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Ignorance Isn't Bliss: Uninformed Voters Drive Budget Cycles

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Keywords

Political Budget Cycle, Uninformed Voters, Elections, Rational Inattention, Generalized Method of Moments

JEL Classification

D72, E62, H62

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Ignorance Isn't Bliss: Uninformed Voters Drive Budget Cycles[1]

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Abstract

The paper shows that blissful ignorance does not apply to fiscal policy. In countries with insufficiently informed voters, politicians attempt to 'buy' votes by substantially increasing government expenditures in election years and tightening the belt post-election. This generates costly budget cycles and unnecessary macroeconomic fluctuations. Unlike much of the earlier literature that found this effect only in low-income countries or new democracies, we demonstrate that it has occurred in many prosperous countries with an established political system. In particular, constructing an Informed-voter (INFOVOT) index, we show that only the top third of OECD countries with well-informed voters does not experience political budget cycles. In contrast, the bottom third of OECD countries with poorly-informed voters see a deterioration of the budget balance by 1% of GDP on average in election years, which represents an increase of more than 25% relative to their usual budget deficits. Interestingly, for the intermediate group of countries with moderately-informed voters, for example Austria, France, Germany, Japan, Luxembourg, the U.K. and the U.S., election deficit hikes (of 0.75% of GDP) are observed during the 1995-2008 period only, but not since. We discuss why their budget cycles may have disappeared after the Global financial crisis, unlike in countries with poorly-informed voters, drawing on the 'rational inattention' literature. We also offer some policy recommendations that could improve the voters' incentives to acquire and process fiscal policy information, and thus avoid an 'ignorance trap'.

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1 Introduction

In 1811 French philosopher Joseph de Maistre argued that 'Every nation gets the government it deserves.' Our paper shows that this statement is still painfully true two centuries later, at least in the area of fiscal policy. We demonstrate that existence of costly budget cycles, whereby politicians 'bribe' voters in election years by extra government handouts, is highly dependent on how informed the voters are.

One of our contributions is to construct an 'Informed-voter' (INFOVOT) index containing five different criteria, and quantify it for OECD countries using data over the 1995-2014 period. The index captures three aspects of information flows, namely information provision (policy transparency and credibility), information transmission (internet availability and independence of the media), and information processing by the public (the proportion of labour force with tertiary education and high school students' scores on PISA tests in mathematics and reading).

Based on the INFOVOT index, we split our sample of 34 OECD countries into three groups with well-informed, moderately-informed and poorly-informed voters. Our empirical analysis uses a dynamic panel in the tradition of the conditional political budget cycles (PBC) literature, e.g. Persson and Tabellini (2002) and Shi and Svensson (2006).[2]

Controlling for a number of economic, social and political factors, we show that the group of countries with *well-informed voters* (Australia, Belgium, Canada, Denmark, Finland, Iceland, Netherlands, the New Zealand, Norway, Sweden and Switzerland) does not experience budget cycles. This is in stark contrast to countries with *poorly-informed voters* (Chile, Czech Republic, Greece, Hungary, Italy, Mexico, Poland, Portugal, Slovakia and Turkey) that feature budget balance deterioration in election years.

The effect is significant both economically and statistically. The budget deficits of OECD countries with poorly-informed voters are, on average, higher by around 1% of GDP in election years compared to non-election years (p-value < 0.01). This constitutes a 25% increase in the budget deficit in election years, implying a substantial level of 'buying votes' by incumbent governments to secure re-election. Our analysis shows the budget deterioration to be driven by increased government expenditures rather than lower taxes. Given the need for a reversal of such undue spending in subsequent (non-election) years, and the resulting excessive macroeconomic volatility together with a possible debt accumulation, such populist budgetary behaviour is very costly for society (see e.g. Ball and Mankiw, 1995, Wolfers, 2003 or Loayza et al., 2007). Ignorance clearly isn't bliss when it comes to fiscal policy.[3]

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[2] Other valuable studies we build on include Schuknecht (1996, 2000), Block (2002), Brender and Drazen (2005), Alt and Lassen (2006), Mink and Haan (2006), Tujula and Wolswijk (2007), Streb et al. (2009), Hagen (2010), Efthyvoulou (2012), Klomp and Haan (2013a, 2013b) and Ademmer and Dreher (2016). The discussion of their findings, in relation to ours, appears in Section 6.

[3] The costs are found to be even greater in low-income countries. For example, Pallage and Robe (2003) show that 'in many poor countries, the welfare gain from eliminating [consumption] volatility may in fact exceed the welfare gain from an additional percentage point of growth forever'.

The findings for our middle group of countries with *moderately-informed voters* (Austria, Estonia, France, Germany, Ireland, Israel, Japan, Korea, Luxembourg, Slovenia, Spain, United Kingdom and United States) are worth highlighting. They are also in line with the notion that insufficient awareness of voters may be an important – if not the key – driver of fiscal cycles, but their situation is more nuanced. Sizeable increases in budget deficits in election years (around 0.75% of GDP) are detected in the 1995-2008 period, but they disappear in the aftermath of the 2008 Global financial crisis (GFC).

We discuss two factors that may in principle explain why only countries with moderately-informed voters, but not those with poorly-informed voters, saw a demise of the PBC after 2008. One is 'external' (exogenous) and relates to the economic constraints to budget misbehaviour imposed by the crisis. In particular, it is linked to the fact (which we document) that countries with moderately-informed voters faced slightly more pronounced fiscal sustainability challenges in the post-GFC period. They may have therefore felt more compelled to engage in austerity measures that left little room for populist spending over the political cycle.

The second explanation however seems more convincing. It is 'internal' (endogenous) and relates to the differences in how informed the voters are, as well as to the growing literature on rational inattention.[4] The 'budget shock', brought about by the 2008 crisis, arguably increased the voters' cost of inattention, and hence improved their incentives to acquire and process fiscal policy information (in line with Matejka and Tabellini, 2016, who model rational inattention in relation to fiscal policy). This increase in the cost of inattention may have been sufficient to put pressure on politicians to cease election bribery among moderately-informed voters, but still insufficient among poorly-informed voters.

Our results are in contrast to earlier PBC literature, which generally concluded that electoral budget cycles only occur in low-income countries or new democracies (for a discussion see Streb et al., 2009). Our analysis shows that such conclusion is too optimistic. In line with more recent studies such as Alt and Lassen (2006), Hagen (2010) and Efthyvoulou (2012), we have found a PBC even in countries with relatively high incomes and established democratic systems. Our group of moderately-informed voters includes Austria, France, Germany, Japan, Luxembourg, the U.K. and the U.S., and even in our group of poorly-informed voters there are countries such as the Czech Republic, Portugal and Italy. It is worth noting that we can reproduce the conventional results; in Section 6 the degree of the voter's awareness is excluded from the regression and no PBC is found in OECD countries as a whole.

Our finding regarding countries with moderately-informed voters offers a more general lesson. It implies caution in conducting empirical research on fiscal policy that includes both the pre-GFC and post-GFC periods. It is apparent that the possible structural break around 2008 must be taken into account in estimation to avoid misleading results. As a demonstration, when we estimate the effect of the voters' awareness over the whole 1995-

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[4] For some theory see Sims (2003) or Matejka and McKay (2015), for empirical evidence see e.g. Bartos et al. (2016).

2014 sample no statistically significant budget cycle is detected for countries with moderately-informed voters – in contrast to the pre-2008 period alone. We show that this is the case even when we add a dummy to control for the effect of the GFC.

All the above results seem robust as they obtain across several empirical specifications. In particular, our preferred approach uses Blundell and Bond's (1998) System Generalized Method of Moments (GMM) featuring a two-step estimator robust to panel-specific autocorrelation and heteroscedasticity, as well as Windmeijer's (2005) finite-sample correction. Our alternative specifications include first-differencing GMM, a fixed effect model and conventional OLS.

The final section of the paper discusses the policy implications of our findings. In order to reduce costly budget and business cycles, it is beneficial for society as a whole to have more informed voters. In principle, this can be achieved through promoting the three parts of information flows, namely its provision by the government, its transmission through the media and its processing by the public.

The latter aspect is clearly dependent on the quality of education, which provides – in countries with moderately- and poorly-informed voters – an argument for greater investment into education. Nevertheless, as shown forcefully in the above literature on rational inattention, economic agents may *choose* not to acquire or process available information; even if they are perfectly capable of doing so. This is in order to minimize the associated costs, in which case improved education may not always help.

We therefore put forward two measures for consideration that directly affect the incentives of voters and politicians.[5] One is a general 'deficit tax' that could in principle strengthen the voters' incentives to acquire and process relevant information, and thus pressure politicians to conduct sound fiscal policy absent of a PBC. Under the deficit tax each adult would pay a lump-sum amount if the realized budget deficit in a given year exceeded a pre-specified value, for example zero. The amount of the deficit tax would best be postulated as a per-voter proportion of the actual (or structural) budget deficit to emphasize its connection to the voters' choice of politicians and their policies. Nevertheless, the amount could be relatively low, e.g. to jointly cover 15% or 20% of the budget deficit. Its role would be to raise awareness and make people accept some responsibility for their choice of politicians and for budgetary outcomes.

The deficit tax would best be complemented by 'deficit fines', payable by all members of parliament in the case of a deficit. They would have two separate roles to play. First, a deficit fine would directly improve the politicians' incentives for prudent fiscal policy. Second, it would likely enhance the public's support for the deficit tax as their levels could be linked, for example the deficit fine paid by all parliamentarians could be a hundred-fold higher than the deficit tax paid by other individuals.

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[5] A detailed discussion of their pros and cons is beyond the scope of the paper, but can be found in Janku (2016).

Arguably, even if future research finds deficit taxes for voters and deficit fines for politicians beneficial for society, they may not be incentive compatible in countries with insufficiently informed voters. This is because ruling politicians may be unwilling to embrace these measures, or even to invest into education, not to lose the ability to 'bribe' uninformed voters with extra pre-election spending. This implies that a country may get stuck in an 'ignorance trap', whereby uninformed voters breed politicians and policies that reinforce their ignorance.

It should be noted that our INFOVOT index can be useful in the examination of other areas of economic policy that tend to be affected by how informed the electorate is. Two natural examples are monetary policy and financial stability regulation. Their design and effects largely depend on people's ability/willingness to understand the various (intended and unintended) consequences of policy actions. As such, a high proportion of uninformed voters may result in inappropriate policy design and socially inferior outcomes in these areas as well.[6]

2 (Un)Informed Voters and Budget Cycles

This section first uses the existing literature to offer intuition for the relationship of the voters' awareness and budget cycles. It then provides an overview of our Informed-voter index, and subsequently describes its main components.

2.1 Theoretic Background

Economic theory suggests that a higher share of uninformed voters may lead to a (more pronounced) budget cycle. This is because lack of the voters' awareness of economic issues increases incentives of incumbent governments to manipulate the fiscal outcome for short-term political gain. In contrast, in countries with well-informed voters politicians cannot buy votes through greater government spending in election years since the electorate understands the adverse consequences of such actions over the longer term and rejects them.

Let us use the framework of Shi and Svensson (2006) to sketch the mechanics of the argument. Voters derive utility not only from private consumption, but also from a public good (g_t) produced by the government as:

$$g_t = \tau_t + d_t - R(d_{t-1}) + \eta_t, \tag{1}$$

where τ_t denotes taxes in time t, d_t expresses government borrowing, and $R(d)$ is a continuous cost function of government borrowing with $R(0) = 0$ and $R(d) > 0$ for all $d > 0$. The variable η_t expresses the level of the government's competence.

All voters are assumed to know g_t and τ_t, but only a certain share of the electorate, σ, is informed about d_t. The remaining 1-σ fraction are uninformed voters who only know d_{t-1}. They can therefore confuse excessive pre-election spending, financed by government debt,

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[6] One possible example is Basel III, the framework for global financial and banking regulation. It was originally scheduled for 2013-2015, but its full implementation repeatedly postponed. It can be argued that a part of the underlying reason for delaying policy reforms has been the public's insufficient awareness of the pressing problems of the current financial system (see e.g. Blinder, Lo and Solow, 2012, or Cecchetti and Kharroubi, 2012).

with an improvement in the government's competence η_t. This implies that both the government's incentives to engage in such spending, and the magnitude of budget cycles, are decreasing in the proportion of informed voters σ.

2.2 Informed-Voter Index Overview

In order to empirically assess the relationship between election budget cycles and people's awareness we propose an Informed-voter index (INFOVOT). Shi and Svensson (2006) used access to free media (number of radios per capita) in combination with the freedom of broadcasting as a proxy for how informed voters are. We include more variables to capture the richness and breadth of information flows.

The index will serve as basis for our division of OECD countries into three categories.[7] Let us make clear from the outset that our empirical analysis examines the effect of elections (regressor) on fiscal variables (regressand) under certain conditions (different levels of the Informed-voter index). We will *not* examine the influence of the voters' awareness on either the general level of the fiscal balance, see Hagen and Harden (1995), Benito and Bastida (2009), Weber (2012) and Wang et al. (2015), or the election outcome, see Brender and Drazen (2008) and Klomp and Haan (2013a).

Our INFOVOT index encapsulates three key dimensions that contribute to an informed voter, depicted in Figure 1. They relate to the provision (A), transmission (B) and processing (C) of information, whereby each of these three aspects enters the index with an equal weight.

Figure 1. Ingredients of the Informed-voter (INFOVOT) index.
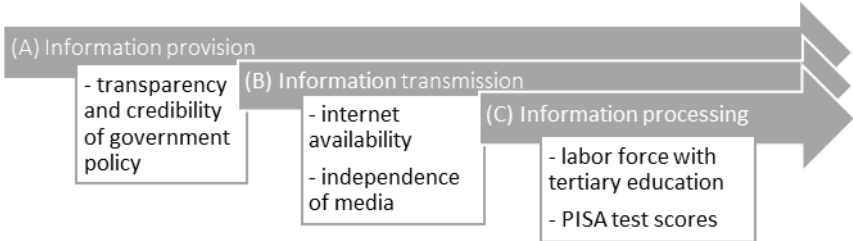
The details of the included variables are discussed in the three sections below. Data used in the index, unless stated otherwise, are yearly, and cover the period from 1995 (or 1996) to 2014 (for more details see Table 6 in Appendix A).

2.3 Information Provision (A)

We proxy the quality of information provision by the *Government Effectiveness (GE)* component of the World Bank's Worldwide Governance Indicators (WGI). It is widely accepted to be a good measure of government transparency and credibility, which are closely linked to the voters' awareness; see e.g. Alt and Lassen (2006) or Klomp and Haan (2013b). This is because the *GE* indicator also captures 'the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies'; see

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[7] We do not include the most recent OECD member, Latvia, as it only joined in July 2016 and some of the required data are unavailable.

Kaufmann et al. (2010). Its underlying data (almost 50 sub-indicators) are gathered from over 30 research institutes, think-tanks, NGOs, international organizations and private companies.

2.4 Information Transmission (B)

The quality of information flows between the government and the public is approximated in the INFOVOT index by two factors: internet availability (*IA*) and independence of the media (*IM*). In terms of the former, we use the World Bank's statistic *Internet users (per 100 people)*, which is defined as a share of individuals who have used the Internet (on any device) in the last 12 months. Independence of the media is proxied by *The World Press Freedom Index*. It has been published every year since 2002 by Reporters Without Borders, and used extensively by international organizations such as the United Nations and the World Bank. It ranks countries according to the level of freedom available to journalists and other contributors to the media.

2.5 Information Processing (C)

In approximating society's ability to acquire and comprehend available information we use two measures of the quality (and partly the quantity) of education; for its link to education and election behaviour see e.g. Palfrey and Poole (1987), Rosenstone and Hansen (1993) or Berinsky and Lenz (2010).

The first component is *the proportion of the labour force with tertiary education (TE)*, available from the World Bank. The second indicator is composed of each country's *PISA test scores (PI)* obtained in OECD's Programme for International Student Assessment. The data come from testing 15-year old high school students, and are available for OECD countries at three years' intervals, namely in 2000, 2003, 2006, 2009, 2012 and 2015.[8]

3 INFOVOT Quantification and Link to Budget Outcomes

In this section, the Informed-voter index is first quantified for OECD countries and then correlated against various measures of discretionary fiscal policy.

3.1 Informed-Voter Index for OECD Countries

In order to include all five selected variables into the Informed-voter index, we use standard scores for its construction. As we employ the index primarily for splitting OECD countries into three groups, we only need one average INFOVOT value for each country (apart from that, we cannot calculate yearly INFOVOT scores due to unavailability of some data). To do so, we first obtain average values of each sub-indicator during 1995-2014 for each country i:[9]

$$GE_i = E_i(GE_{it}); \; IA_i = E_i(IA_{it}); \; IM_i = E_i(IM_{it}); \; TE_i = E_i(TE_{it}); \; PI_i = E_i(PI_{it}). \qquad (2)$$

As a second step, the INFOVOT index is calculated as the weighted standard scores of each sub-indicator. In particular, provision, transmission and processing of information all have

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[8] We include scores for the mathematics and reading tests as they seem most relevant for comprehension of policy actions. Including the science tests as well would have a negligible effect on our country scores.
[9] In order for all five components to be comparable, i.e. to express that a higher value means *more* informed voters, the *IM* component (originally postulating the opposite) was recalculated as the difference between the index for a given country and Mexico.

equal weights, and the same applies to components within the latter two parts of information flows:[10]

$$INFOVOT_i = \frac{1}{3}\frac{GE_i - E(GE_i)}{\sqrt{var(GE_i)}} + \underbrace{\frac{1}{6}\frac{IA_i - E(IA_i)}{\sqrt{var(IA_i)}} + \frac{1}{6}\frac{IM_i - E(IM_i)}{\sqrt{var(IM_i)}}}_{} + \underbrace{\frac{1}{6}\frac{GE_i - E(TE_i)}{\sqrt{var(TE_i)}} + \frac{1}{6}\frac{GE_i - E(PI_i)}{\sqrt{var(PI_i)}}}_{}. \quad (3)$$

$$\underbrace{}_{\text{information provision}} \quad \underbrace{}_{\text{information transmission}} \quad \underbrace{}_{\text{information processing}}$$

Intuitively, the INFOVOT index shows how many standard deviations a particular country differs from the average OECD country. An advantage of such specification is that we can divide the countries into three groups with: well-informed voters (their INFOVOT value is 'above average'), moderately-informed (INFOVOT is 'average'), and poorly-informed (INFOVOT is 'below average'). We define the average country as one with an INFOVOT value between -0.5 and 0.5 standard deviations. The values of the index for all 34 OECD members are displayed in Figure 2, and more details including the INFOVOT sub-components are reported in Table 6 of Appendix A.

Figure 2: Informed-voter index (INFOVOT) for OECD countries over the 1995-2014 period.
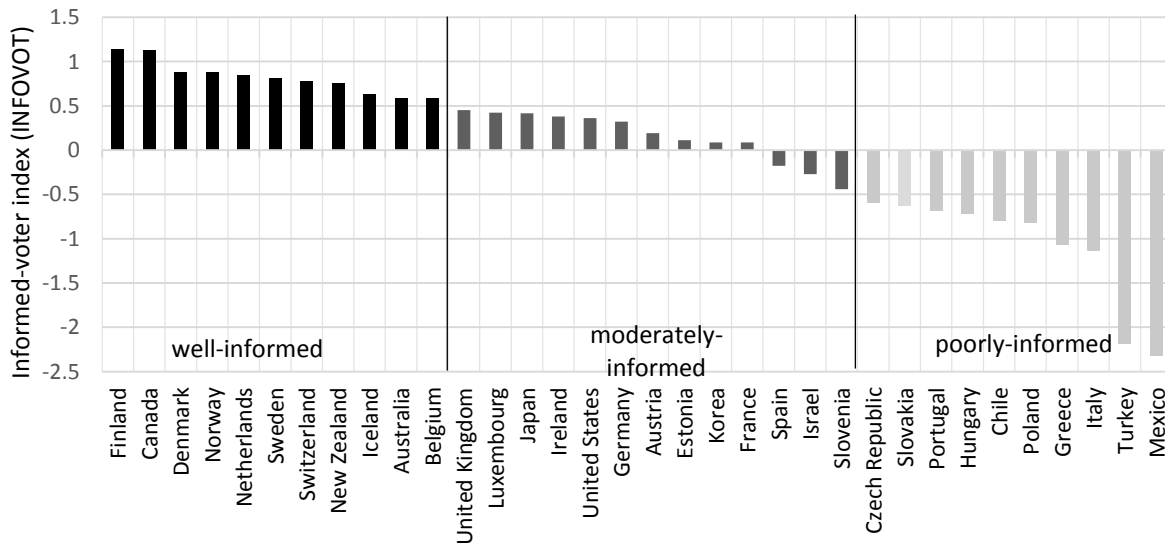
It is worth pointing out that our Informed-voter index correlates highly with the Human Capital Index calculated by the World Economic Forum (for details see WEF, 2016). The Pearson correlation coefficient is 0.918, partly due to some overlap in the composition of the indices.[11] Nevertheless, the next section shows that our INFOVOT index associates more strongly with fiscal outcomes than the Human Capital Index, and thus seems superior for our purposes.

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[10] Using equal weights of $\frac{1}{5}$ for each of the five included indices yields analogous empirical results, because all 34 countries remain in the same category as with the weights in (3).

[11] Our index is also strongly associated with the Control of Corruption indicator, which is part of the World Bank's Worldwide Governance Indicators; the correlation coefficient was 0.827 in 2014. Such relationship between the voters' awareness and corruption has been reported by e.g. DiRienzo at al. (2007).

3.2   Correlation of the INFOVOT Index and Fiscal Measures

Before we conduct a formal econometric analysis of the effect of the voters' awareness on the government budgets, it is useful to examine some simple correlations. Recall that our interest differs from most of the literature, in that we do *not* test the usual hypothesis that poorly-informed voters tend to cause higher budget deficits. Instead, we examine whether countries with less informed voters have higher deficits *at the time of the elections*. Put differently, we ask whether a potential systematic difference in their budget deficits in election and non-election years may depend on how informed the voters are.

To reflect that, Figure 3 reports the relationship between our INFOVOT index and the differences in the average cyclically adjusted primary balance (CAPB) in election and non-election years. It shows a positive correlation, with the Pearson correlation coefficient being 0.538.[12] For comparison, the correlation of CAPB with the Human Capital Index by the World Economic Forum is 0.487.

Figure 3: The relationship between the Informed-voter index and differences in average cyclically adjusted primary balances over 1995-2014 (election relative to non-election years).
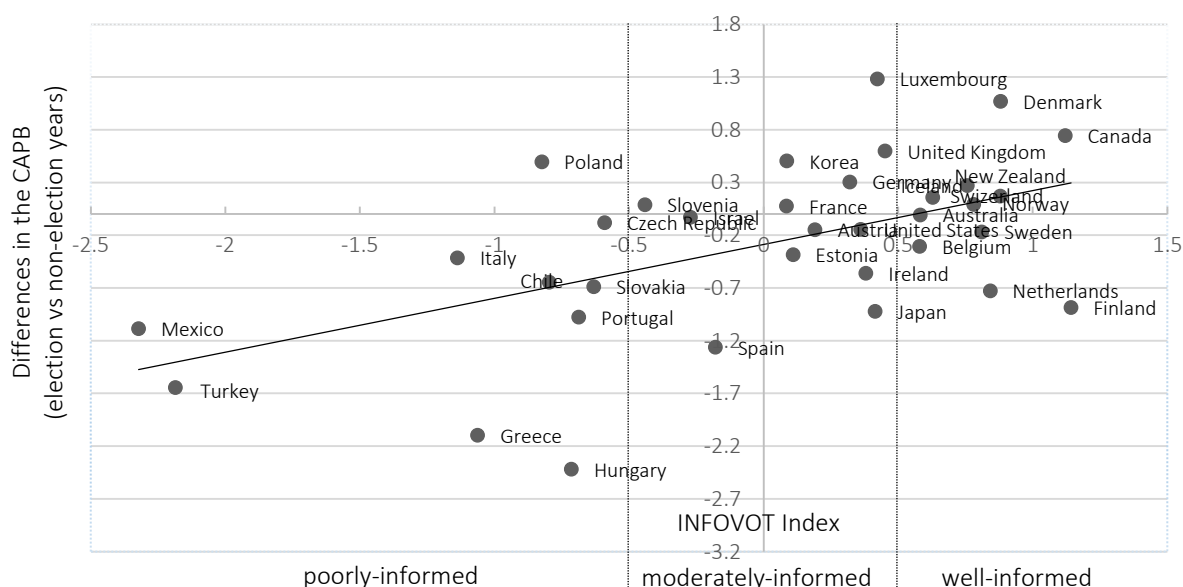
It is worth noting that while there seems to be a strong relationship across the three groups, it is weaker within groups. This lends support to our empirical approach below whereby we only use the INFOVOT index to split OECD countries into three groups.

It is also informative to plot the differences between average overall secondary budget balances in election and non-election years for our groups of countries, see Figure 4. It shows that in countries with well-informed voters budgets are balanced on average, in both election and non-election years. This is not the case for the other two country groups. Countries with moderately-informed voters experience budget deficits both pre-2008 and post-2008. But it is interesting to note that there are greater differences between election and non-election years in the pre-crisis period, suggesting a possible regime change around 2008 (which we will

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[12] All 34 countries are included. Data on the CAPB for Chile, Mexico and Turkey are not available, so their structural budget balances from the IMF database have been used instead. The same applies to Figure 5.

explore formally below). This does not seem to be the case in countries with poorly-informed voters, whereby neither the size of the budget deficit, nor the difference between budget deficits in election and non-election periods, seem to have changed in the post-2008 period.

Figure 4: Overall secondary budget balances for the three INFOVOT country groups; both for the full sample and the pre-crisis period only.[13]
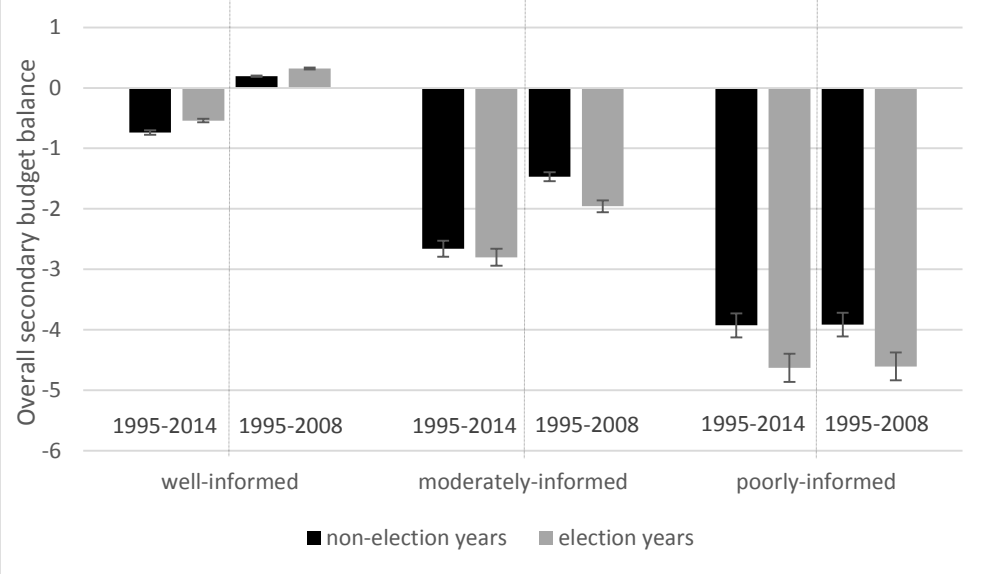
To obtain an alternative perspective, Figure 5 reports the average cyclically adjusted primary balance across our three groups of countries. As the CAPB measure removes the influence of the economic cycle and debt servicing, it is commonly used to assess discretionary fiscal policies.

Figure 5: Average cyclically adjusted primary balances during 1995-2014 for the INFOVOT country groups.

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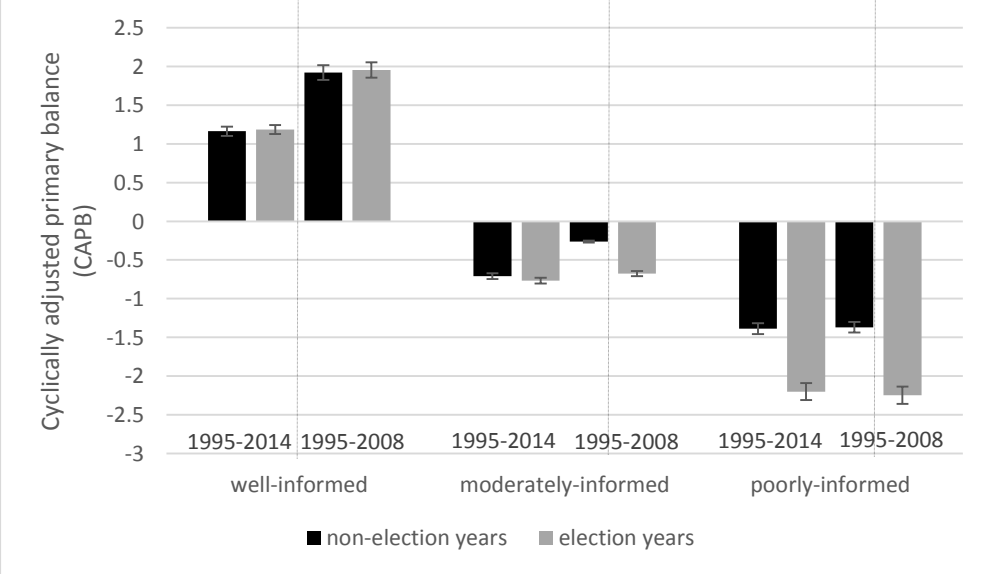
[13] Norway is excluded from Figures 4 and 5 because its massive budget surpluses – a result of oil revenues – would reduce their information value.

The largest differences between CAPB in election and non-election years remain in the countries with below-average levels of the INFOVOT index, i.e. with poorly-informed voters. It is however worth noting that non-negligible differences between CAPB in election and non-election years are also apparent in countries with moderately-informed voters in the pre-GFC period of 1995-2008.

4 Data and Empirical Specification

This section postulates the empirical model, discusses the details of the estimation methodology and then describes the data.

4.1 Econometric Model of the Political Budget Cycle

We use an autoregressive (dynamic) panel data framework to test the predictions of the conditional PBC model. It modifies and extends the original empirical specification due to Shi and Svensson (2006) and Persson and Tabellini (2002) by considering the following:

$$Y_{it} = \alpha Y_{it-1} + \gamma GROWTH_{it} + \sum_{j=1}^{3} \delta_j \left(BINFOVOT_{it}^j \, ELE_{it} \right) + \beta X'_{it} + \mu_i + \varepsilon_{it}. \tag{4}$$

The dependent variable Y_{it} is the budget balance (BB), government expenditures (EXP) and government revenues (REV) respectively. The variable $GROWTH_{it}$ is the GDP growth rate, $BINFOVOT_{it}^j$ is a binary rank based on our Informed-voter index, ELE_{it} is an electoral dummy variable, X'_{it} is a row vector of control variables, μ_i captures unobserved country-specific effects and ε_{it} is the error term.

In regards to the dependent variable, we focus on the budget balance in our benchmark specification of Sections 5.1-5.2, but in Section 5.3 we also explore separately its main components, i.e. expenditures and revenues. The variable ELE_{it} denotes the year in which the government gets elected, equalling 1 if an election takes place and 0 otherwise. It is our key variable for evaluation of a politically induced cycle. It is further divided by a binary $BINFOVOT_{it}^j$, where j refers to one of the three groups of countries based on the Informed-voter index. In particular, $BINFOVOT_{it}^1, BINFOVOT_{it}^2$ and $BINFOVOT_{it}^3$ take the value of 1 in countries with well-informed, moderately-informed and poorly-informed voters respectively, and they take the value of 0 otherwise.

The variable $GROWTH_{it}$ represents the annual percentage growth rate of GDP at market prices to filter out fiscal fluctuations caused by economic fluctuations. A positive sign is expected because an underperforming economy puts more strain on public finances.[14] The vector of control variables contains $X'_{it} = (NAIRU_{it} \, OLD_{it} \, TRADE_{it} \, EXCHANGE_{it})$, because all these tend to be related with fiscal policy outcomes.

The non-accelerating inflation rate of unemployment, $NAIRU_{it}$, represents the longer-term conditions in the labour market (see Modigliani and Papademos, 1975). A higher $NAIRU_{it}$

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[14] We do not use the level of GDP as a control variable, unlike some PBC studies, due to its non-stationarity. Its first differences are naturally strongly correlated with GDP growth.

generally implies a higher budget deficit and hence a lower budget balance, i.e. a negative sign is expected. Including $NAIRU$ is our first point of departure from the existing PBC studies, which commonly disregarded labour market variables.[15]

The variable OLD_{it} conveys the old-age dependency ratio, that is, the number of people older than 64 relative to those aged 15-64. The idea (also implemented in Klomp and Haan, 2013a, 2013b, and Ademmer and Dreher, 2016) is to control for the observed demographic trend towards an aging population. The trend implies increased government expenditures and decreased tax revenues, so a higher OLD is expected to lead to a lower budget balance (a negative sign).[16]

The variable $TRADE_{it}$ represents openness to trade, i.e. the sum of exports and imports as a share of GDP. It has been widely used in PBC studies and related research (e.g. Rodrick, 1998). A positive sign is expected because greater trade openness makes government expenditures less effective in stimulating economic activity. Let us mention that like $NAIRU$ and OLD, $TRADE$ is non-stationary, which is why we use the first differences of these variables in the regressions.[17]

Another open economy variable is $EXCHANGE_{it}$, which captures the exchange rate regime in each country and period. Ilzetzki et al. (2017) provide a valuable database, using the scale between 1 and 15 from the least to the most flexible regime. The exchange rate has only recently been included in PBC studies (e.g. Ademmer and Dreher, 2016), despite the fact that it has long been believed that a fixed exchange rate promotes fiscal discipline (see Johnson, 1969, or in relation to the European Monetary Union Giavazzi and Pagano, 1988). Intuitively, under a fixed exchange regime a populist pre-election fiscal expansion must be offset by a monetary policy contraction, which is unpopular among voters. As such, a negative sign on $EXCHANGE_{it}$ is expected.

4.2 Estimation Methodology

Our benchmark estimation strategy uses Blundell and Bond's (1998) System GMM (Generalized Method of Moments) with Instrumental Variables (IV). It features a system of equations where lagged differences of dependent variables are instruments for the equation in levels, in addition to the lagged levels used as instruments for equations in first differences. It is important to note that the System GMM estimator does not magnify gaps in unbalanced panels, in contrast to the First-Differencing GMM. Moreover, System GMM is asymptotically more efficient.

In order to alleviate some known problems within the GMM approach, we use a two-step GMM estimator, which is robust to panel-specific autocorrelation and heteroscedasticity. To avoid the fact that its standard errors are downward biased in small samples, we use

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[15] The exceptions include e.g. Klomp and Haan (2013a, 2013b), who use the headline unemployment rate. As its business cycle aspect is largely captured by the GDP growth rate, we find $NAIRU$ to be more relevant.

[16] In earlier studies (e.g. Persson and Tabellini, 2002 or Brender and Drazen, 2005) two demographic variables representing the percentage of the population aged 15-64 and 65+ were used instead. However, these two variables are highly collinear, which is why we replace them by OLD.

[17] For more on why we need to ensure stationarity of the variables, especially in relation to the estimators based on OLS, see Smith (2001).

Windmeijer (2005) finite-sample correction, which yields a finite-sample corrected two-step covariance matrix. A second common issue is existence of too many instruments (see Roodman, 2009), which can make some asymptotic results of the GMM estimators and of the related specification tests misleading. To mitigate this problem we use only a subset of the available instrument matrix. In particular, 'GMM-type' instruments are still generated for each period, but we cap their number per period – their count is therefore linear in T.

We test the validity of the instrumental variables in two ways. First, we examine the second order serial correlation of differenced residuals (AR2), as proposed by Arellano and Bond (1991). If the null hypothesis of the test (absence of serial correlation) is not rejected, we can treat the instrumental variables as valid. Second, we test the validity of all orthogonality conditions for the overidentified model by the Hansen (1982) test. This test verifies the exogeneity of instruments' subsets and is preferable for a two-step estimation. If the null hypothesis that residuals are uncorrelated with instruments is rejected we can treat the instruments as orthogonal.

As a robustness check, we accompany the System GMM results with those of three alternative models, namely First-Differencing GMM, a Fixed Effects specification featuring a Within Groups (WG) estimator, and Ordinary Least Squares (OLS). For a discussion of their potential drawbacks see Appendix B.

4.3 Data

We use an unbalanced cross-country time series data set, comprising all OECD countries except Latvia over the period 1995-2014. Our full sample consists of 34 countries and 613 observations that all have data on government fiscal budget balance and elections, but some have missing values for other variables.

Data used to compile the Informed-voter index have been described in Section 2; OECD countries are divided into three groups based on their INFOVOT score (see Figure 2). Other data come from a number of sources that are reported in Table 7 of Appendix C. The table also summarizes the units of all included variables and expected signs of the estimated coefficients.

5   Results

This section presents our empirical results regarding political budget cycles linked to elections and the voters' awareness. Such linkage appears if the regression coefficient on the electoral variable (ELE) is statistically significant and signed correctly, i.e. if there is a negative sign in the budget balance (BB) and revenues (REV) regressions, and a positive sign in the expenditures (EXP) regressions. We explore these dependent variables in turn. In each specification we report results for the full sample (the 1995-2014 period), as well as for the pre-crisis period alone to account for a possible change in fiscal policy behaviour after 2008.

5.1   Budget Balance in the Full Sample Period

Table 1 reports the effect of elections and other control variables on the budget balance for the whole period 1995-2014 and for the three types of OECD countries based on how informed their voters are. All columns relate to the regression in equation (4). The first column (model

4A) features results of our preferred specification, namely System GMM estimation (two-step Blundell-Bond procedure) using the Windmeijer (2005) finite-sample correction.[18] The second column of Table 1 (model 4B) reports estimates for the First-Differencing GMM estimation (two-step Arellano-Bond procedure), the third column (model 4C) for the Fixed Effects specification, and the fourth column (model 4D) for the OLS estimation without fixed effects.

The results are comparable across the four models, and hence seem robust. Most notably, in the full sample the coefficient on the electoral dummy variable is only statistically significant for the third group of countries with a below-average INFOVOT score (ELE3). In these countries with poorly-informed voters elections are found to have a sizeable effect on fiscal policy, which is statistically significant at the 99% or 95% confidence level (except model 4B, where it is at the 90% level).[19]

Quantitatively, in countries with poorly-informed voters budget deficits are, on average, higher by 1% of GDP in election years relative to non-election years. Given the average non-election budget deficit in these countries (3.93% of GDP), our estimate implies that, on average, the budget deficit increases by more than 25% in election years. Taken at face value, this seems a substantial degree of election 'bribery'.[20]

In contrast, in the group with well-informed voters there are no signs of a PBC as the estimated coefficient (ELE1) has the wrong sign and is not statistically significant. In the group of countries with moderately-informed voters the estimated parameter (ELE2) is statistically insignificant across all four specifications.

Table 1: Estimation results for the government's budget balance and the full sample (1995-2014).

Dependent variable: BB	Sys. GMM (robust) model 4A	FD GMM (robust) model 4B	FE model 4C	OLS model 4D
BB(-1)	0.715***	0.720***	0.586***	0.799***
	(8.64)	(7.02)	(20.32)	37.06
GROWTH	0.258***	0.335***	0.323***	0.272***
	(4.74)	(4.59)	(8.93)	(7.61)
ELE1	0.161	0.062	-0.037	0.389
	(0.56)	(0.22)	(-0.12)	(1.25)
ELE2	-0.097	0.173	0.042	-0.284
	(-0.46)	(0.83)	(0.14)	(-0.95)
ELE3	-0.961***	-0.539*	-0.822**	-0.990***
	(-2.92)	(-1.69)	(-2.44)	(-2.98)
NAIRU	-0.976*	-1.244**	-1.249***	-0.736**
	(-1.84)	(-2.45)	(-3.57)	(-2.25)

[18] The instruments used in the System GMM regression are lagged levels (two periods) of the dependent variable for the differenced equation, and the lagged difference (one period) for the level equation. The exogenous covariates and electoral dummies are instrumented by themselves in the differenced and level equations.

[19] Some of the differences between models 4A and 4B can be explained by the restricted sample of 579 observations in the latter model, which is due to the modification of the equation in FD GMM.

[20] Naturally, our analysis cannot rule out the possibility that omitted factors account for some part of this effect. However, the literature does not seem to imply any such factors, and for example the logistic costs of running an election are negligible relative to the estimated size of the effect.

OLD	-1.029***	2.138	0.118***	0.196
	(-2.63)	(1.44)	(0.31)	(0.62)
TRADE	0.038*	0.021	0.027*	0.046***
	(1.72)	(1.07)	(1.77)	(2.90)
EXCHANGE	-0.074**	0.020	0.002	-0.007
	(-2.01)	(0.28)	(0.04)	(-0.36)
CONSTANT			1.592***	-0.992***
			(-4.03)	(-4.72)
Hansen test	27.89	19.49		
	[0.798]	[0.301]		
AB test	0.29	0.04		
	[0.768]	[0.971]		
adj. R^2			0.750	0.768
No. observ.	613	579	613	613
No. countries	34	34	34	34

The columns report estimated coefficients with the z-statistics in brackets. ∗∗∗, ∗∗, ∗ denote significance at the 99%, 95% and 90% levels, respectively.

Regression coefficients on the lagged dependent variable and the other controls generally have the expected signs and they are statistically significant at conventional levels. In particular, past budget balances *BB(-1)* and current economic conditions (*NAIRU* and *GROWTH*) are statistically significant in all models, whereas the old-age dependency ratio (*OLD*) and open economy variables (*TRADE* and *EXCHANGE*) in some models, including our preferred System GMM. The reported Hansen test of overidentifying restrictions and the Arellano-Bond test for second order serial correlation of the differenced residuals both have p-values indicating that the instruments are orthogonal, and the differenced residuals are not serially correlated in the second order.

5.2 Budget Balance in the Pre-2008 Period Only

In a further exploration of the robustness of our results, let us consider whether a structural change in fiscal policy behaviour may have occurred around the time of the 2008 Global financial crisis (as suggested by Figures 4-5). This is because a number of countries have experienced fiscal stress resulting from a major slowdown in GDP, large fiscal stimuli during 2008-2010 and bailouts of financial institutions. While some of our controls (especially *GROWTH*) account for macroeconomic shocks to a certain degree, they cannot account for all of these changes, nor can they capture the change in the fiscal paradigm towards austerity that occurred in many countries after 2010 (for an in-depth discussion see Dellepiane-Avellaneda, 2014).

To shed some light on this, Table 2 reports the estimates of all four models using data over the 1995-2008 period rather than the full sample. The results are very similar to those in Table 1 for the full sample, with one important exception. The estimates of the dummy variable *ELE3* remain practically unchanged, and they are still highly statistically significant. We can therefore conclude that in countries with poorly-informed voters politicians did not stop bribing the electorate in election years after the Global financial crisis. In countries with well-informed voters there is also no change in the shorter sample, i.e. the *ELE1* estimates are still statistically insignificant and no PBC is found even if focusing specifically on the pre-2008 period.

Table 2: Estimation results for the government's budget balance and the pre-2008 period.

Dependent variable (*BB*)	Sys. GMM (robust) model 4A	FD GMM (robust) model 4B	FE model 4C	OLS model 4D
BB(-1)	0.730***	0.592***	0.605***	0.843***
	(7.90)	(3.59)	(16.15)	(33.68)
GROWTH	0.249***	0.406***	0.395***	0.269***
	(5.51)	(5.36)	(8.92)	(6.47)
ELE1	-0.056	-0.065	-0.118	0.205
	(-0.23)	(-0.22)	(-0.37)	(0.64)
ELE2	-0.738***	-0.514***	-0.569*	-0.740***
	(-3.52}	(-2.62)	(-1.81)	(-2.33)
ELE3	-0.982**	-0.723**	-0.914***	-1.122***
	(-2.21)	(-2.11)	(-2.63)	(-3.14)
NAIRU	-0.972**	-1.063*	-0.378	-0.699**
	(-2.42)	(-1.80)	(-1.03)	(-2.02)
OLD	-1.638***	-0.087	0.574	-0.145
	(-4.81)	(-0.06)	(0.79)	(-0.35)
TRADE	0.022	0.019	0.017	0.028
	(0.80)	(0.71)	(0.91)	(1.46)
EXCHANGE	-0.052	0.071	0.027	0.008
	(-1.52)	(0.70)	(0.48)	(0.42)
CONSTANT			-1.828***	-0.859***
			(-3.96)	(-4.32)
Hansen test	25.35	27.60		
	[0.333]	[0.189]		
AB test	-0.36	-0.55		
	[0.716]	[0.584]		
adj. R^2			0.771	0.796
No. observ.	409	375	409	409
No.countries	34	34	34	34

The columns report estimated coefficients with the z-statistics in brackets. ∗∗∗, ∗∗, ∗ denote significance at the 99%, 95%, and 90% levels, respectively.

Examining the estimates of Tables 1 and 2 implies one important difference, namely in the coefficient on the electoral dummy *ELE2*. In all estimated models it is considerably higher than in the full sample and statistically significant. This implies that the countries with moderately-informed voters experienced a PBC in the pre-2008 period, but the underlying practice of buying votes in election years through loosened fiscal policy disappeared after 2008.

A plausible explanation for these developments could relate to the concerns over fiscal sustainability observed in the post-2008 period. A natural question however arises: why did a change in fiscal policy behaviour occur in countries with moderately-informed voters, but not in countries with poorly-informed voters?

One possible answer could be a different fiscal situation and incentives in these two sets of countries in the aftermath of the GFC. To examine this, Figure 6 reports the trends in the

public debt to GDP ratios for our three INFOVOT groups.[21] We can see that the pre-2008 situation was comparable in countries with moderately- and poorly-informed voters. While the former group was on a slight upward trend of the previous 15 years and the latter on a slight downward trend, their public debt to GDP ratios over the 2004-2007 period were almost identical.

The post-2008 developments however show a difference in the acceleration of public indebtedness, caused primarily by the lower level of economic growth in countries with moderately-informed voters. This could have arguably made their fiscal pressures somewhat more pronounced than in countries with poorly-informed voters, and would imply a greater need for a PBC-free fiscal policy in the former group.

**Figure 6:** Debt-to-GDP ratios in the three INFOVOT country groups.
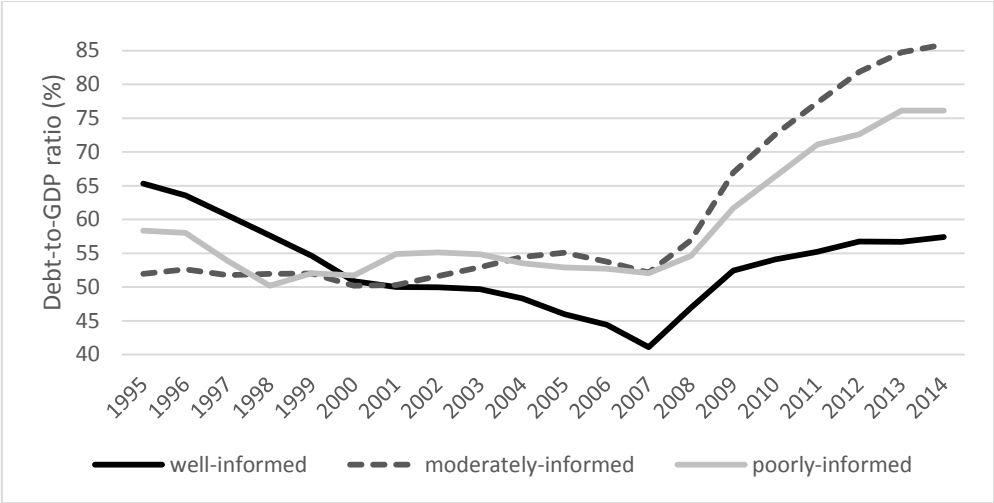
Nevertheless, the differences in Figure 6 are relatively minor to explain the post-2008 divergence on the PBC front; especially taking into account the fact that countries with moderately-informed voters are more prosperous on average and thus have a greater capacity to borrow than countries with poorly-informed voters.

Further insights arise when we compare the overall budget deficits of these countries during 2009 and 2010, reported in Figure 7. The left panel shows that in the aftermath of the GFC budget deficits in countries with moderately- and poorly-informed countries were very large, and practically the same in both groups. This is even more apparent in the right panel of Figure 7, in which Island, Ireland and Greece – the countries with the largest deficits in each group – have been dropped from the sample. This suggests that countries with moderately- and poorly-informed voters experienced a comparable 'budget shock' in the crisis period, and casts doubt on the 'exogenous' explanation for their differences in PBC post-2008.

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[21] A similar picture applies when countries with the worst public debt situation in each group (Belgium, Japan and Greece) are excluded.

Figure 7: Budget deficits following the peak of the GFC for the three groups of OECD countries.
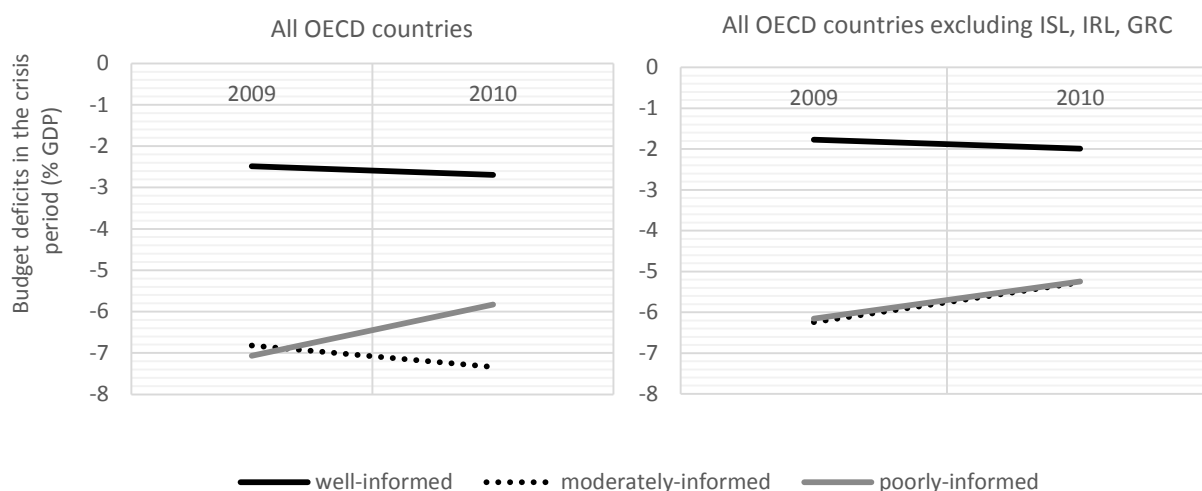
An alternative 'endogenous' explanation related to the voters' awareness relates to the theory of rational inattention. It is plausible that the GFC contributed to a reduced cost of acquiring and processing fiscal policy information, and/or an increased cost or the voters' inattention. As a consequence, moderately-informed voters could simply divert more attention to fiscal issues post-2008, lowering the politicians' payoffs from buying votes during elections. We discuss this explanation and implied policy prescriptions in Section 7.

5.3 Government Expenditures and Revenues: Full Sample and the Pre-Crisis Period

Our findings from the preceding sections can be extended by examining individual parts of the budget balance – expenditures and revenues. We again test both the whole sample 1995-2014 and the pre-2008 period. The left half of Table 3 contains estimation of the regression model in (4) with the government expenditures as a dependent variable, using our preferred method of System GMM (i.e. model 4A). The signs of the regression coefficients (for the controls and for the electoral dummies) should naturally be the opposite compared to the case of the budget balance (*BB*) being the dependent variable (reported in Table 1).

Table 3: Estimation results for the government's expenditures (left) and revenues (right).

	Full sample: 1995 - 2014	Pre-crisis: 1995 - 2008		Full sample: 1995 - 2014	Pre-crisis: 1995 - 2008
Dependent variable (*EXP*)	Sys. GMM (robust) model 4A	Sys. GMM (robust) model 4A	Dependent variable (*REV*)	Sys. GMM (robust) model 4A	Sys. GMM (robust) model 4A
EXP(-1)	1.009***	1.010***	*REV(-1)*	0.978***	0.972***
	(89.84)	(93.22)		(109.02)	(72.68)
GROWTH	-0.310***	-0.292***	*GROWTH*	0.005	0.059
	(-6.85)	(-4.72)		(0.10)	(1.55)
ELE1	-0.194	0.208	*ELE1*	0.026	0.031
	(-0.55)	(1.09)		(0.21)	(0.18)
ELE2	-0.228	0.468***	*ELE2*	-0.082	-0.037
	(-0.65)	(2.59)		(-0.47)	(-0.17)

ELE3	0.518**	0.765**	ELE3	-0.099	0.246
	(1.96)	(2.53)		(-0.33)	(0.77)
NAIRU	0.451	0.666**	NAIRU	0.179	0.158
	(1.43)	(2.16)		(0.58)	(0.59)
OLD	-0.434	0.033	OLD	1.182***	1.074
	(-0.87)	(0.05)		(2.98)	(1.44)
TRADE	-0.061***	-0.052**	TRADE	0.006	0.006
	(-4.25)	(-2.52)		(0.34)	(0.35)
EXCHANGE	0.054**	0.036	EXCHANGE	0.052***	0.065**
	(2.05)	(1.39)		(2.72)	(2.14)
Hansen test	29.12	27.53	Hansen test	30.33	29.56
	[0.747]	[0.234]		[0.693]	[0.162]
AB test	1.10	0.09	AB test	-1.64	-1.37
	[0.273]	[0.930]		[0.102]	[0.171]
No. observ.	613	409		613	409
No. countries	34	34		34	34

The columns report estimated coefficients with the z-statistics in brackets. ∗∗∗, ∗∗, ∗ denote significance at the 99%, 95%, and 90% levels, respectively.

One result, reported in the first column of Table 2, is that there again exists a PBC during 1995-2014 in the group of countries with poorly-informed voters. In particular, government expenditures grew on average by 0.52 percentage points in election years.

In the full sample no such budget cycle is evident in the other country groups. However, if we examine the pre-crisis period only (the second column of Table 2), we find a relatively large PBC not only in countries with poorly-informed voters (*ELE3* is 0.765), but also in countries with moderately-informed voters (*ELE2* is 0.468). These coefficients are statistically significant at the 99% and 95% level respectively.

When evaluating regression models of government revenues (the third and fourth columns of Table 2), we find no signals of a conditional PBC. Coefficients on the electoral dummy variables are all statistically insignificant, even if they have the expected signs in the 1995-2014 period. Nevertheless, these results should be interpreted with caution as the empirical setting may not be suitable for the examination of government revenues.[22]

6 Extensions and Further Robustness Checks

6.1 Controlling for the Global Financial Crisis Period

In order to filter out the effects of the GFC, we consider the following model:

$$Y_{it} = \alpha Y_{it-1} + \gamma GROWTH_{it} + \sum_{j=1}^{3} \delta_j \left(BINFOVOT_{it}^{j} ELE_{it}\right) + \beta X_{it}' + CRISIS_{it} + \mu_i + \varepsilon_{it}, \quad (5)$$

where $CRISIS$ denotes a dummy variable equal to 1 in the years 2008, 2009 and 2010, and 0 otherwise. Table 4 shows the results for the 1995-2014 period with the budget balance as the dependent variable, using our preferred System GMM estimator.

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[22] This is especially the case if we assess revenues in proportion to GDP. If automatic stabilizers on the revenue side work as predicted, revenues elasticity is high and revenues can be almost perfectly correlated with the cycle. Then a unit increase in GDP can lead to a unit increase in revenues, so the revenues-to-GDP ratio remains unchanged. The coefficient on the variable *GROWTH* in the revenues regression is presumably statistically insignificant for that reason.

Table 4: Estimation results with a control variable for the crisis.

Dependent variable (*BB*)	Sys. GMM (robust) model 5A
BB(-1)	0.666***
	(9.12)
GROWTH	0.204***
	(3.66)
ELE1	0.218
	(0.78)
ELE2	-0.017
	(-0.06)
ELE3	-0.930***
	(-2.98)
NAIRU	-1.092*
	(-2.13)
OLD	-1.107***
	(-3.78)
TRADE	0.038*
	(1.93)
EXCHANGE	-0.043
	(-1.03)
CRISIS	-1.702***
	(-3.70)
Hansen test	28.39
	[0.778]
AB test	0.72
	[0.474]
No. observ.	613
No. countries	34

The columns report estimated coefficients with the z-statistics in brackets. ∗∗∗, ∗∗, ∗ denote significance at the 99%, 95% and 90% levels, respectively.

The results of model 5A are consistent with our previous findings. A PBC is apparent only in countries with poorly-informed voters and the coefficient is virtually unchanged. What is equally important, there is still no PBC in countries with moderately-informed voters in the full sample. This suggests that a crisis dummy is insufficient to capture the regime change in these countries after 2008, supporting our empirical approach above.

6.2 Conventional Analysis Without Controlling for the Voters' Awareness

Upon evaluation of a conditional political budget cycle in the three groups of countries, we now examine existence of an *unconditional* PBC. We consider a specification in which the electoral dummy variable *ELE* treats all OECD countries as one group, disregarding their differences in terms of the voters' awareness:

$$Y_{it} = \alpha Y_{it-1} + \gamma GROWTH_{it} + \delta ELE_{it} + \beta \mathbf{X}'_{it} + \mu_i + \varepsilon_{it}. \tag{6}$$

We find it beneficial to also explore a model with an interaction term $INFOVOT_i * ELE_{it}$, which takes us back to a conditional PBC, but without the country division

$$Y_{it} = \alpha Y_{it-1} + \gamma GROWTH_{it} + \delta INFOVOT_i * ELE_{it} + \beta \mathbf{X}'_{it} + \mu_i + \varepsilon_{it}. \tag{7}$$

As the INFOVOT index does not vary over time, it assigns one specific weight to the dummy variable *ELE*, and it is able to measure whether the level of the voters' awareness explains different fiscal policy reactions to the electoral shocks.

Table 5 reports the results for the 1995-2014 period, using our preferred System GMM specification with the budget balance as the dependent variable. The left column shows the estimates of the regression in (6), model 6A. The dummy variable *ELE* is correctly signed (its value is -0.284) but it is statistically insignificant. Based on this, one would conclude that there is no PBC in OECD countries. Our baseline results in Sections 5.1-5.3 however emphasize that such conclusion would be inaccurate for the majority of OECD countries.

Table 5: Conditional and unconditional PBC in OECD countries, disregarding the level of the voters' awareness.

Dependent variable (*BB*)	Sys. GMM (robust) model 6A	Sys. GMM (robust) model 7A
BB(-1)	0.690*** (9.03)	0.695*** (9.03)
GROWTH	0.247*** (4.27)	0.246*** (4.26)
ELE	-0.284 (-1.62)	
*INFOVOT*ELE*		0.498** (2.17)
NAIRU	-1.156** (-2.37)	-1.196** (-2.35)
OLD	-1.167*** (-3.67)	-1.236*** (-3.46)
TRADE	0.034 (1.54)	0.036 (1.50)
EXCHANGE	-0.074* (-1.74)	-0.078* (-1.88)
Hansen test	31.64 [0.631]	31.43 [0.641]
AB test	0.36 [0.716]	0.20 [0.838]
No. observ.	613	613
No. countries	34	34

Columns report estimated coefficients with the z-statistics in brackets. ∗∗∗, ∗∗, ∗ denote significance at the 99%, 95%, and 90% levels, respectively.

The right column of Table 5 reports the estimates of the regression in equation (7), model 7A. The coefficient on the dummy variable *ELE* with the interaction term is correctly signed and statistically significant at the 95% confidence level. The coefficient takes a positive sign because a higher level of the INFOVOT index is associated with an improved budget balance.

Using our interaction term, we can measure the marginal impact of the change in the Informed-voter index on the political budget cycle. If the INFOVOT score increases by 1 (one standard deviation), the difference between the election and non-election year deficit decreases by 0.498 percentage points on average. For illustration, one standard deviation in the Informed-voter index is the difference between the voters' awareness in Finland and

Iceland, or between Australia and Slovenia, or between the United Kingdom and the Czech Republic. In summary, in our benchmark specification the estimates show that the political budget cycle in the OECD is not the same across the member countries. It is conditioned by how informed the voters are.

6.3 Consistency and Unbiasedness of the GMM Estimators

Bond (2002) argued that the comparison of the consistent GMM estimators to simpler estimators such as OLS and Within Groups (FE) is useful, because the latter two are likely to have their coefficients on the lagged dependent variables $Y_{i,t-1}$ biased in opposite directions. As we note in Appendix B, the lagged dependent variable of the OLS estimator is positively correlated with the error term u_{it} and its regression coefficient is upward biased. Therefore, we should expect the true estimate to be lower. Conversely, the FE estimation of the lagged dependent variable is downward biased as purging out the individual effects makes every observation of the transformed variable automatically endogenous to the idiosyncratic disturbances $\varepsilon_{i,t}^*$.

This discussion implies that an unbiased estimation of the lagged dependent variable should generally lie between the FE and OLS estimates. Going back to Tables 1 and 2, we can observe that the coefficient on *BB(-1)* is safely in the range of the FE and OLS estimations. This is true for both the full sample, whereby 0.715 is in the (0.586, 0.799) interval, as well as for the pre-crisis period, whereby 0.73 lies in the (0.605, 0.843) range. These results give further credibility to our System GMM estimators.

7 Discussion of the Results and Policy Implications

Some people seem to believe that 'what you don't know cannot hurt you'. This paper shows one of the many dimensions in which this belief is flawed. It relates to incumbent politicians who take advantage of the voters' ignorance. They manipulate fiscal outcomes in attempt to sway elections in their favour, but the resulting budget cycles and macroeconomic volatility are costly for the voters.

One of our contributions is to construct an index that measures how informed the voters are, with emphasis on the level of their awareness in regards to fiscal policies. Quantifying it for OECD countries, our analysis demonstrates that political budget cycles are associated with the level of the voters' awareness. Sharp increases in the budget deficit in election years occur in countries with poorly-informed voters, whereas they are non-existent in countries with well-informed voters. Interestingly, even our intermediate group with moderately-informed voters featured a political budget cycle, but it disappeared after the 2008 crisis.

These findings are robust to several empirical specifications and robustness checks. They are in contrast to earlier PBC literature, which generally found an election budget cycle only in countries with low incomes and/or new democracies (see e.g. Schuknecht, 2000, Block, 2002, Akhmedov and Zhuravskaya, 2004, or Vergne 2009; for a discussion see Streb et al. 2009 or the detailed survey by Haan and Klomp, 2013).

In particular, Shi and Svensson (2006) report that in the 1975-1995 period 'developing' countries saw on average a 1.27 percentage points' worsening of the budget balance in

election years. But the authors detected no PBC for 'developed' countries, similarly to Brender a Drazen (2005) who have not found any robust evidence of election 'bribery' through the budget in established democracies. We can replicate these conventional findings. We show that without controlling for the level of the voters' awareness the empirical analysis reports no PBC for OECD countries as a group during the 1995-2014 period.

Nonetheless, several more recent studies cast doubt on the earlier widespread consensus, and they are in line with our findings. For example, Alt and Lassen (2006), Tujula and Wolswijk (2007) and Hagen (2010) find budget cycles in OECD countries, whereas Mink and Haan (2006), Efthyvoulou (2012) and Ademmer and Dreher (2016) do so for the members of the European Union. Klomp and Haan (2013a) find a weak PBC in industrialized countries and Klomp and Haan (2013b) in some OECD countries. Table 8 in Appendix D provides further details and additional studies that have found a PBC in high-income countries.

Table 8 also indicates the studies that attempt to account for the level of the voters' awareness, which is our key focus. Our results on this front are broadly in line with these earlier contributions. In particular, Shi and Svensson (2006) combined the number of radios per capita with freedom of broadcasting to measure the share of informed voters. Their greater share was associated with smaller political budget cycles, namely an increase in their index by one standard deviation reduced the size of the PBC by 0.3% of GDP. Similarly, Alt and Rose (2009) confirmed the effect of an informed population on the PBC among individual U.S. states. They showed that government spending was the strongest in states with the lowest levels of newspaper circulation. Alt and Lassen (2006) replicated Persson and Tabellini's (2002) analysis and confirmed a statistically significant cycle in the government's budget balances in 19 OECD countries in the 1990s. They constructed an index of fiscal transparency based on a questionnaire originating from OECD's Best Practises for Budget Transparency (OECD, 2001). Their results showed that the average fiscal balance for low fiscal transparency countries was under 2.9% of GDP in non-election years, whereas in election years it was 3.3% of GDP. In contrast, such PBC was not detected in countries with high fiscal transparency.

It can be argued that the comprehensiveness of our Informed-voter index and of our empirical specification allows us to capture the PBC effects more accurately than these earlier studies. The findings are thus more credible, strengthening the case for policy actions to rectify the situation. A further contribution is our testing of the PBC for different periods, which is uncommon in the empirical literature. Efthyvoulou (2012) examined 27 EU member states over the period 1997-2008 and found quite a strong PBC (around 0.9% of GDP). Examining a longer time span (1980-2008) for some countries confirmed his benchmark results, namely a large election year worsening of the budget balance. The author's results are further consistent with ours in that a PBC tends to occur through the expenditure side rather than the revenue side. Brender and Drazen (2005) came to the same conclusion. They found a strong and statistically significant political budget cycle in the new democracies on the expenditure side, but not on the revenue side.

It is worth noting that our results challenge the hypothesis of Brender and Drazen (2005) regarding the voters' learning. The authors argue that in newly democratic countries PBC occur only for two or three election cycles, after which they disappear. This should be because voters become aware of this costly political game and no longer participate in it. However, our group of OECD countries with poorly-informed voters still features large increases in the budget deficit in election years after almost three decades of democracy (7 out of 10 countries in this group have been consistently ranked as democratic since the early 1990s). Similarly, our countries with moderately-informed voters still featured a PBC in the 1995-2008 period, despite having high incomes and a long tradition of democratic leadership.

What are the policy implications of our findings? From a social welfare perspective, we can conclude that ignorance is anything but bliss when it comes to fiscal policy. It leads to budget cycles, which the literature has shown to be costly through several avenues. In avoiding these costs and enhancing social welfare, three main policy recommendations offer themselves. The first is uncontroversial, namely an increased investment into the education system that would help to produce more informed voters. The literature has identified a number of reasons to support this policy prescription, mainly in the area of economic growth, and our analysis adds elimination of budget cycles to the list.

A more controversial suggestion is to explore the desirability of deficit fines for politicians. Arguably, if all members of parliament incurred a hefty automatic penalty in the case of a budget deficit, their incentives to 'bribe' voters with extra pre-election spending would be reduced to some extent. Nevertheless, deficit fines would put politicians between a rock and a hard place. If the voters were still uniformed, politicians would face a dilemma between paying the fine and satisfying uninformed voters.

It can therefore be argued that a lasting solution needs to entail a mechanism that provides incentives for voters to acquire and process relevant policy information, and hence does away with the underlying reason for election 'bribery'. We believe that a general deficit tax could play this role and deserves attention of future research. This mechanism could have similar effects to the 'budget shock' described in Chapter 5. Under the deficit tax every voting-age individual would pay a lump-sum amount in the case that the budget deficit exceeded a certain pre-announced level. The idea is that the deficit tax would increase the cost of the voters' inattention to the adverse social welfare consequences of excessive election spending (see Matejka and Tabellini, 2016), making them more likely to oppose such policies. To highlight the linkage between the tax and the budget outcomes, the amount would best be a percentage of the per-voter deficit. Nevertheless, it should be no more than 20% to avoid the tax being too pro-cyclical; alternatively, it could be calculated from the structural deficit (for a comprehensive discussion of the benefits and potential drawbacks see Janku, 2016).

It is clear that a major obstacle to seriously considering deficit fines and deficit taxes are the incentives against their adoption. In game-theoretic terms, these arrangements are unlikely to be incentive compatible, because uniformed voters generally dislike exposing themselves to the threat of an additional tax, and re-election eager politicians generally dislike losing the

opportunity to buy votes through extra spending. The policy of increased investment into education may also lack incentive compatibility in countries with uninformed voters.

All this points to the danger of an 'ignorance trap', a situation in which uniformed citizens elect politicians whose policies reinforce the citizens' ignorance. In a sense, this policy conundrum is comparable to a time-inconsistency problem identified by Kydland and Prescott (1977). A large body of literature, most influentially Barro and Gordon (1983) and Rogoff (1985), explored how the problem could be solved in the area of monetary policy, namely the various commitment devices available to policymakers. This initiated the trend towards independent central banks with explicitly legislated inflation targets and a high degree of transparency and accountability. It remains to be seen whether similar progress in eliminating inefficient policy outcomes and improving social welfare can be replicated in the area of fiscal policy as well.

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Appendix A. Informed-Voter (INFOVOT) Index

Table 6: Informed-voter (INFOVOT) index score, its sub-indices and country ranks.

	Rank	Country	INFOVOT Score	GE	IA	IM	TE	PI
WELL- INFORMED	1.	Finland	**1.142**	1.423	1.067	0.897	1.348	0.698
	2.	Canada	**1.122**	0.915	0.852	0.462	1.239	2.348
	3.	Denmark	**0.882**	1.378	1.149	0.759	0.401	0.223
	4.	Norway	**0.880**	1.021	1.491	0.889	0.068	0.790
	5.	Netherlands	**0.843**	0.965	1.162	0.832	0.972	0.160
	6.	Sweden	**0.811**	1.128	1.430	0.717	0.151	0.313
	7.	Switzerland	**0.781**	1.129	0.873	0.653	0.780	0.124
	8.	New Zealand	**0.758**	0.782	0.723	0.650	0.866	0.744
	9.	Iceland	**0.629**	0.808	1.644	0.753	-0.055	-0.182
	10.	Australia	**0.583**	0.688	0.598	0.063	0.796	0.666
	11.	Belgium	**0.580**	0.627	0.045	0.506	0.672	1.002
MODERATELY-INFORMED	12.	United Kingdom	**0.451**	0.635	0.586	0.065	0.331	0.456
	13.	Luxembourg	**0.423**	0.793	0.601	0.581	-0.492	0.261
	14.	Japan	**0.414**	0.036	0.388	-0.335	1.232	1.130
	15.	Ireland	**0.381**	0.381	-0.419	0.722	0.569	0.651
	16.	United States	**0.362**	0.483	0.692	-0.196	-0.082	0.792
	17.	Germany	**0.321**	0.514	0.411	0.502	0.265	-0.278
	18.	Austria	**0.192**	0.788	0.169	0.534	0.147	-1.275
	19.	Estonia	**0.110**	-0.769	0.053	0.686	0.642	0.817
	20.	Korea	**0.086**	-0.671	0.725	-0.575	1.760	-0.051
	21.	France	**0.086**	0.346	-0.289	-0.168	0.196	0.083
	22.	Spain	**-0.179**	-0.097	-0.623	-0.269	-0.351	0.364
	23.	Israel	**-0.272**	-0.262	-0.899	-1.155	-1.208	2.155
	24.	Slovenia	**-0.441**	-0.702	-0.495	0.040	-0.003	-0.782
POORLY-INFORMED	25.	Czech Republic	**-0.590**	-0.869	-0.674	0.419	-0.010	-1.534
	26.	Slovakia	**-0.630**	-1.077	-0.317	0.436	-0.617	-1.129
	27.	Portugal	**-0.687**	-0.529	-1.082	0.202	-0.524	-1.658
	28.	Hungary	**-0.713**	-1.052	-0.852	-0.096	-0.359	-0.869
	29.	Chile	**-0.796**	-0.279	-1.283	-0.442	-2.129	-0.364
	30.	Poland	**-0.823**	-1.417	-1.020	-0.194	0.068	-0.960
	31.	Greece	**-1.062**	-1.348	-1.509	-0.494	-1.195	-0.477
	32.	Italy	**-1.138**	-1.494	-1.073	-0.577	-0.580	-1.608
	33.	Turkey	**-2.185**	-2.163	-1.966	-3.160	-1.920	-1.740
	34.	Mexico	**-2.322**	-2.109	-2.159	-3.705	-2.980	-0.870

Sources: *Government Effectiveness (GE):* component of the World Bank's Worldwide Governance Indicators (WGI): https://data.worldbank.org/data-catalog/worldwide-governance-indicators. *Internet availability (IE)*: internet users (per 100 people), World Development Indicators: https://data.worldbank.org/data-catalog/world-development-indicators. *Independence of the media (IM):* The World Press Freedom Index, Reporters Without Borders: https://rsf.org/en/ranking. *Tertiary education (TE):* Labor force with tertiary education (% of total): https://data.worldbank.org/data-catalog/world-development-indicators. *PISA tests (PI)*: The Programme for International Student Assessment scores for the mathematics and reading: http://www.oecd.org/pisa/data.

Appendix B. Choice of the Estimation Methodology

There exist three important assumptions under which the panel regression model in (4) could in principle be estimated using Ordinary Least Squares (OLS). It would have to be the case that: (i) the unobserved country-specific effects μ_i are equal across the countries, (ii) the idiosyncratic disturbances ε_{it} are not serially correlated, and (iii) the explanatory variables are strictly exogenous. Such scenario is highly unlikely, for example it is almost certain that assumption (i) does not hold, meaning that the simple OLS estimator is biased. This is true because the vector of the lagged dependent variable $Y_{i,t-1}$ is endogenous to the country specific effects μ_i that are contained in the error term ($u_{it} = \mu_i + \varepsilon_{it}$), and the implied positive correlation between a regressor and the error term violates the assumption of orthogonality (for more see Roodman, 2006).

Most empirical studies therefore employ Fixed Effects (FE) in order to allow for cross-country differences. However, the conventionally used Within Groups (WG) estimator is problematic as well, especially if the number of periods is low. It is well-documented that the WG estimator does not eliminate the dynamic panel bias, commonly being in the order of 1/T (see Nickell, 1981 and Kiviet, 1995).[23]

For the above reasons, one has to replace the Fixed Effects with a different transformation of the data that fully removes the dynamic panel bias created by the WG transformation. The first-difference transformation can eliminate the time invariant part of the error term (fixed effect μ_i). While the term $Y_{i,t-1}$ in the transformed variable $\Delta Y_{i,t-1} = Y_{i,t-1} - Y_{i,t-2}$ is still correlated with ε_{it-1} in $\Delta \varepsilon_{it} = \varepsilon_{it} - \varepsilon_{it-1}$, unlike in the WG transformation, deeper lags of the regressors remain orthogonal to the error term and thus available as instruments. For that reason we can use the Arellano-Bond (1991) estimation, which transforms all regressors by First-Differencing (FD), and which uses the Generalized Method of Moments (GMM) with Instrumental Variables (IV).

The Arellano and Bond (1991) estimator is based on the moment conditions from the lagged levels of the dependent variables and the first-differenced errors. If the errors are not serially correlated, dependent variables Y_{it} lagged by two or more periods will be valid instruments for the difference of the lagged dependent variable ΔY_{it-1}, because $E(y_{i,t-s}\, \Delta \varepsilon_{it}) = 0$ for each $t \geq 3, s \geq 2$. This estimator hence uses the lagged levels of the dependent variable as an instrument for the equations in first differences.

An alternative (and superior) approach is Blundell and Bond's (1998) System GMM, which is our benchmark specification. It is described in the main text, including its advantages over the other three models discussed here.

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[23] Under the WG transformation, the lagged dependent variable becomes $Y^*_{i,t-1} = Y_{i,t-1} - \bar{Y}_{i,-1}$ and the idiosyncratic disturbance term becomes $\varepsilon^*_{i,t} = \varepsilon_{i,t} - \bar{\varepsilon}_i$. We know that $\bar{Y}_{i,-1} = \sum_{t=2}^{T} \frac{Y_{i,t-1}}{T-1}$ and $\bar{\varepsilon}_i = \sum_{t=2}^{T} \frac{\varepsilon_{i,t-1}}{T-1}$. The problem is that the $Y_{i,t-1}$ term in $Y^*_{i,t-1}$ correlates negatively with the $-\bar{\varepsilon}_i$ term in $\varepsilon^*_{i,t}$, because it includes $\varepsilon_{i,t-1}$. Moreover, endogeneity cannot be mitigated by instrumenting $Y^*_{i,t-1}$ with its lags $Y_{i,t-1}$, because they are embedded in the transformed error $\varepsilon^*_{i,t}$. The resulting correlation creates bias of the estimated parameters of the lagged dependent variable and the other regressors. All this implies that the FE estimator using the WG transformation is biased, despite being consistent for $T \to \infty$.

Appendix C. Data Sources, Descriptions and Expected Signs

Table 7: Data sources, variable descriptions and signs expected in the *BB* regression.

Variable	Units	Expected sign[*]	Description	Data provider
BB	percent		General government budget balance (percent of GDP)	World Economic Outlook Database: www.imf.org/en/Data
EXP	percent		General government total expenditure (percent of GDP)	World Economic Outlook Database: www.imf.org/en/Data
REV	percent		General government revenue (percent of GDP)	World Economic Outlook Database: www.imf.org/en/Data
ELE	dummy	negative (-)	Election dummy (equals 1 if election takes place that year)	Database of Political Institutions (Cruz, Keefer and Scartascini, 2016)
NAIRU	percent	negative (-)	Non-accelerating inflation rate of unemployment	OECD Economic Outlook: http://stats.oecd.org
OLD	index	negative (-)	The ratio of people older than 64 to those aged 15-64	World Development Indicators: https://data.worldbank.org/data-catalog/world-development-indicators
TRADE	percent	positive (+)	The sum of merchandise exports and imports as a share of GDP	World Bank Open Data: http://data.worldbank.org
EXCHANGE	index	negative (-)	Exchange rate regime (ranging from 1 to 15)	Ilzetzki, Reinhart and Rogoff (2017) database and IMF's Annual Reports on Exchange Arrangements and Exchange Restrictions
GROWTH	percent	positive (+)	Annual percentage growth rate of GDP at market prices	OECD Economic Outlook: http://stats.oecd.org

Expected sings for the model with BB as the dependent variable (for REV they are the same and for EXP exactly the opposite).

Appendix D. Recent Empirical Literature on the PBC

Table 8: Overview of studies finding a PBC in developed countries.

Study	Sample	Is the voter's awareness (or information flows) included? How?	Conclusions
Brender and Drazen (2005)	106 countries, 1960-2001. Subsample of 32 old democracies	Yes (partly) Emphasizes lack of experience with elections, unavailability of data and inexperienced media in the new democracies.	The results are driven by the experience of 'new democracies'. A strong PBC in new democracies (0.87% of GDP) and no PBC in old democracies.
Alt and Lassen (2006)	19 OECD countries, 1989-1998	Yes (partly) Countries divided according to Fiscal Transparency (own index).	A persistent pattern of electoral cycles was identified in low(er) transparency countries (estimates range from 0.54 to 0.69), while no such cycles can be observed in high(er) transparency countries.
Mink and Haan (2006)	12 EMU member states, 1999-2004	No	From the start of the Stability and Growth Pact, budget deficits increased by 0.96% of GDP at the time of elections.
Shi and Svensson (2006)	85 developed and developing countries, 1975-1995. Subsample of 27 developed countries	Yes Own INFO index as an explanatory variable (radios per capita and freedom of broadcasting).	A strong PBC detected in the full sample, but no PBC in the subsample of developed countries. Significant effect of the INFO index in the whole sample (subsample of developed countries was not tested).
Tujula and Wolswijk (2007)	22 OECD countries, 1970-2002	No	Fiscal balance ratios on average deteriorate by about 0.34% of GDP in general election years.
Hagen (2010)	24 OECD countries, 1989-2005	No	The results indicate that the primary surplus is significantly smaller in election years (by 2.7% of GDP). Even after excluding 'new democracies' statistically significant effects are found.
Efthyvoulou (2012)	27 EU member states, 1997-2008	No	A PBC is larger and statistically more robust in the Eurozone countries (1.25) and in the old democracies (0.90) than in non-Eurozone countries and new democracies.
Klomp and Haan (2013a)	70 democratic countries, 1970-2007. Subsample of industrialized (developed) countries, according to the IMF classification.	Yes (partly) Countries divided according to Fiscal Transparency (index from the ICRG database).	The short-run election effect is much higher in developing countries (0.88) than in industrialized countries (0.21), and in low transparency countries (0.98) than in high transparency countries (0.26).
Klomp and Haan (2013b)	65 democratic countries, 1975-2005	No	On average, elections hardly affect budget balances. A PBC was found in selected countries (some of them developing, some OECD members).
Ademmer and Dreher (2016)	25 EU member states	Yes (partly) Press Freedom (PF) index (from Freedom House) included as a control variable and also used for the division of countries into two groups (low vs high press freedom).	A strong PBC found in the panel of EU countries (above 1.12 in various specifications). Instead of a linear effect of the Press Freedom index (used as a control variable), there is a certain threshold – a large PBC in the low PF countries (above 1.03) and no effect in high PF countries.