countries (1975-2012). Firstly, a critical review of Brender & Drazen (2008) is presented, identifying some methodological shortcomings and analysing the (lack of) robustness of some of their results. Subsequently, several methodological changes are proposed in order to obtain better estimates. First of all, the dependent variable measures political alternation at a political party level instead of at a political leader level. Secondly, the new specification uses cyclically adjusted primary balances to avoid multicollinearity problems between fiscal variables and GDP. Finally, a discount factor is introduced to construct a weighted-average of GDP per capita growth. The new specification is used to estimate the economic determinants of political alternation. In contrast to previous studies (Brender & Drazen, 2008), this paper finds that higher growth rates of GDP per capita increase the probability of reelection in OECD countries. In particular, a *ceteris paribus* increase of 1 percentage point in the weighted average growth rate during the term in office increases the probability of reelection by 8%. At the same time, rising deficits during the incumbent's term are associated with a lesser probability of reelection. However, there is no evidence that fiscal policy changes in the last year of the term in office affect the re-election chances of the incumbent parties.

Keywords: Economic Voting, Political Alternation, Fiscal Policy

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1 Introduction

Although there are many variables that can influence election outcomes (quality of politicians, ideology, foreign policy, scandals, wars, campaign spending...) it is widely documented that economic performance plays an important role. A branch of Political Economy, often referred to as Economic Voting, analyses the relation between economy and election outcomes (Lewis-Beck & Stegmaier, 2000 and Hibbs, 2005 for a comprehensive review of the literature).

Many empirical studies claim a high correlation between economic performance and election outcomes (reelection prospects). However, among experts, there is no consensus in pointing out which are the most relevant economic variables. Several variables have been proposed in the literature: real disposable personal income, real GDP per capita growth, unemployment rate, fiscal variables (surplus/deficit), inflation, taxes, transfers, inequality, etc.

The main objective of this paper is to review the relationship between economic activity and election results. It is very important to study the incentive structure that determines the behavior of political leaders, and which affects the functioning of institutions.

The paper is organized as follows. First, a brief review of the literature on "economic voting" is presented. Then, a critical review of Brender & Drazen (2008), identifying some methodological shortcomings and analysing the (lack of) robustness of some of their results. Subsequently, several alternative specifications are proposed and the model is re-estimated, in order to identify new correlations. As an extension of the article, two additional questions are addressed: (1) Does the International Crisis (2008-2012) change the model estimates? (2) Does the ideology of the incumbent party matter? Finally, conclusions are presented.

2 Literature review

In order to summarize the state of the art on economic voting, a selection of some of the most important articles in this field of research is presented:

Most studies on "economic voting" are country-level studies. Besley & Case (1995) focus on USA gubernatorial elections and find that the probability of incumbent defeat is increased by an increase in state taxes. However, this effect is offset (at least in part) if neighbours increase their taxes simultaneously. Hibbs (2000) propose the "Bread and Peace Model". The evolution of per capita disposable income and the cumulative numbers of American military personnel killed in action largely explain the results (% vote) for the U.S. Presidential Elections ($R^2=0.86$). Lewis-Beck & Paldam (2000) state that: "economic changes explain about one-third of the change in the vote". Fraile & Lewis-Beck (2010) find strong economic effects in the 2000 Spanish general election, using microdata from surveys.

However, few studies investigate the relation between economic performance and po-

litical alternation from a large cross-section of countries. Wilkin, Haller & Norpoth (1997) found that "election-year economic growth influences the vote of the major party in office" in a cross-national research. Alesina, Carloni & Lecce (2012) find "no evidence that governments which quickly reduce budget deficits are systematically voted out of office" in a sample of 19 OECD countries from 1975 to 2008.

Among the studies that contrast the existence of "economic voting" from a large panel of countries (cross-national studies), it is worth noting the following work, which will be analysed and reviewed in the next section:

Article: Brender, A., & Drazen, A., (2008) How do Budget deficits and economic growth affect reelection prospects? Evidence from a large panel of countries. *The American Economic Review*. 98(5). 2203-20.

3 Brender & Drazen (2008). A critical review.

3.1 Objectives and model specification

The aim of Brender & Drazen's work is to study the influence of economic growth and fiscal policy on the probability of re-election in a large sample of countries over the period 1960-2001. The authors suggest as a starting point the responsibility hypothesis: "Voters believe that the government is responsible for the evolution of the economy" and also the retrospective voting hypothesis: "Voters reward (or punish) politicians as a function of the good (or bad) evolution of the economic situation over their term in office." Moreover, they also believe that citizens value budgetary discipline and penalise governments that increase the public deficit.

To test these hypotheses, the authors propose the estimation of a reelection probability model. As a general rule¹, the dependent variable (*ReelectLeader*) receives the value 1 if the incumbent leader ² is reelected in the elections and a value of 0 if the incumbent leader is defeated³.

The explanatory variables included in the regression model can be classified into two groups (economic and control variables):

i) **Economic variables.** The model specification includes the following economic variables: real GDP per capita growth and two fiscal variables:

-GDPpcGrowth: Average real GDP per capita growth over the term in office.

$$GDPpcGrowth = 100 * \sqrt[x]{\frac{GDP_0}{GDP_{-x}}} - 1 \quad (1)$$

where, GDP_0 is the value of Real GDP per capita in the election year; GDP_{-x} is the value of Real GDP per capita in the first year of the legislature; x is the number of years

¹There are some specific cases that are detailed in the appendix (as the rule chosen when the incumbent leader is not eligible for re-election due to the existence of term limits).

²Prime minister in parliamentary systems and president in presidential systems.

³Sources: Database of Political Institutions, (World Bank) and Zárate's Political Collections (ZPC).

in office. Source: World Development Indicators (WB).

-SurplusTerm: The change in the average surplus-to-GDP ratio in the two years preceding the elections (not including the election year) compared to the previous two years.

$$SurplusTerm = 1/2 * (B_{-1} + B_{-2}) - 1/2 * (B_{-3} + B_{-4}) \quad (2)$$

where, B_{-i} is the surplus as a percentage of GDP i years before the elections. Source: International Financial Statistics (IMF) and Government Finance Statistics (IMF).

-SurplusLastYear: The change in the surplus-to-GDP ratio in the election year relative to the previous year.

$$SurplusLastYear = (B_0 - B_{-1}) \quad (3)$$

where, B_{-i} is the surplus as a percentage of GDP i years before the elections. Source: International Financial Statistics (IMF) and Government Finance Statistics (IMF).

ii) **Control variables.** The authors use political variables to control for different characteristics of the countries, such as:

-NewDemocracy: A binary variable, for each country in each election year, receiving the value 1 if country is defined as a New Democracy. Otherwise, the country is defined as an Old Democracy and the variable receives a value of 0.

-MajoritarianSystem: A binary variable, for each country in each election year, receiving the value 1 in a country with a majoritarian electoral system, and 0 otherwise.

3.2 Main results

Table 1 presents the logistic regression output by Brender & Drazen (2008) for developed countries (OECD) over the period 1960-2001. The first column shows the estimated coefficients and p-values in parentheses, while the second column presents the marginal effects computed at the sample means of the data. Greater fiscal discipline (increase in the primary surplus or decrease in the primary deficit) in the election year increases the likelihood of re-election of the ruling leader. At the same time, greater fiscal discipline throughout the rest of the term in office also increases the probability of re-election of the incumbent leader. However, the authors note that there is no evidence that "average economic growth over the term in office" is a significant variable in developed countries (OECD), other things equal.

Other things equal, the probability of reelection is higher in New Democracies, while the binary variable that differentiates between majoritarian and proportional systems is not statistically significant.

At the end of the article, the authors make a recommendation to politicians, "Running deficits in an election year is not an effective tool to help reelection and in fact is punished at the polls in developed countries. Politicians, take note!". At the same time, according to authors, there is evidence that fiscal adjustments increase the probability of reelection.

Table 1: Brender & Drazen (2008), OECD (1960-2001)

Dependent Variable:	ReelectLeader	
	β / p-value	Mfx
GDPpcGrowth ^a	-0.008 (0.937)	-0.002
SurplusTerm ^b	0.132* (0.096)	0.033
SurplusLastYear ^c	0.352*** (0.001)	0.088
NewDemocracy	1.266** (0.033)	0.316
MajoritarianSystem	0.586 (0.142)	0.146
Constant	-0.182 (0.555)	
Observations	180	
Pseudo R^2	0.071	
LR chi2	15.348	
Prob > chi2	0.009	
Baseline predicted probability	0.489	

^aGDPpcGrowth: the average growth rate of real per capita GDP during the term.

^bSurplusTerm: the change in the surplus-to-GDP ratio in the two years preceding the election year, relative to the two previous years

^cSurplusLastYear: the change in the government surplus ratio to GDP in the election year, compared to the previous year.

***Significant at 1%, **Significant at 5%, *Significant at 10%

Why is it so important to think about Brender & Drazen's work (2008)?

Their work was published in American Economic Review, has been cited in many articles (224 citations to date according to Google Scholar) and was also cited in various publications of the OECD. In addition, the findings are original, unlike other studies, the authors claim that economic growth does not influence the probability of re-election, once taken into account the effect of the fiscal and control variables. Once observed these results, the following questions arise:

1. Is this correlation robust?
2. Is this correlation generated by a causal relationship?
3. Are there other correlations between economic performance and election outcomes?

All these questions will be answered in the following sections of this paper.

3.3 Criticism

a) Multicollinearity problems

The specification defined by Brender & Drazen (2008) includes explanatory variables that have a high correlation between them. Specifically, there is a very high correlation between fiscal variables and GDP growth.

The existence of approximate multicollinearity can be a problem when estimating and correctly interpreting the model parameters, as it makes it difficult to estimate the individual effects of each of the variables. Given that the value of statistics for contrasts of individual significance is usually small, the probability of not rejecting the null hypothesis is increased and it is more difficult to find statistically significant variables.

A possible solution to this problem is to work with "cyclically adjusted balances"⁴. The original series of government deficit can be divided into two components: (1) structural deficit: defined as a projection of the deficit assuming that the economy is at its normal level of activity, and (2) cyclical deficit: defined as the part of the deficit related to the economic cycle. The structural deficit data allow the correlation between fiscal variables and GDP growth to be eliminated, thereby avoiding (or reducing) multicollinearity problems.

b) Fiscal variables are poorly defined

In Brender & Drazen's work, the variable `SurplusLastYear` is not defined precisely because it does not take into account the month in which the elections are held. The variable has the same value if elections are held in January or if they are held in December.

When elections are held in last months of the year, the variable does reflect the true purpose for which it was designed, that is simply to measure the change in fiscal policy in the last year of the term in office. However, if elections take place in the first months of the year, the definition does not fit the time frame that it wants to measure, because it uses surplus/deficit data in the months after the election day (up to 11 months after elections held in January). Hence in reality, it does not measure changes in fiscal policy in the last year of the term in office, but rather in the first year of the next term. This imprecision distorts the purpose for which the variable was included in the specification and calls into question the model estimations.

After verifying the inaccuracy of the variable `SurplusLastYear` it is advisable to propose an alternative definition. At this point, the difficulty encountered is that only annual data is available, as quarterly data of structural deficits are only available for recent years. The following assumption is chosen to be included: "the increase or reduction in the surplus occurs uniformly throughout the year." It is a fairly strong assumption but it still allows for a more precise definition to be built. The new definition is the following:

⁴Bornhorst et al. (2011) describe the methodology to construct "Cyclically Adjusted Balances".

$$NewSurplusLastYear = \frac{(m) * (B_0 - B_{-1}) + (12 - m) * (B_{-1} - B_{-2})}{12} \quad (4)$$

where, B_{-i} is the government surplus as a percentage of GDP i years before the elections and m is the month in which the elections are held (for example, February=2 and April=4).

An example is presented next, in order to illustrate the differences between the two definitions given. We assume that the elections take place in the first part of the year to sharpen the differences between the two definitions, for example, in February 2012. The data regarding the surplus with respect to the GDP are shown in the first row of **Table 2**. The second row shows the variation in the surplus-to-GDP ratio with respect to the previous year. It can be seen that the government in this case implemented an expansive fiscal policy in the months before the elections, while performing a smooth adjustment after the elections.

Table 2: Example to compare the two definitions.

	2009	2010	2011	2012
Surplus-to-GDP	-2%	-3%	-4%	-3%
Change in Surplus-to-GDP		-1%	-1%	1%
Last Year Surplus (B & D)				1%
New Last Year Surplus				-0.83%

In our example, according to the definition of Brender & Drazen (2008), the variable $SurplusLastYear$ takes the value of 1%, resulting from subtracting the value of the surplus-to-GDP ratio in 2012 (-3%) minus the value of the ratio in 2011 (-4%). According to this definition, the government is improving the situation of public finances (by reducing the deficit by one percentage point in the pre-election year). This definition does not adjust to reality, in fact, the government has increased the budget deficit in 2011 just before the election, while after the election (February 2012) the government has chosen a restrictive budgetary policy and has reduced the deficit by one percentage point.

According to the new definition proposed in this paper, the variable is calculated as follows:

$$NewSurplusLastYear = \frac{(m) * (B_0 - B_{-1}) + (12 - m) * (B_{-1} - B_{-2})}{12} = -0.83\% \quad (5)$$

$$\text{Values: } m=2, B_0 = 1\%, B_1 = -1\%, B_2 = -1\%$$

where, B_{-i} is the government surplus as a percentage of GDP i years before the elections.

The new definition is able to capture more accurately the change in fiscal policy in the last twelve months of the term in office. The differences between the two definitions are greater in elections that are held in the first months of the year and are very small when they are held at the end of the year. The change in the definition allows the change in fiscal policy in the final months of the term to be measured more precisely, although its value is approximate due to the unavailability of quarterly or monthly data for the whole series and therefore the results should be considered with caution.

c) Definition of "reelection"

Brender & Drazen (2008) studies political change focusing on re-election (or no re-election) of the head of government. In presidential systems, this position is occupied by the president; while in parliamentary systems, the head of government is the prime minister.

However, there is an alternative approach that measures political change at a political party level. Voters tend to think that the ruling party (or ruling coalition) is responsible for the good (or bad) economic situation. Thus, the alternative variable (*ReelectParty*⁵) is proposed as a new dependent variable.

d) No discount rate for GDP growth.

Brender & Drazen (2008) proposes that the average economic growth rate over the term in office be included as an explanatory variable in the model of reelection probability. There is evidence that voters tend to give more importance to recent events (Paldam & Nannestad, 2000 and Healy & Lenz, 2014). That is, voters (or at least most of them) would have a short time horizon (they are "myopic").

In this context, it appears advisable to replace the arithmetic mean by the weighted mean as the latter gives more weight to data close to the elections, in the same way as Hibbs (2000). This modification allows the impact of economic growth on the probability of re-election to be measured more accurately. The formula used to calculate the weighted economic growth is:

$$GDPpcWeighted = \sum_{i=0}^n \lambda^i * \Delta GDP_{-i} * (1 / \sum_{i=1}^n \lambda^i) \quad (6)$$

where, ΔGDP_0 is the real GDP per capita growth in the month in which the election was held; n is the number of months of the legislature; GDP_{-n} is the real GDP per capita growth in the first month of the legislature; λ is the discount rate; $\lambda \in (0, 1)$

3.4 Robustness analysis

This section is intended to check whether the results found in Brender & Drazen (2008) are robust. The model will be subjected to several robustness tests.

⁵The complete definition of the variable is described in the appendix

3.4.1 Robustness test against changes in the sample period.

First, we check the model’s robustness against changes in the sample period. Brender & Drazen use a panel containing democratic elections in OECD countries from 1960 to 2001 (180 observations). Keeping constant Brender & Drazen’s specification, we re-estimate the regression but extending the sample period until 2012 (72 additional elections). Table 3 shows the new regression output:

Table 3: Robustness analysis against changes in the sample period

Dependent variable:	Original Sample		Extended Sample (1960-2012)	
	ReelectLeader β / p-value	Mfx	ReelectLeader β / p-value	Mfx
GDPpcGrowth ^a	0.027 (0.783)	0.007	0.097 (0.233)	0.024
SurplusTerm ^b	0.160** (0.047)	0.040	0.174*** (0.005)	0.044
SurplusLastYear ^c	0.296*** (0.007)	0.074	0.108 (0.112)	0.027
NewDemocracy	1.403** (0.013)	0.350	1.037* (0.083)	0.259
MajoritarianSystem	0.323 (0.399)	0.081	0.273 (0.393)	0.068
Constant	-0.170 (0.594)		-0.259 (0.275)	
Observations	182		255	
Pseudo R^2	0.064		0.051	
LR chi2	13.395		16.090	
Prob > chi2	0.020		0.007	
Baseline predicted probability	0.485		0.499	

^aGDPpcGrowth: the average growth rate of real per capita GDP during the term in office.

^bSurplusTerm: the change in the surplus-to-GDP ratio in the two years preceding the election year, relative to the two previous years

^cSurplusLastYear: the change in the government surplus ratio to GDP in the election year, compared to the previous year.

***Significant at 1%, **Significant at 5%, *Significant at 10%,

By expanding the sample, SurplusLastYear stops being significant. Unlike the original regression, there is no evidence that an improvement in the public surplus in the last year of the term in office increases the probability of re-election. It can be concluded that Brender & Drazen’s results are not robust against changes in the sample period.

3.4.2 Robustness test against changes in the model specification.

In this section, the robustness of the Brender & Drazen’s results against changes in the model specification is analysed. Four changes are proposed: (1) using ”cyclically adjusted fiscal variables” to avoid multicollinearity problems, (2) new definition of reelection (focusing on the party instead of the head of the government), (3) new definition of variable ”SurplusLastYear” and (4) introducing a discount rate to calculate a weighted average of the economic growth. The changes will be introduced sequentially in order to observe the results step by step. **Table 4** describes briefly the four proposed regressions for the robustness analysis.

Table 4: Robustness test against changes in the model specification

	Fiscal variables	Reelection	New Def.	Discount rate (λ)	Obs.
B & D	Non-Adjusted	Leader	No	No	112
Reg. 1	Cycl. Adjusted	Leader	No	No	112
Reg. 2	Cycl. Adjusted	Party	No	No	112
Reg. 3	Cycl. Adjusted	Party	Yes	No	112
Reg. 4	Cycl. Adjusted	Party	Yes	Yes	112

Structural deficit data are only available since 1970, so it is only possible to include elections from 1975 and onwards. The unavailability of data for structural deficit in the 1960s means that the robustness analysis can only be performed on a reduced sample.

Therefore, as a first step, the original Brender & Drazen model for the period 1975-2001 is estimated again, excluding 68 elections that took place between 1960 and 1974. The model has been re-estimated from the information provided by the authors on their website (database and do file). The estimation results are presented in **Table 5** and it can be observed that there is almost no change compared to the original estimation. After this step, the robustness tests are carried out:

In **Regression 1**, Brender & Drazen’s regression is replicated, but using cyclically adjusted fiscal variables instead of non-cyclically adjusted fiscal variables. The new variables are called: SurplusLastYearCA and SurplusTermCA. Everything else remains identical to the original formulation. The results are shown in column 1 of **Table 5**.

The results change significantly. Economic growth becomes a significant variable (5%) and the sign of the coefficient is positive, implying that higher economic growth over the term in office increases the probability of reelection, other things equal. Furthermore, the fiscal variables are not significant at usual levels. It can be concluded that eliminating multicollinearity problems (using cyclically adjusted fiscal variables) there is empirical evidence that economic growth is a significant variable.

In **Regression 2**, we continue using cyclically adjusted fiscal variables and we also change the definition of reelection. We use the following rule ”there is reelection when

Table 5: Robustness test

Dependent Variable:	(0)		(1)		(2)		(3)		(4)	
	Reelect_leader β / p-value	Mfx	Reelect_leader β / p-value	Mfx	Reelect_party β / p-value	Mfx	Reelect_party β / p-value	Mfx	Reelect_party β / p-value	Mfx
GDPpcGrowth ^a	0.146 (0.297)	0.036	0.279** (0.032)	0.070	0.441*** (0.005)	0.098	0.412*** (0.009)	0.091		
GDPpcWeighted ^b									0.446*** (0.007)	0.098
SurplusTerm ^c	0.142* (0.099)	0.035								
SurplusLastYear ^d	0.240* (0.074)	0.060								
SurplusTermCA ^e			0.101 (0.296)	0.025	0.094 (0.371)	0.021	0.888** (0.018)	0.197	0.938** (0.012)	0.207
SurplusLastYearCA ^f			0.080 (0.581)	0.020	0.015 (0.920)	0.003				
NewSurplusLastYearCA ^g							-0.429 (0.125)	-0.095	-0.433 (0.120)	-0.096
NewDemocracy	1.177 (0.239)	0.293	0.585 (0.537)	0.146	0.969 (0.417)	0.216	0.526 (0.656)	0.117	0.362 (0.758)	0.080
MajoritarianSystem	0.045 (0.932)	0.011	0.074 (0.888)	0.018	-0.526 (0.328)	-0.118	-0.492 (0.364)	-0.109	-0.643 (0.241)	-0.142
Constant	-0.279 (0.464)		-0.581 (0.111)		-0.292 (0.449)		-0.272 (0.490)		-0.374 (0.368)	
Observations	112		112		112		112		112	
Pseudo R^2	0.073		0.049		0.093		0.132		0.149	
LR chi2	11.306		7.661		13.595		19.275		19.709	
Prob > chi2	0.046		0.176		0.018		0.002		0.001	
BPP	0.527		0.527		0.643		0.643		0.643	

^aGDPpcGrowth: The average growth rate of real per capita GDP during the term in office.

^bGDPpcWeighted: Weighted economic growth over the term in office. Discount rate ($\lambda = 0.95$).

^cSurplusTerm: The change in the surplus-to-GDP ratio in the two years preceding the election year, relative to the two previous years

^dSurplusLastYear: The change in the government surplus ratio to GDP in the election year, compared to the previous year.

^eSurplusTermCA: The change in the surplus-to-GDP ratio in the two years preceding the election year, relative to the two previous years (cyclically adjusted data).

^fSurplusLastYearCA: The change in the government surplus ratio to GDP in the election year, compared to the previous year (cyclically adjusted data)

^gNewSurplusLastYearCA: The change in the surplus-to-GDP ratio in the last twelve months of the term in office (cyclically adjusted data.)

***Significant at 1%, **Significant at 5%, *Significant at 10%,

BPP: Baseline predicted probability

the incumbent party (or incumbent coalition) wins again in the elections⁶, instead of focusing on the incumbent leader (prime minister or president). The justification for this change is to check whether the correlations are maintained when we assume that voters assign responsibility to political parties, instead of declaring responsible to the incumbent leader. The new variable is called: *ReelectParty*.

With this new specification, the variable *GDPpcGrowth* is significant at 1% (instead of 5%) and their marginal effect at mean (MEM) increases. In addition, the pseudo R2 increases from 0.05 to 0.09.

In **Regression 3**, we modify the definition of the variable that measure the change in the surplus-to-GDP ratio in the last year in office, to take into account the month in which the elections are held. The new variable is called *NewSurplusLastYearCA*.

With this new definition, we find that the variable measuring economic growth remains significant at 1% and its marginal effect is very similar to that obtained in regression 2. On the other hand, the variable that measures the change in the surplus-to-GDP ratio over the term in office (*SurplusTermCA*) becomes significant at 5%. Voters reward governments that achieve high levels of economic growth and reduce the structural deficit at the beginning and in the middle of the legislature. The change in the surplus-to-GDP ratio in the last year of the term in office is still not significant. So, there is no evidence that increasing public spending (or lower taxes) in the last year of the term in office helps or harms the chances of re-election.

In **Regression 4**, we include a discount rate (λ) to compute a weighted average of the economic growth. The formula is shown below:

$$GDPpcWeighted = \sum_{i=0}^n \lambda^i * GDP_{-i} * (1 / \sum_{i=1}^n \lambda^i) \quad (7)$$

where, GDP_0 is the real GDP per capita growth in the month in which the election was held; n is the number of months of the legislature; GDP_{-n} is the real GDP per capita growth in the first month of the legislature; λ is the discount rate; $\lambda \in (0, 1)$

The introduction of a discount factor allows to give more weight to data closest to the election date. We assume that voters give more weight to the recent past. There is plenty of evidence that voters are quite myopic, they tend to forget quite fast.

When choosing the value of lambda, there are two possibilities:

i) Take the value of previous studies. Hibbs (2000) estimated a probability model for re-election, where λ is an endogenous variable. The value of lambda is estimated simultaneously with the other coefficients⁷. Hibbs estimates a quarterly discount rate equals to 0.84, equivalent to a montly discount rate equal to 0.94.

ii) Estimate the value of λ . We introduced an endogenous discount rate (λ) in the

⁶The complete definition of the variable is described in the appendix

⁷The estimation method is non-linear least squares.

model specification. An estimated value of 0.954 is obtained⁸.

Finally, we choose $\lambda = 0.95$ and the new variable "weighted economic growth" is calculated. The new regression output (last column in Table 5) is very similar to that obtained in regression 3. Signs, significance and marginal effects remain practically the same. The only noticeable change is the increase of pseudo R2, going from 0.13 to 0.15. The introduction of a discount rate allows the improvement of the model, probably because voters give more weight to the latest data growth and therefore the variable "weighted economic growth" fits best to data.

Table 6 summarizes the results coming from the analysis of robustness. Correlations found in Brender & Drazen's work (2008) do not seem very robust. Recall that the authors claimed to have found evidence that a higher surplus (or lower deficit) in the election year increased the chances of re-election in the OECD countries. By contrast, economic growth was not a statistically significant variable in his model of re-election probability. However, when introducing some reasonable changes in the model's specification, very different results are obtained and new correlations appear. Real GDP per capita growth is statistically significant and positively affect the chances of re-election. Maintaining stable government finances over the term of office also increases the chances of re-election as in Brender & Drazen (2008). At the same time, there is no evidence that increasing the surplus (or reducing deficit) during the election year is positively valued by voters. In summary, voters reward governments that achieve high levels of economic growth and reduce the structural deficit at the beginning and in the middle of the term of office.

It is likely that the lack of significance of the economic growth variable in Brender & Drazen's regression was caused by the inclusion of non-cyclically adjusted fiscal variables, highly correlated with GDP. This way, the individual effect of economic growth on the likelihood of re-election is not properly estimated.

Table 6: Summary of robustness analysis (significance)

	GDPpcGrowth	SurplusTerm	SurplusLastYear	Obs.
B & D	No	Yes*	Yes*	112
Regression 1	Yes**	No	No	112
Regression 2	Yes***	No	No	112
Regression 3	Yes***	Yes**	No	112
Regression 4	Yes***	Yes**	No	112

⁸Detailed results are available from the author.

4 Alternative specification to identify the economic determinants of political alternation

Once the lack of robustness of the results found by Brender & Drazen is shown, the purpose of this section is to propose an alternative specification in order to identify new correlations between democracy (election results) and economic performance. Another objective is to test the hypothesis that the growth of real GDP per capita is a statistically significant variable when estimating the probability of re-election.

Next, a brief overview of variables and data sources used in the new specification: ⁹

- **ReelectParty:** Dependent Variable. It was constructed from: "Database of Political Institutions", (World Bank).
- **GDPpcWeighted:** Weighted economic growth over the term in office. Same formula as in Hibbs (2000). Discount rate: $\lambda = 0.95$. Real GDP per capita data are from the "World Developments Indicators" (World Bank).
- **SurplusTermCA & NewSuplusLastYearCA:** Cyclically Adjusted Fiscal Variables. They was collected from "Economic Outlook Database" (OCDE).
- **Duration:** Variable that measures the number of years that the incumbent party has been governing the country. Alesina, Carloni & Lecce (2012) suggest that the longer the government has been in office, the higher its probability of defeat. Source: "Database of Political Institutions" (World Bank).
- **Control variables.** The same binary control variables as in Brender & Drazen (2008): NewDemocracy and MajoritarianSystem.

The sample period is from 1975 to 2012 and only democratic elections are included. It has not been possible to include before 1975 elections because structural deficit data are only available since 1970, and in order to include an election it is necessary to have data from the beginning of the term in office.

Table 7 shows the regression output, using the new specification. Unlike Brender & Drazen (2008), an increase in the GDP per capita growth rate increases the probability of reelection in OECD countries. A ceteris paribus increase of 1 percentage point in the average growth rate during the term increases the probability of reelection by 8%. At the same time, increases in public deficit over the term in office decrease the probability of reelection. Voters penalize persistent budgetary imbalances. However, there is no evidence that fiscal policy changes (increase or decrease in the government surplus) in the last year of the term in office affect the chances of re-election of incumbent parties.

The probability of reelection is higher in Proportional Systems, while the binary variable that differentiates between new and old democracies is not statistically significant. Finally, the more years the incumbent party has been in office (variable "Duration"), the higher the probability of its defeat, other things equal.

⁹A comprehensive description of the variables and data sources is presented in the Appendix.

Table 7: OECD Countries (1975-2012). Logit.

Dependent variable:	Reelect_party	
	β / p-value	Mfx
GDPpcWeighted ^a	0.350*** (0.001)	0.079
NewSurplusLastYearCA ^b	-0.210 (0.173)	-0.048
SurplusTermCA ^c	0.350* (0.087)	0.079
NewDemocracy	-0.304 (0.740)	-0.069
MajoritarianSystem	-0.803** (0.047)	-0.183
Duration ^d	-0.423** (0.015)	-0.096
Constant	1.209** (0.016)	
Observations	194	
Pseudo R^2	0.108	
LR chi2	27.454	
Prob > chi2	0.000	
Baseline predicted probability	0.634	

^aGDPpcWeighted: Weighted economic growth over the term in office. Discount rate ($\lambda = 0.95$).

^bNewSurplusLastYearCA: The change in the surplus-to-GDP ratio in the last twelve months of the term in office (cyclically adjusted data.)

^cSurplusTermCA: The change in the surplus-to-GDP ratio in the two years preceding the election year, relative to the two previous years (cyclically adjusted data).

^dDuration: Variable that measures the number of years that the incumbent party has been governing the country.

***Significant at 1%, **Significant at 5%, *Significant at 10%

5 Additional questions

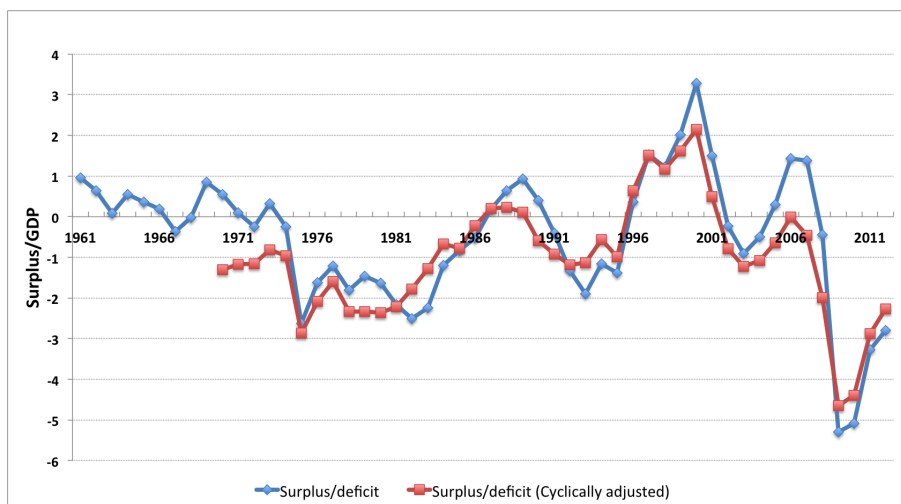
Finally, once defined the new model specification, two additional questions are addressed:

5.1 Does the International Crisis (2008-12) change the model estimates?

The aim of this section is to check the robustness of the new specification against extreme events. The global economic crisis that began in 2008 caused significant declines in GDP and strong increases in government deficits in virtually all OECD countries.

Figure 1 shows the evolution of government surplus (blue: non-cyclically adjusted, net: cyclically adjusted) for the OECD weighted average¹⁰. If we identify the five worst deficit data in the time series (1975, 2009, 2010, 2011 and 2012), four of them took place in the period (2008-2012), which highlights the magnitude of the economic crisis.

Figure 1: Sovereign Debt Crisis in OECD (2008-2012)



Source: "Economic Outlook Database" (OECD)

In this section (**Table 8**), we re-estimate the model only for the period 1975-2007 (excluding the 29 elections held during the economic crisis). The independent variables had extreme values in that period, so it is very interesting to test the robustness of the model to extreme events. The conclusions are as follows:

-When excluding the elections held during the economic crisis, the estimation results do not change.

-Only a small decrease in the level of significance of estimated coefficients is observed, which may be explained by the reduction in the number of elections (N=165).

¹⁰Weights are calculated using GDP.

Table 8: OECD Countries 1975-2012. Logit.

Dependent variable:	1970-2007		1970-2012	
	β / p-value	Mfx	β / p-value	Mfx
GDPpcWeighted ^a	0.344** (0.014)	0.076	0.350*** (0.001)	0.079
NewSurplusLastYearCA ^b	-0.299 (0.142)	-0.066	-0.210 (0.173)	-0.048
SurplusTermCA ^c	0.504* (0.077)	0.111	0.350* (0.087)	0.079
NewDemocracy	-0.305 (0.743)	-0.067	-0.304 (0.740)	-0.069
MajoritarianSystem	0.841* (0.056)	0.185	0.803** (0.047)	0.183
Duration ^d	-0.320* (0.079)	-0.070	-0.423** (0.015)	-0.096
Constant	0.880 (0.128)		1.209** (0.016)	
Observations	165		194	
Pseudo R^2	0.090		0.108	
LR chi2	19.104		27.454	
Prob > chi2	0.004		0.000	
Baseline predicted probability	0.655		0.634	

^aGDPpcWeighted: Weighted economic growth over the term in office. Discount rate ($\lambda = 0.95$).

^bNewSurplusLastYearCA: the change in the surplus-to-GDP ratio in the last twelve months of the term in office (cyclically adjusted data.)

^cSurplusTermCA: the change in the surplus-to-GDP ratio in the two years preceding the election year, relative to the two previous years (cyclically adjusted data)

^dDuration: Variable that measures the number of years that the incumbent party has been governing the country.

***Significant at 1%, **Significant at 5%, *Significant at 10%

5.2 Does the ideology of the incumbent party matter?

Very few studies on "economic voting" pay attention to government ideology in the functional form of the regression. Powell & Whitten (1993) studied incumbent gains and losses in over 100 elections in 19 nations (1969-88). They found the support for right-wing governments is enhanced by lower inflation, whereas left governments were helped by better than average unemployment records. T. Romer (2012) proposed the following conjecture "Other things equal, a left government that undertakes a large fiscal adjustment is more likely to survive than a right government". According to Romer, it is an issue of credibility, because a leftist government that applies a large fiscal adjustment goes against their ideology core, so it will only implement such a policy in cases of extreme necessity.

In this section, the aim is to test the Romer Conjecture. To do this, we carry out the following steps:

1. A dummy variable for incumbent ideology is proposed (**IdeologyRight**). This variable receives the value 1 if the incumbent party is rightist and 0 if the incumbent party is leftist. The variable is constructed using the information from "Database of Political Institutions" (DPI)¹¹.
2. Later, we substitute the value of the variable "SurplusTermCA"¹² by its percentile. The new variable is called "**SurplusTermPer**".
3. We create the interaction term between SurplusTermPer and IdeologyRight. This variable is called "**SurplusTermPerRight**" and is added to regression to check the Romer conjecture.
4. Finally, the new specification that control for government ideology is estimated.

Table 9 shows the regression output. The data do not support the Romer Conjecture, as the variable SurplusTermPerRight is not statistically significant. There is no evidence that a right government that undertakes a fiscal adjustment is more likely to survive than a left government.

Note: The results should be taken with caution. The regression does not control for the possibility that a right government is more likely to undertake a fiscal adjustment than a left government.

¹¹The variable "EXECRLC" provides the ideology of the incumbent party (left, center or right), according to their platforms.

¹²SurplusTermCA: the change in the surplus-to-GDP ratio in the two years preceding the election year, relative to the two previous years (cyclically adjusted data)

Table 9: Does the ideology of the incumbent party matter?

Dependent variable:	(1)	
	β / p-value	Mfx
GDPpcWeighted ^a	0.394*** (0.007)	0.090
SurplusTermPer ^b	-0.011* (0.091)	-0.003
SurplusTermPerRight ^c	0.000 (0.984)	0.000
Duration ^d	-0.454*** (0.007)	-0.104
Constant	1.591*** (0.004)	
Observations	181	
Pseudo R^2	0.095	
LR chi2	12.797	
Prob > chi2	0.012	
Baseline predicted probability	0.630	

^aGDPpcWeighted: Weighted economic growth over the term in office. Discount rate ($\lambda = 0.95$).

^bSurplusTermPer: The change in the surplus-to-GDP ratio (percentile) in the two years preceding the election year, relative to the two previous years (cyclically adjusted data)

^cSurplusTermPerRight: IdeologyRight*SurplusTermPer

^dDuration: Variable that measures the number of years that the incumbent party has been governing the country.

***Significant at 1%, **Significant at 5%, *Significant at 10%

6 Conclusions

Throughout this article it has been demonstrated that the correlations found in Brender & Drazen (2008) were little robust. When some reasonable changes are introduced in the model specification, in the definition of variables and in the sample period, the results obtained have varied and some of the correlations have disappeared.

Firstly, the model's robustness is tested against changes in the sample period. The sample period is extended from 2001 to 2012, keeping the rest of the specification exactly as in the original work. On performing this simple robustness exercise, one of the two correlations disappear. In particular, deficits in the last year of the term become not significant; there is no evidence that increasing the deficit in the last year in office reduces the likelihood of re-election.

Secondly, the robustness of the model is tested against changes in the model specification and against changes in the definition of the variables. Four changes are proposed (1) using data from structural deficit to avoid problems of multicollinearity, (2) change in the definition of the dependent variable to consider alternation at a political party level, (3) new definition of fiscal variables and (4) introducing a discount rate to calculate a weighted average of the variable economic growth. Considering again the model with these changes it is shown that the deficit in the last year of the term in office is not significant and that economic growth positively affects the probability of re-election.

Subsequently, an alternative specification for the reelection probability model is proposed, including the changes suggested in the previous section and also adding a variable that measures the years that the ruling party has been in office. With this alternative specification the model is estimated for the period 1975-2012. The results are as follows:

- Unlike Brender & Drazen (2008), an increase in the GDP per capita growth rate increases the probability of reelection in OECD countries. In particular, a *ceteris paribus* increase of 1 percentage point in the average growth rate during the term increases the probability of reelection by 8%¹³.
- At the same time, increases in government deficit over the term in office decrease the probability of re-election, but increases in the last year have no impact.
- The more years the incumbent party has been in office (variable "Duration"), the higher the probability of its defeat, other things equal.

Finally, the new correlations are robust against extreme values of the independent variables. The inclusion or exclusion of the elections held during the 2008-2012 global economic crisis does not significantly alter the regression results.

It is important to note that the new correlations identified in this article should not be considered as conclusive evidence. Unstable results are common in cross-national studies about "economic voting" and it is worth further investigation about this field of research.

¹³Marginal effect at mean (MEM).

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Statistical Appendix

I. Databases

- Database of Political Institutions (DPI), World Bank.
- International Financial Statistics (IFS), International Monetary Fund.
- Database of Political Institutions (DPI), World Bank.
- World Development Indicators (WDI), World Bank.
- Political Finance Database, Institute for Democracy and Electoral Assistance (IDEA).
- Polity IV, University of Maryland, Center for International Development and Conflict Management.
- Economic Outlook Database (OCDE).
- World Economic Outlook (WEO), International Monetary Fund.
- A Historical Public Debt Database, International Monetary Fund.
- World Political Leaders, Zárate's Political Collections
- CPDS I, University of Bern.

II. Variable Definitions

i) Brender & Drazen's specification (Table 1 & 3)

DEPENDENT VARIABLE

-ReelectLeader: See comprehensive definition in Brender & Drazen (2008), pag. 2205-2206 (Variable "Reelect").

ECONOMIC VARIABLES

-GDPpcGrowth: Average real GDP per capita growth over the term in office.

$$GDPpcGrowth = 100 * \sqrt[x]{\frac{GDP_0}{GDP_{-x}}} - 1 \quad (8)$$

where, GDP_0 is the value of Real GDP per capita in the election year; GDP_{-x} is the value of Real GDP per capita in the first year of the legislature; x is the number of years in office. Source: World Development Indicators (WB).

FISCAL VARIABLES

-SurplusTerm: The change in the average surplus-to-GDP ratio in the two years preceding the elections (not including the election year) compared to the previous two years.

$$SurplusTerm = 1/2 * (B_{-1} + B_{-2}) - 1/2 * (B_{-3} + B_{-4}) \quad (9)$$

where, B_{-i} is the surplus as a percentage of GDP i years before the elections. Source: International Financial Statistics (IMF) and Government Finance Statistics (IMF).

-SurplusLastYear: The change in the surplus-to-GDP ratio in the election year relative to the previous year.

$$SurplusLastYear = (B_0 - B_{-1}) \quad (10)$$

where, B_{-i} is the surplus as a percentage of GDP i years before the elections. Source: International Financial Statistics (IMF) and Government Finance Statistics (IMF).

CONTROL VARIABLES

-NewDemocracy: A binary variable, for each country in each election year, receiving the value 1 if country is defined as a New Democracy. Otherwise, the country is defined as an Old Democracy and the variable receives a value of 0. Source: Database of Political Institutions (DPI), World Bank.

-MajoritarianSystem: A binary variable, for each country in each election year, receiving the value 1 in a country with a majoritarian electoral system, and 0 otherwise. Source: Database of Political Institutions (DPI), World Bank.

ii) **Alternative specification (Table 5, 7 & 8)**

DEPENDENT VARIABLE

-ReelectParty: The definition is as follow:

a) **Case 1:** The old and the new government are formed by a single party.

-ReelectParty=1 if the incumbent party wins the elections

-ReelectParty=0 if the incumbent party is defeated

b) **Case 2:** The old government was formed by a single party and the new government is formed by a coalition of parties.

-ReelectParty=1 if the incumbent party is member of the coalition formed after the elections and has more than 60% of the seats in the new coalition.

-ReelectParty=0 otherwise

c) **Case 3:** The old government was formed by a coalition of parties and the new government is formed by a single party.

-ReelectParty=1 if the winning party was part of the ruling coalition before the election and had more than 60% of the seats.

-ReelectParty=0 otherwise

d) **Case 4:** The old and new government are formed by a coalition of parties.

-ReelectParty=1 if the parties that were members of the previous coalition have more than 60% of the seats in the new coalition and the parties who are members of the new coalition had more than 60% of the seats in the previous coalition

-ReelectParty=0 otherwise

ECONOMIC VARIABLES

-GDPpcWeighted: Weighted economic growth rate over the term in office.

$$GDPpcWeighted = \sum_{i=0}^n \lambda^i * \Delta GDP_{-i} * (1 / \sum_{i=1}^n \lambda^i) \quad (11)$$

where, ΔGDP_0 is the real GDP per capita growth in the month in which the election was held; n is the number of months of the legislature; GDP_{-n} is the real GDP per capita growth in the first month of the legislature; λ is the discount rate; $\lambda = 0.95$

FISCAL VARIABLES

-SurplusTermCA: The change in the average surplus-to-GDP ratio in the two years preceding the elections (not including the election year) compared to the previous two years (cyclically adjusted data).

$$SurplusTerm = 1/2 * (B_{-1} + B_{-2}) - 1/2 * (B_{-3} + B_{-4}) \quad (12)$$

where, B_{-i} is the surplus as a percentage of GDP i years before the elections. Source: International Financial Statistics (IMF) and Government Finance Statistics (IMF).

-SurplusLastYearCA: The change in the surplus-to-GDP ratio in the election year relative to the previous year (cyclically adjusted data).

$$SurplusLastYear = (B_0 - B_{-1}) \quad (13)$$

where, B_{-i} is the surplus as a percentage of GDP i years before the elections. Source: International Financial Statistics (IMF) and Government Finance Statistics (IMF).

-NewSurplusLastYearCA: The change in the surplus-to-GDP ratio in the last twelve months of the term in office (cyclically adjusted data).

$$NewSurplusLastYear = \frac{(m) * (B_0 - B_{-1}) + (12 - m) * (B_{-1} - B_{-2})}{12} \quad (14)$$

where, B_{-i} is the government surplus as a percentage of GDP i years before the elections and m is the month in which the elections are held (for example, February=2 and April=4).

OTHER VARIABLES

-Duration: number of years that the incumbent party has been governing the country.

ii) Ideology variables (Table 9)

FISCAL VARIABLES

-SurplusTermPer: the change in the surplus-to-GDP ratio (percentile) in the two years preceding the election year, relative to the two previous years (cyclically adjusted data).

IDEOLOGY VARIABLE

-IdeologyRight: This variable receives the value 1 if the incumbent party is rightist and 0 if the incumbent party is leftist. The variable is constructed using the information from "Database of Political Institutions".

INTERACTION TERM

-SurplusTermPerRight: $SurplusTermPer * IdeologyRight$