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VOTING IN THE AFTERMATH OF A PENSION REFORM: THE ROLE OF FINANCIAL LITERACY

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Voting in the aftermath of a pension reform:

the role of financial literacy

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Abstract

This paper documents that the electoral cost of major pension reforms is lower in countries where the level of financial literacy is higher. The evidence from data on legislative elections held between 1990 and 2010 in 21 advanced countries is robust when we control for macro-economic, demographic, and political conditions. Interestingly, these findings are not robust when we use less specific indicators of human capital as general schooling, supporting the view that knowledge of basic economic and financial concepts has distinctive features that may help reduce the electoral cost of reforms having a relevant impact on the life-cycle of individuals.

JEL classification: D72; H5; I2.

Keywords: pension systems; reforms; re-election; financial literacy.

1. Introduction

Reforms are often viewed as difficult to implement because the burden they impose on citizens may make the government unpopular, independently on its goals. Jean-Claude Juncker, the present President of the European Commission, expressed the concern in a much quoted aphorism: "We all know what to do, but we don't know how to get re-elected once we have done it" (The Economist, March 15, 2007).

In this paper, we explore whether the electorate's ability to understand essential economic concepts may be a relevant element for the evaluation of the "electoral costs" of economic reforms that typically require sacrifices today in expectation of benefits tomorrow and that have a relevant impact on the life cycle of individuals. Specifically, we focus on the major restructuring of pension systems that took place in advanced countries in the past decades, and study whether the probability of a government to be confirmed into office is associated with the signing into law of a pension reform during its term of office, and to indicators of the degree of basic economic and financial knowledge among the population.

Research on the association, in advanced countries, between economic reforms and electoral outcomes does not decisively support the view that a "political toll" exists. For instance, Alesina *et al.* (2013) find no evidence of a clear relation between large fiscal adjustments and the probability of a government to be re-elected in OECD countries. Buti *et al.* (2010), who analyze the impact of deregulation in five policy areas using the database on reforms developed by Duval (2008), show that re-election of the incumbent government is not affected by reforms when a synthetic index of reformist attitudes in all policy areas is adopted, and find mixed results when different types of reforms are instead considered: the association is mildly positive for tax wedge and unemployment benefits cuts, and mildly negative for reforms of employment protection and retirement schemes.

Related works study the reasons why it is difficult for a government to carry out economic reforms and analyze the conditions under which policy changes are most likely to occur. Alesina *et al.* (2006) use a "war of attrition" model - whereby the political conflict between two generic groups in the society delays fiscal stabilization after a negative permanent shock to the economy - to show that reforms whose target is the stabilization of large budgetary deficits or of the inflation rate are more likely to occur in times of economic crisis, after the appointment of a new government, and when the government is stronger. Prati *et al.* (2013) study reforms of real and financial markets and show that there is a positive, albeit very heterogeneous across countries, association between reforms and growth. Bonfiglioli and Gancia (2016) study the association

between deregulation of financial and real markets and economic uncertainty and show a positive correlation between stock market volatility and structural reforms.

In this work, we focus on the electoral cost of reforms that introduce structural modifications in people's economic life cycle and are likely to receive prolonged front page media attention, as it is arguably the case for major changes to the pension system or to the labor market. We concentrate specifically on a set of policy changes that represent a key public policy issue in advanced countries, and considers "major" reforms to the pension system, collecting information on those laws that are universalistic in their scope and that, according to international organizations such as the Organisation for Economic Co-operation and Development (OECD), the International Monetary Fund (IMF), and the World Bank (WB), are targeted at improving financial sustainability by reducing future pension spending without putting at risk the adequacy of retirement incomes.

We find no robust evidence, as in Alesina *et al.* (2013), of a clear relationship between reforms and re-elections *per se*. Things change, however, when we take into account the population's level of basic economic and financial knowledge: the electoral cost of a pension system reform appears indeed to be significantly lower in countries where the level of economic and financial knowledge among the population is higher. We also consider other indicators of human capital, and test their role as explanatory variables, showing that economic and financial knowledge has distinctive features that more general dimensions of education, such as school attainment, do not capture.

Our argument that the electoral cost of reforms requiring specific skills in order to be correctly understood and assessed (even if only at a very basic level) depends on the general understanding of their economic content thus finds support in the data. We contribute to the growing literature on the importance of economic and financial knowledge to people's decision-making. Recent studies by, e.g., Bucher-Koenen and Lusardi (2011), Lusardi and Mitchell (2007, 2014), Fornero and Monticone (2011), Van Rooij *et al.* (2011), show that economic and financial literacy helps explain people's ability to accumulate and manage wealth and build retirement plans. Poor financial literacy is also associated to a lack of portfolio diversification in country studies (Guiso and Jappelli, 2008) as well as across countries (Jappelli, 2000; Giofré 2017). People's ability to take advantage of new investment opportunities, measured by economic literacy, may help reduce inequality across countries and over time (Lo Prete, 2013). Little has been done so far to include economic and financial knowledge in models that study why governments are reluctant to introduce economic reforms. Experimental evidence on Portuguese

voters suggests that people willingness to support pension reforms is related to the information they gather (Fontoura Gouveia, 2017), while in a recent work on data from the British Election Study financial literacy seems associated with lower attitudes in favour of redistributive policies (Montagnoli *et al.,* 2017).

Of course, financial literacy is not the only ingredient necessary to successfully implement economic reforms, but it appears to be a relevant one in our empirical models, where we control for macro-economic conditions, characteristics of the political system, political and demographic factors.

The contribution of our work is thus twofold. We contribute to the research on the association between reforms and re-election in advanced countries, with an innovative feature which emphasizes the role of economic and financial knowledge on the success of reforms, thus adding a new perspective to the research on financial literacy. We also propose a qualitative taxonomy of pension reforms that allows for cross-country comparisons.

The paper is organized as follows. We define the variables we use in the empirical analysis in Section 2. We provide some descriptive evidence and present the empirical strategy in Section 3. The main results and a set of robustness checks are discussed in Section 4. Concluding remarks are to be found in Section 5.

2. Data

Our dataset covers the period 1990-2010 and includes information on pension reforms, electoral outcomes of parliamentary elections, education, macro-economic, demographic and political aspects in 21 OECD countries, namely: Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Netherlands, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, and United Kingdom.

Re-election. Following previous studies on the association between electoral outcomes and reforms (Brender and Drazen, 2008; Buti *et al.*, 2010), we define "re-election" as a dummy variable which takes value one if in year t an election takes place and the head of government that held office before the election is confirmed in office, and value zero if a new head of the government is appointed. By considering who was in power before and after the election, our definition of re-election accounts for the possibility that a cabinet reshuffle which resulted in the appointment of a new head of the government belonging to the same party (e.g., the appointment of Major as UK Prime Minister after Thatcher's resignation in 1990) or to a different party (e.g., the appointment of Bruton as Taoiseach of Ireland in 1994, after the "Rainbow Coalition" was

formed) occurred during the legislature. We do not distinguish whether such changes were due to resignation, retirement, or death of the head of the government who held power at the beginning of the legislature which ends with the election in year t. What is relevant for our purposes is to rule out the possibility that the political toll of the reforms under analysis was paid before the elections by a different head of the government with respect to the one who signed a reform into law. This is actually the case, since in our sample cabinet reshuffles never occurred during a legislature which witnessed the ratification of a major pension reform.

Pension reforms. We build our pension reform variable following an approach based on expected rather than effective results, and consider whether a "fundamental" (structural) pension reform was introduced by the incumbent government. More specifically, we define "major" a pension reform that satisfies both the following criteria:

(a) introduces a structural change that - according to valuations of the international institutions (such as the OECD, the WB, or the IMF) – has an impact in terms of financial sustainability and/or income adequacy; and

(b) has a broad scope, that is, it affects the generality of workers and not only specific categories, including reforms which aim at greater integration of public and private pillars of retirement systems.

The resulting reform variable takes value one if a major change in the pension system was signed into law during the legislature, and zero otherwise (a full list and description of reform events is available in the Online Appendix to this paper).

Our definition has the advantage of ruling out minor changes to formulae and other technical features characterizing the pension rules (the *so-called* "parametric" reforms[1]) that are not central to the pension system and that, as it is reasonable to expect, are less likely to receive widespread media coverage and voters' attention. A similar attempt to distinguish between "marginal" and "structural" pension reforms was made by Fondazione Rodolfo De Benedetti and IZA on the basis of a scope criterion – namely they considered changes in the generosity of public pension systems that modify the monetary amount of pensions or eligibility criteria for the generality of workers. We construct upon their effort by explicitly taking into account the sustainability and adequacy perspectives to evaluate the reforms under analysis, and by enlarging both the country and the period samples.

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[1] Our taxonomy does not entirely correspond to the usual distinction between "structural" and "parametric" reforms, as some parametric reforms have a profound impact on sustainability/adequacy and may thus be considered as "major".

An alternative approach to the definition of the reform variable would be to consider effective results and measure the impact of a pension restructuring on the household sector and on public finances. It is, however, difficult to find statistics on changes such as the reduction in households' pension wealth (i.e. implicit public debt, for a pay-as-you-go system) or in the internal rate of return on contributions resulting from a reform. For instance, in Duvall's study (2008) on the role of macroeconomic policy in fostering structural reforms in labour and product markets, the author built an index of major reforms in old-age pension schemes by considering one of the few data series available for cross-country comparisons. He used an average of OECD measures of implicit tax rates on continuing work, and defined as "major" a change in the resulting indicator that was greater than two standard deviations of its annual change over all the observations considered in the study. This methodology allowed to identify as "major" a very limited number of reform events, and, when used in Buti *et al.* (2010) to assess the association between reforms and re-elections, constrained the pension reform to have an electoral cost only after it became effective - which could be many years after its enactment depending on the length of the phasing in.[2]

We overlook such admittedly difficult, albeit important, assessment because of the extreme complexity in arriving at clear cut definitions, and focus on whether voting behavior is directly affected by the occurrence of a pension reform. In doing so we concentrate mainly on people's perceptions of the net costs (benefits) of a reform instead of relying on effective changes, due to the reform, in money's worth measures of pension programs (such as the replacement ratios, the internal rate of returns and the net worth).

Education. There are several dimensions of human capital accumulation that may affect people's understanding of public policies. The ability to understand basic economic concepts about individual financial decisions and the functioning of a modern economy is generally referred to as "financial literacy" (Lusardi and Mitchell, 2014). We cannot rely on the more recent direct measures, through surveys, of the level of financial literacy (FL) among the population. We use an indicator that allows for cross-country comparisons, compiled by the IMD World Competitiveness Yearbook, built on the basis of interviews to senior representatives of the national business community who are asked to evaluate the level of economic and financial

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[2] Duvall (2008) classifies only eight changes as major reforms to retirement schemes in the 21 OECD countries over the 1985-2003 period he considers. Besides, the timing of such changes depends on the enforcement of specific measures that might have been phased in over several years after the reform package they belong to was voted into law and placed before the people in polling stations.

knowledge among the population on a 1-10 scale.[3] Of course, an indicator obtained from indirect survey of interviews may convey subjective biases. This measure has, however, the notable advantage of being available for a large number of countries; moreover, our confidence in its information content is fostered by the observation that, as discussed in Section 4, the measure is correlated at significant levels with other indicators of educational achievements.

Neither can we exploit the information on financial literacy collected by the Programme on International Student Assessment (PISA) of the OECD, because its data collection covers only recent years that are out of our reference period. We use, instead, PISA data on the level of "mathematical literacy", which are based on the assessment of mathematical performance of 15 years old scholars. This score aims to measure the level of skills that should enable people to make well-founded decisions in daily issues involving some mathematics, as it could be the case for the evaluation of a pension reform. Although the surveyed students do not yet participate in parliamentary elections and may thus only marginally be interested in pension reforms, it could be argued that where PISA scores are higher the financial literacy of parents is also higher. Finally, we consider more generic indicators of human capital: secondary and tertiary school attainment, as measured by Barro and Lee (2013), which account for the percentage of people who achieved a secondary or a tertiary school degree, respectively.

Control variables. The probability of a government to be re-elected may depend on many factors that are not directly related to the reform process or to financial literacy. We thus use many control variables, starting from macro-economic and demographic variables. One may expect people living in countries that experience periods of higher economic growth, expansionary fiscal policies, and lower inflation, to be keener of re-electing the incumbent government. To control for the spurious effects that may derive from the presence of these confounding factors, we include a measure of the level of economic activity in the years before the elections, the output gap to GDP ratio, and we account for changes in fiscal policy and price level dynamics by controlling for the change in the primary cyclically adjusted balance and for yearly changes in inflation, respectively. Given that the age structure of the voting population may also be relevant

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[3] The World Competitiveness Yearbook is published yearly by the IMD Business School in Lausanne. Using data from international databases and from an international survey of expert managers, it compiles indicators of the competitiveness of countries (i.e. their economic performance, government efficiency, business efficiency and infrastructure). The information on economic and financial knowledge it gathers from its Executive Opinion Survey has been used in macro-economic studies on the relevance of FL to stock market participation (Jappelli, 2010) and inequality (Lo Prete, 2013).

to electoral outcomes, we include as a proxy for the age of the median voter the "median age" of the total population.[4]

We include information of the main aspects of the political system and electoral rules, using data drawn from the Database of Political Institutions (DPI) by the World Bank (see Beck *et al.*, 2001, and Cruz *et al.*, 2016). As other studies on the determinants of re-election, we consider some characteristics of the political system as the presence of proportional *versus* majoritarian voting rules, parliamentary *versus* presidential systems of government, and differences in the frequency of elections due to the constitutional term of office of the elected chambers.

Next, we include information on the incumbent government. To measure its power to enact policies, we consider the "margin of majority" it enjoys over the opposition parties, that is, the ratio of the number of seats held by the parties supporting the government to total number of seats. The political orientation of the government may also be important to test if the electoral cost of a reform differs across parties due to their ideological connotation. For instance, one may expect a left-wing government to lose more support if it got involved in reforms that impose a burden on all citizens irrespectively of their income/wealth level. To represent political orientation, we use the definition by the DPI and define "left-wing" a government whose head is from a Communist, Socialist, or Social-democratic party. To account for the "stability" of the government, we consider the percent of veto players (i.e. members of the government coalition) who left the government in the year before the elections.

As robustness checks, we investigate whether the electoral cost of a reform depends on political and civic support to the reform process. To gather information on the nature, content, and intensity of policy-related discussions, qualitative analyses of media debates would be helpful which require a data collection effort far beyond the scope of the present project. Still, we can try to control for dimensions that are related to the ones that we cannot measure. For instance, we have no data on the political support of opposition parties, but we have information on the political distance between the main parties elected at the national level. The "polarization" variable we use is defined by the DPI as taking value zero if the party of the head of the government has an absolute majority, and otherwise measures the maximum distance in political orientation between the party of the head of the government and the largest opposition party. As regards the popularity of the government and the intensity of policy-related discussions, we

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[4] In regressions not reported, we control also for changes in real GDP, inequality, young and old dependency ratios. Our main findings are robust to the use of these alternative controls for macro-economic and demographic conditions.

include the projections of old-age dependency ratios (30 years ahead), to account for the possibility that people's perception of a higher cost of ageing may create more sympathy for a reform and reduce its electoral costs, and we consider the number of civil unrests that took the form of political expression events such as strikes and mass demonstrations at the national level. Finally, we consider some characteristics of the political juncture which can be relevant to re-election probabilities, as the number of years the incumbent head of the government has been already in office before the election, and how early in the legislature the reform was introduced.

3. Descriptive evidence and empirical strategy

We collected data on 118 parliamentary (general) elections that took place between 1990 and 2010 in the sample of advanced countries listed in Table A.1. The sample is unbalanced due to the (across-countries) staggered nature of the election calls, the different constitutionally defined length of tenure, which in our sample ranges between 4 and 5 years, and potential early dissolutions of the legislature, an event which occurred 46 times and at least once in every country of the sample with the exceptions of Finland, Hungary, and Norway.

We relate electoral outcomes to the introduction of major changes to the pension system. We classified as "major" the 28 pension reforms that are listed in Table A.2. It is possible that the same government enacted more than a pension reform act in the same legislature, as did the Schussel government in Austria, or that a change in the pension system was implemented by a series of legislative acts dealing with different aspects of the pension system, as it was the case of Finland in 2005, Hungary in 1997, and the Slovak Republic in 2003-2004.

We do not distinguish explicitly between contractionary and expansionary reforms as the sample period we consider (1990-2010) is largely the period of the reform process, with almost all countries being involved in pension restructuring with more rapid or lengthy phasing in. Reforms were generally addressed to improve the financial sustainability of pension schemes, threatened by demographic ageing, poor design and "excessive" political generosity (towards current generations). Of course, this does not preclude that some aspects of the restructuring carried a positive sign for some specific groups of people. While we do not have information on whether the pension reform was part of a broader reform package which included important innovations in other economic sectors, we observe that none of the reforms in our database has been substantially reversed.

We included in our list also the privatization of the Dutch public pension fund ABP and the reform of the Finnish ITP occupational pension plan in 2007, to acknowledge the relevance of

occupational plans in the countries considered – a choice which does not affect our findings, that are robust to the exclusion of these two reform events from the sample. As the footnote to Table A.2. remarks, we record no major pension reforms over the period under analysis in three countries, namely: Denmark, Greece, and Ireland.

Concerning re-elections, the head of the government was elected for a second term of office in 49 election rounds out of 118. The countries where the head of the government was confirmed in office more frequently are Austria, Belgium, Canada, Denmark, and Germany, where re-election occurred four times in the period under analysis. In contrast, in Italy, France, Hungary, and Poland the head of the government has never been re-elected over the period under analysis.

Figure 1 provides some descriptive evidence by plotting the frequency of pension reforms against the frequency of re-election. In our sample, there is a slightly negative association between the percentage of elections that result in the re-election of the incumbent government and the percentage of elections that took place after a major change in the pension system occurred. Interestingly, the countries that have reformed more are also those in which the governments have paid the higher electoral costs, with the notable exception of Germany, where reforms are associated to a high probability of the incumbent government to be re-elected.[5]

This descriptive evidence is useful to depict a figure that summarizes some characteristics of the variables under analysis, but has of course to be qualified. In what follow, we develop empirical models to analyze the relationship between re-election and pension reforms and to show that the introduction of education, measured by indicators of economic-specific competences, uncovers interesting insights about the association between reform events and their political toll.

Econometrically, we test if the slope of the relationship between reforms (REF) and re-election ($REEL$) differs across countries in ways that depend on the level of financial knowledge that the population displays on average (FL) by including an interaction term between our pension reform variable and the FL indicator. In empirical models that read

$$REEL_{jt} = \alpha + \beta REF_{jt} + \gamma\,(REF_{jt\prime} \times FL_{jt}) + \delta\,FL_{jt} + X_{jt}\theta + \varepsilon_{jt}\,, \qquad (1)$$

we expect the coefficient of the interaction term, γ, to be not significantly different from zero, if the association between re-election and pension reforms does not differ across countries when we allow them to differ on the basis of the level of economic and financial knowledge of their population; significantly different from zero, otherwise.

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[5] The results in Section 4 are robust to the exclusion of Germany from the sample.

We study the outcome of a parliamentary election in country j at time t, and consider if a major pension reform was enacted in a year t', where $t - n \leq t' \leq t$, and n represents the constitutionally specified term of office of the legislature. If the legislature is interrupted s years before its constitutionally defined conclusion, the inequality becomes $t + s - n \leq t' \leq t$, as we consider reforms that occurred within the term of office of the elected chambers, whatever its length. We control for the possibility that a cabinet reshuffle occurred, and for other potentially relevant determinants of re-election that may or may not vary across countries $j = 1, \dots, J$ and over time $t = 1, \dots, T$. The X_{jt} set of control variables in the empirical model above includes country-specific characteristics of the political system, indicators of the power, political orientation, and stability of the incumbent government, and macro-economic indicators that, to account for the fact that people are more likely to consider recent events when casting a ballot in national elections (Fair, 1978; Brender and Drazen, 2008; Buti *et al.*, 2010), are averaged over the current (election) year and the previous year. To measure people's understanding of the economic content of reforms that may have been signed into law up to four years before the call of the election scheduled at time t, and to reduce potential measurement errors, we consider the four-year moving average of the indicators of education (see the Data Appendix for details).

We estimate our empirical models by using linear probability models. As discussed in Angrist and Pischke (2009) and related literature, Ordinary Least Squares (OLS) estimators can be preferable to non-linear estimators when running regressions on panel data and when using instrumental variables (IV). We also show that our main results from OLS estimators are similar to the results we get from Probit estimators.

4. Results

Results in the first column of Table 1 from OLS estimation of the bi-variate association between the probability of a government to be re-elected and the introduction of major changes to the pension system confirm, in the context of our study, previous results by Alesina *et al.* (2013): the probability of the incumbent government to win the elections is not significantly related to the enactment of a reform during its years of office.[6]

In the second column of Table 1, we present results from OLS estimation of the main specification of interest, that is, of the empirical model that allows the relation between reforms

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[6] The association between the pension reform variable and the probability of the head of the government to be re-elected becomes mildly significant in specifications where we include the set of control variables listed in column 3 of Table 1. However, this finding is not robust to minor changes to the set of control variables, to the inclusion of country and time effects, to IV estimation (results available upon request).

and electoral outcomes to differ across countries on the basis of the level of FL among the population. The introduction of an interaction term between FL and the pension reform variable provides interesting insights. FL is significantly associated to the probability of confirming the head of the government for a second term of office not *per se* - its main effect being not significantly estimated - but because of its interaction with the pension reform variable. As in Buti *et al.* (2010), who consider a very narrow set of changes in the pension system, pension reforms are negatively associated to re-election, but interestingly in our data this effect is mediated by the ability of people to understand basic economic and financial concepts.

In the next columns of Table 1, we include variables that control for macro-economic conditions, demographics, and for features specific to the political system and to the incumbent government. In the smaller sample that data availability allows to inspect,[7] the result of a significant association between re-election, pension reforms, and FL is confirmed. Re-election probabilities are also significantly associated to some control variables. The positive association with the output gap level indicates that the incumbent government has more chances to win the elections in times when the economy is working above its potential, that is in good times, in line with the results in Brender and Drazen (2008) and Buti el al. (2010). The probability of a government to be re-elected is also higher for governments which enjoy a greater margin of majority (as in Alesina *et al.,* 2006) and are more stable, and lower in countries where the median age of the population is higher and in presidential systems.

The positive sign of the coefficient of the reform-FL interaction term indicates that in countries where the population on average has more economic-specific competences the electoral cost of a pension reform is lower. To give a sense of magnitude to the associations under analysis, we use the results from the linear probability model in column 3, which are easier to interpret than marginal effects from a Probit model (that we present in the last column of Table 1), even if they have to be considered with caution. Since the value of FL ranges between 2.84 and 7.96, the total effect of a pension reform on the re-election of the head of the government, measured by $\beta + \gamma FL_{jt}$ in equation 1, spans both sides of the point estimate and falls in the unit interval. If we consider where and when a major change to the pension system occurred, and compute the effect of the pension reform net of the effect of FL (estimated by the interacted slope coefficient) in our sample the probability of the incumbent government to be re-elected after the enactment of a

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[7] We lose ten observations because information on the output gap and on government balance is not available in early 1990s for Germany, East European countries, and Greece.

reform was highest (0.6) in Finnish 2007 elections and lowest (-0.3) in Portuguese 2005 elections.

The results are similar when we include country, and country and time effects, in columns 4 and 5 of Table 1, respectively, and in the last column of Table 1, when we compute Probit average marginal effects. Country and time effects are jointly not significant. Thus, in the analyses to follow we will test the robustness of the findings from the linear probability model in column 3 of Table 1, which represents our baseline specification.

4.1 Endogeneity issues

In Table 2, we relax the implicit assumption we made so far that reforms are exogenous to re-election probabilities, and address potential endogeneity issues. Given that the reform efforts over the two decades we consider were targeted to improve the sustainability of pension schemes, such concerns should be minor. Indeed, while changes which increase the generosity of the pension scheme can be motivated by electoral concerns, retrenchments are hardly driven by a desire to increase the popularity of the government within the electorate. Anyway, to rule out this possibility, we first follow Buti *et al.* (2010) and run regressions on the sub-sample of countries that belong to the European Union (EU), and on the years that followed the signature of the 1992 Maastricht Treaty. The argument for this estimation strategy is that Maastricht criteria and the limitations they imposed to discretionary national policies by EU member countries may help considering the subsequent reforms as exogenously spurred by common developments rather than as the result of nationally-driven interests. The results in column 1 of Table 2 show that our main findings are robust to this specification.

Next, we try to isolate the exogenous (to re-election) component of major policy changes to the pension system and run IV regressions. It is admittedly difficult to find good instruments for our pension reform variable. After some experimentation we collected a set of arguably exogenous drivers of pension reforms that help addressing endogeneity concerns: cross-country differences in welfare systems; demographic forces driving pension systems' change over time; the age of the pension system (by building a variable that considers when social legislation on old age insurance was introduced for the first time); the introduction of supranational constraints to discretionary policies imposed to EU member countries by the Maastricht Treaty (by using a dummy which takes value one if a country signed the Treaty and zero otherwise). More in detail, we identify five models of welfare on the basis of historical roots and common traits of welfare states: Social Democratic, Liberal-Anglo Saxon, Continental, Southern European, Central and East European (see Esping-Andersen, 1990, Bonoli, 1997, Ferrera, 1996, Katrougalos and

Lazaridis, 2002, and the discussion in Gordon *et al.*, 2006).[8] To represent demographic forces driving pension systems' change over time, we use the average number of births to the total population ratio lagged by 30 years. In the set of instruments we also include the interactions between this trending variable and welfare state typology dummies.

In the empirical model of equation 1, the pension reform variable, REF, is interacted with the level of financial literacy, FL. Thus, to address endogeneity of pension reforms, we follow Wooldridge (2010) and, first, run a regression including all the excluded instruments listed above and all the included instruments from our baseline specification to estimate the exogenous (to electoral outcomes) component of the probability to enact a pension reform. Second, we use the predicted pension reform probability, $REFhat$, and its interaction with FL, $REFhat \times FL$, as instruments for REF and for its interaction with financial literacy, $REF \times FL$, in the second stage regression.

We cannot test exclusion restrictions because the model is just identified. However, looking at our instruments' set, it would be difficult to argue that historical roots of welfare states and past demographic trends can play a direct role as drivers of the probability of a government to be re-elected. The results in the second column of Table 2 show that, with respect to the Social Democratic welfare state model, used as reference group, the probability to enact a pension reform is significantly lower in Southern European welfare models, less strongly so in countries with more positive demographic trends, and mildly not significantly lower in Liberal and Central and East European models. The weak identification test at the bottom of the third column of Table 3, a Kleibergen-Paap F statistic, exceeds the critical values for the Cragg-Donald statistic it generalizes (see Baum *et al.*, 2007). This fosters confidence on the power of the instruments and on the results from the second-stage regression in column 3, which confirm our finding that the electoral cost of a pension reform is significantly lower in countries where the level of financial literacy is higher.

4.2 Robustness checks

As we discuss in Section 2, the probability of a government to be elected for a second term of office may depend on several factors other than the ones we considered so far. In this section, we present estimates from specifications that include all the macro-economic, demographic, and political control variables considered in our baseline specification in column 3 of Table 1, and a

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[8] Although this taxonomy of welfare models has been somewhat bypassed by reforms that have everywhere increased the correlation between contributions and benefits at the personal level, it is still considered to be a valid representation of the diversity in particular of European pension system.

number of additional control variables. For each model we report OLS and second-stage estimates from 2SLS regressions whereby the predicted pension reform probability (computed by estimating the model in column 2 of Table 2) and its interaction with FL are used as instruments for the pension reform variable and its interaction with FL.

In Table 3, we add information on political and civil support to pension reforms. In columns 1 and 2, we consider the polarization of political positions between the party of the head of the government and the largest opposition party. In columns 3 and 4, demographic projections account for the possibility that a future expected change in the age structure of the population may be related to the probability of the head of the government to be re-elected. In columns 5 and 6, we consider if at least one civil unrest was recorded in the year of the elections or in the year before that had a nation-wide scope and that took the form of a mass demonstration that could be classified as political expression. The "civil unrest" variable is available only for the years before 2005 - thus, we consider a smaller period sample that does not include the years of the 2007-2008 financial crises. The results in Table 3 indicate that the association between re-election, pension reforms, and FL holds in all specifications, and that the additional control variables we consider are not significantly associated to re-election.

In Table 4, we consider the years of office of the incumbent head of the government (columns 1 and 2), whether the reform was enacted early in the legislature (columns 3 and 4), and a different definition of re-election whereby a government is re-elected if the party the incumbent head of the government belongs to is still able to appoint her successor, independently on her identity (columns 5 and 6). Our main findings hold in all specifications but in the last one, where results from the IV strategy indicate that the probability to appoint the head of the government from the same party as her predecessor is not significantly associated to the exogenous (to re-election) component of our pension reform variable. This might suggest that the electoral cost of major reforms is more likely to be paid by the chief executive than by her party. Leaving to future research the task to explore this potentially interesting issue, as it goes beyond the scope of the present analysis, we move to the last part of the paper.

The above analysis indicates that FL plays a role in explaining the association between electoral outcomes and pension reforms. As we discuss in the introduction, this measure of specific human capital can arguably be related to people's understanding of reforms to the pension system, because the economic content of such policy changes requires some specific concepts in order to be correctly understood and assessed. In Table 5, we consider other indicators of human capital that capture people achievement in other dimensions of education: PISA scores on

mathematical performance, secondary and tertiary school attainment. Table A.4 shows correlations between the pension reform variables and the other indicators of education. For all the education measures considered, the bivariate association with the pension reform variable is low and never significant at conventional levels. The bi-variate correlations between FL, PISA scores in mathematical performance, and tertiary schooling are high. Thus, countries with a higher percentage of highly educated people seem to have also higher levels of FL. Secondary schooling, instead, is less positively associated to the other measures of human capital. In Table 5, we present estimates from empirical models where we use in the place of FL the indicators of human capital accumulation we have just presented, one by one not to incur in multicollinearity issues. Interestingly, there are no robust findings.

5. Concluding remarks

Our analysis of legislative elections held between 1990 and 2010 in advanced countries provides evidence in favor of a role of economic and financial-specific competences in explaining the association between economic reforms and their electoral cost. Where FL is higher, economic reforms that impose current sacrifices in exchange of future benefits are better understood by citizens who are thus less likely to "punish" the governments/political parties that introduced them. The "electoral cost" of reforms is therefore lower.

Our results for the specific case of pension reforms are robust with respect to the inclusion of indicators that account for characteristics of the political system and for political, demographic and macro-economic conditions. Interestingly, they do not hold when more general indicators of school attainment are used.

Of course, FL is not, *per se*, a sufficient condition for the success of reforms and future research might successfully extend the analysis, for instance, by collecting information on other reforms belonging to the same policy package of the pension reforms, or approved during the same legislature, such as changes in labour market regulation. And possibly use more direct indicators of economic and financial knowledge, like the PISA and other surveys providing cross-country information, as soon as they become available. Complementary theoretical research might also focus more closely on voting behavior and analyze the mechanisms behind the relationship that we detect between economic and financial competences and re-election probabilities.

Our analysis has clear policy implications. As implied by Mr. Juncker's aphorism quoted in the introduction, the *awareness* of what is involved in a reform could be an important determinant of its electoral cost and future viability. In this respect, FL could become a new, more transparent

alternative to concealing from citizens the unpleasant consequences of reforms, a potentially key element in the relationship between citizens and politicians. Since such literacy is primarily a result of education, government policy could thus indirectly induce long-run support for virtuous reforms and more effective citizenship by promoting specific education programs for adults, in parallel with basic financial education in school.

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Data Appendix

The dataset includes information for the 21 OECD countries listed in Table A.1. We collected data on parliamentary elections held between 1990 and 2010, ruling out presidential elections in countries where they take place, and on major pension reforms that were signed into law in the years before the parliamentary elections took place.

Pension reforms. The list of the reform events is available in Table A.2. Details on the pension reform variable are available in the Online Appendix to this paper.

Education. The indicator of financial literacy (FL) is the measure of "economic literacy among the population" compiled by the IMD World Competitiveness Yearbook. It is measured on a yearly basis between 1995 and 2008. PISA scores refer to the OECD mean values of PISA scores in mathematical performance for boys and girls (we include the simple average over gender) available for 2003, 2006, 2009, 2012. Measures of secondary and tertiary general school attainment are from the Barro-Lee Educational Attainment Dataset (version 2.0, June 2014 release; see Barro and Lee, 2013). They are recorded every five years from 1950 to 2010. In the empirical models, we use the four-year moving average of the indicators of education. Missing data are interpolated when two consecutive observations are available. The FL indicator is filled onwards/backwards by keeping the first/last value constant in the years of no record. The results are robust to limiting the period of analysis to the available first and last value, and to the use of the current year or of current and previous year average value of the indicators.

Control variables. Macro-economic variables are drawn from the OECD and the IMF World Economic Outlook databases. Data on the median age of the total population (years) are drawn from the UN World Population Prospects (2015 revision). Data on the characteristics of the political system and on political conditions are from the Database of Political Institutions 2015 described by Cruz *et al.* (2016), that is an updated version of the original Beck *et al.* (2001)'s database. Demographic projections refer to old dependency ratios (i.e. the ratio of people older than 64 to the working-age population) from the online database "Health Nutrition and Population Statistics: Population estimates and projections" by the World Bank. The variable "civil unrest" measures the number of political expression events which took the form of strikes and mass demonstrations at the national level. Data on civil unrests are available until 2005 and are drawn from the "Social, Political, Economic Event Database" (SPEED Project – Civil Unrest Event Data) by the Cline Center for Democracy (University of Illinois).

Istrumental variables. We consider five welfare state (WS) typologies: Social Democratic, Liberal, Continental, South European, Central and East European. The age of the pension system is measured with respect to the year of introduction of principal legislation on old age insurance. We collected information on models and history of welfare states from several sources (Esping-Andersen, 1990; Bonoli, 1997; Ferrera, 1996; Katrougalos and Lazaridis, 2002; Gordon *et al.*, 2006). Data on birth rates are from the World Bank online database and are expressed in terms of annual births per 1000 population.

Table A.1
Elections and pension reforms in 1990-2010, by country.

Country	Nr. of legislative elections in the sample	Nr. of major pension reforms in the previous legislature
Austria	7	1
Belgium	6	1
Canada	6	1
Czech Republic	6	1
Denmark	6	0
Finland	5	2
France	4	2
Germany	6	3
Greece	7	0
Hungary	5	1
Ireland	4	0
Italy	6	3
Japan	7	2
Netherlands	6	2
Norway	5	1
Poland	5	1
Portugal	6	2
Slovak Republic	5	1
Spain	5	1
Sweden	6	2
United Kingdom	5	1

Table A.2
1990-2010 elections and major pension reforms, by country.

Country	Year of election	Major pension reforms signed into law before the election day
Austria	2006	Austrian Pension Reform (2003), Harmonization of Austrian Pension Systems Act (2004)
Belgium	1999	Framework Act (1996)
Canada	2000	Canada Pension Plan reform (1998)
Czech Republic	1996	Pension Reform (1995)
Finland	1999	Pension reform law (HE 189/1996)
Finland	2007	Pension reform laws on earnings-related pensions (HE 118/2005) and on national pensions (HE 119/2005)
France	1993	Balladur reform (1993)
France	2007	Pension Reform Act (2003)
Germany	1994	Pension Reform Act (1992)
Germany	2002	Riester reform (2001)
Germany	2009	Retirement Age Adjustment Act (2007)
Hungary	1998	Pension Reform Acts LXXX on Eligibilities and finances of social insurance and private pension (1997), LXXXI on Social security pensions (1997), LXXXII on Private pensions and private pension funds (1997)
Italy	1994	Amato reform (1992)
Italy	1996	Dini reform (1995)
Italy	2006	Maroni reform (2004)
Japan	2000	Pension system reform (2000)
Japan	2005	Pension system reform (2004)
Netherlands	1998	Privatization of the public pension fund ABP (1996)
Netherlands	2006	Life Course Savings Scheme (2006)
Norway	2009	Flexible Retirement Act (2009)
Poland	2001	Pension reform (1999), Act No. 887 on the Social Insurance System (1998), Act No. 162 on Old-Age and Disability Pensions from the Social Insurance Fund (1998)
Portugal	1995	Law 329/93 (1993)
Portugal	2005	Law 60-B/2005 (2005)
Slovak Republic	2006	Social Insurance Act (2003), Old-Age Pension Savings Act (2004), Supplementary Old-Age Pension Savings Act (2004)
Spain	2000	Royal Decree 6/1997 (1997)
Sweden	1998	Pension reform (1998)
Sweden	2010	Reform of the ITP occupational pension plan (2007)
United Kingdom	2010	Pensions Act (2007)

Note: according to our coding, three countries recorded no major pension reforms over the period under analysis, namely: Denmark, Greece and Ireland.

Table A.3

Summary statistics.

Variable	Obs.	Mean	Std. Dev.	Min	Max
Pension reform	118	0.24	0.43	0	1
Re-election of the head of the government	118	0.41	0.49	0	1
Re-election, the head of the gov. from the same party	118	0.48	0.50	0	1
Output gap, level	110	-0.01	2.90	-7.58	8.94
Government balance	108	2.57	5.22	-7.27	47.73
Inflation	115	3.80	5.07	-0.57	41.1
Median age of the population	118	38.06	2.56	29.02	44.52
Proportional system	118	0.87	0.33	0	1
Presidential form of government	118	0.36	0.48	0	1
Constiutional tenure	118	4.26	0.44	4	5
Margin of majority	118	0.55	0.09	0.25	0.86
Left-wing	118	0.47	0.50	0	1
Stability	118	0.05	0.14	0	0.75
Years of office	118	4.66	2.88	1	16
Demographic projections	118	40.1	7.64	24.36	62.44
Polarization	114	1.2	0.93	0	2
Civil unrest	87	0.29	0.45	0	1
Newly appointed government	118	0.16	0.37	0	1
Concurrent election	118	0.16	0.37	0	1
Financial literacy	118	5.33	1.26	2.84	7.96
PISA scores on mathematical performance	64	502.2	24.2	445.5	546.8
Secondary schooling	118	54.41	12.9	21.23	88
Tertiary schooling	118	17.5	6.86	4.86	41.22
Birth rate, lagged 30 years	118	16.5	3.01	9.9	24.6
Age of the pension system	118	83.1	17.39	48	120

Notes: This table shows descriptive statistics for the variables used in the analysis.

Table A.4

Correlations between pension reforms and indicators of competence in 2005.

	Pension reform	Financial literacy	PISA scores	Secondary schooling	Tertiary schooling
Pension reform	1				
Financial literacy	-0.06	1			
PISA scores	0.06	0.73***	1		
Secondary schooling	0.03	0.16*	0.21*	1	
Tertiary schooling	0.00	0.58***	0.56***	0.09	1

Notes: (*) (**) (***) denote significance at the (10) (5) (1) percent level.

Figure 1
Pension reforms and re-elections, frequencies.
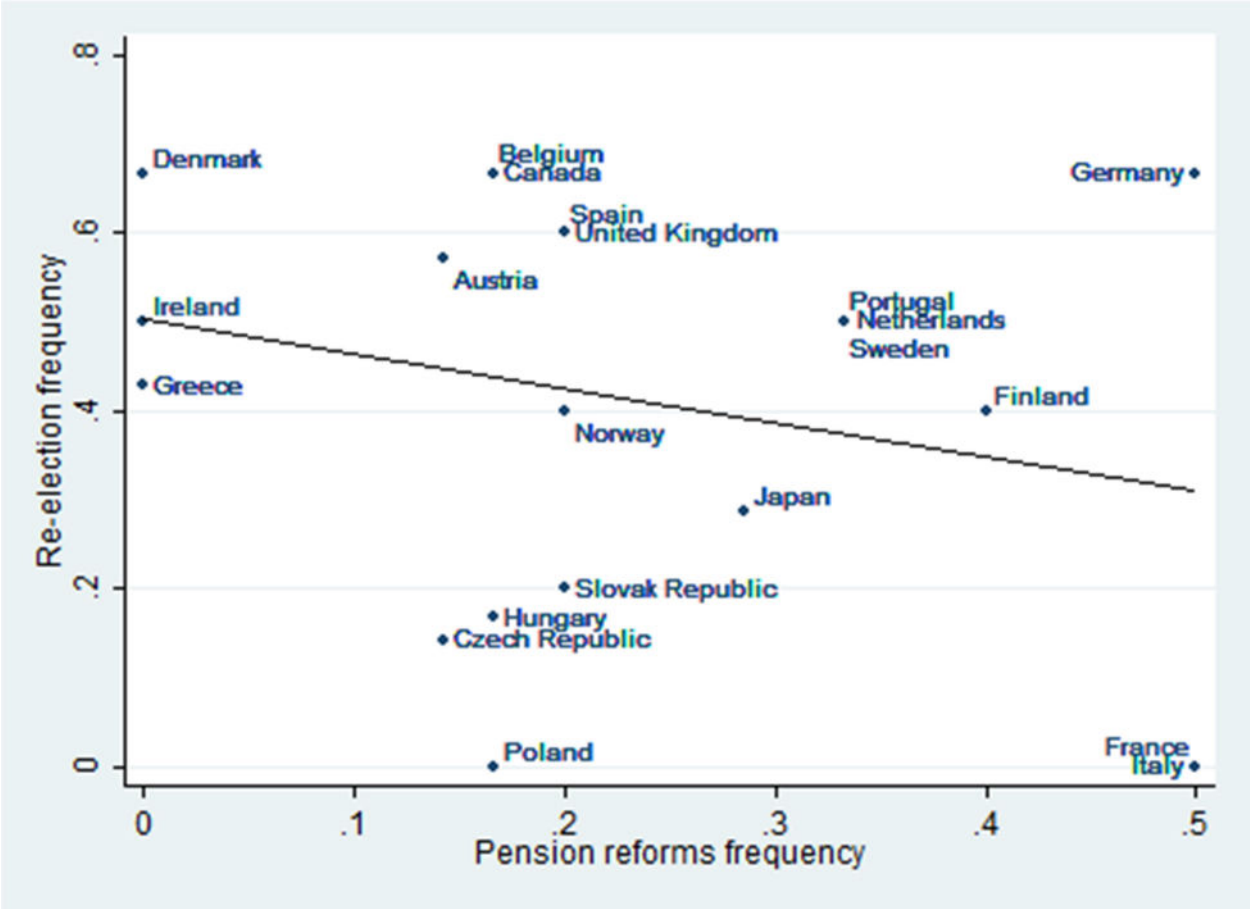
Notes: The panel plots the number of re-election events against the number of major pension reform episodes in each country, both weigthed by the number of election events over the 1990-2010 period. The correlation from an OLS regression, represented by the fit-line, is negative (coefficient -0.39) and significant (t-statistic -2.89).

Table 1

Reforms, financial literacy, and re-election.

Dependent variable:	Re-election of the head of the government					
Estimator:	OLS	OLS	OLS	LSDV	LSDV	PROBIT
	(1)	(2)	(3)	(4)	(5)	(6)
Pension reform	0.111	-1.266***	-1.098***	-1.123**	-1.476**	-1.460***
	(0.108)	(0.331)	(0.398)	(0.453)	(0.585)	(0.516)
Reform*FL		0.265***	0.240***	0.249***	0.338***	0.298***
		(0.067)	(0.076)	(0.080)	(0.097)	(0.096)
Financial literacy		0.009	-0.012	-0.060	-0.104	-0.007
		(0.040)	(0.048)	(0.115)	(0.124)	(0.040)
Output gap			0.040**	0.029	0.035	0.038***
			(0.017)	(0.022)	(0.035)	(0.014)
Gov. balance			0.006	0.009	0.009	0.009
			(0.006)	(0.005)	(0.009)	(0.010)
Inflation			-0.026	-0.010	-0.029	-0.023
			(0.017)	(0.018)	(0.025)	(0.016)
Median age			-0.053**	-0.023	0.002	-0.052***
			(0.022)	(0.030)	(0.099)	(0.020)
Proportional			-0.126			-0.162
			(0.173)			(0.154)
Presidential			-0.290***			-0.269***
			(0.103)			(0.093)
Consitut. tenure			-0.240*			-0.253*
			(0.135)			(0.128)
Margin of majority			0.885*	1.055	1.531*	0.806*
			(0.515)	(0.635)	(0.847)	(0.423)
Left-wing			0.012	0.013	0.007	0.021
			(0.099)	(0.076)	(0.107)	(0.086)
Stability			-0.813***	-0.871***	-0.805**	-1.153**
			(0.298)	(0.298)	(0.323)	(0.496)
Country effects				X	X	
Time effects					X	
Observations	118	118	108	108	108	108

Notes: Robust standard errors in parenthesis. (*) (**) (***) denote significance at the (10) (5) (1) percent level. All specifications include a constant, not reported. OLS estimates in columns 1, 2, 3. LSDV estimates in columns 4 and 5. Probit average marginal effects in column 6.

Source: see the Data Appendix.

Table 2

Endogeneity of reforms.

Dependent variable:	Re-election of the head of the government	Pension reform	Re-election of the head of the government
Estimator:	OLS	OLS	2SLS (second stage)
	(1)	(2)	(3)
Pension reform	-0.955**		-2.988***
	(0.457)		(1.205)
Reform*FL	0.223**		0.597**
	(0.086)		(0.239)
Financial literacy	0.055		-0.086
	(0.063)		(0.061)
Liberal WS		-1.430	
		(1.042)	
Continental WS		-0.967	
		(0.933)	
South European WS		-2.005**	
		(0.941)	
East and Central European WS		-2.100	
		(1.358)	
Birth rate, lagged 30 years (BR)		-0.072	
		(0.057)	
BR * Liberal WS		0.089	
		(0.062)	
BR * Continental WS		0.070	
		(0.062)	
BR * South European WS		0.118**	
		(0.057)	
BR * East and Central European WS		0.131	
		(0.084)	
Maastricht Treaty		0.074	
		(0.124)	
Age of the pension system		-0.003	
		(0.004)	
Kleibergen-Paap weak identification F statistic			7.39
Observations	75	108	108

Notes: Robust standard errors in parenthesis. (*) (**) (***) denote significance at the (10) (5) (1) percent level. All specifications include controls for macro-economic, demographic and political conditions, and a constant, not reported. OLS estimates in column 1 and 2. In the regression of column 2, the pension reform variable is explained by the set of excluded instruments reported (where "WS" is the acronym for "welfare state" model) and by the included instruments listed in column 3 of Table 1 (not reported). Column 3 reports second-stage regression results from a 2SLS estimation whereby the predicted pension reform probability and its interaction with FL are used as instruments for pension reform and its interaction with FL. The model is just identified.

Source: see the Data Appendix.

Table 3

Robustness checks - political and civil support.

Dependent variable:	Re-election of the head of the government					
Estimator:	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Pension reform	-0.977**	-2.753**	-1.052***	-2.783**	-0.681	-4.036*
	(0.393)	(1.212)	(0.399)	(1.243)	(0.532)	(2.080)
Reform*EFL	0.223***	0.554**	0.233***	0.561**	0.155	0.840*
	(0.075)	(0.239)	(0.075)	(0.246)	(0.105)	(0.474)
EFL	-0.020	-0.087	-0.017	-0.083	-0.021	-0.131*
	(0.050)	(0.061)	(0.048)	(0.061)	(0.057)	(0.077)
Polarization	0.026	0.026				
	(0.060)	(0.062)				
Demo. projections			-0.013	-0.010		
			(0.012)	(0.013)		
Civil unrest					-0.185	-0.079
					(0.122)	(0.144)
Observations	105	105	108	108	77	77

Notes: Robust standard errors in parenthesis. (*) (**) (***) denote significance at the (10) (5) (1) percent level. All specifications include controls for macro-economic, demographic and political conditions, and a constant, not reported. OLS estimates in columns 1, 3, 5. 2SLS in columns 2, 4, 6.

Source: see the Data Appendix.

Table 4
Robustness checks – other political variables.

Dependent variable:	Re-election of the head of the government				Head of the government from the same party	
Estimator:	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Pension reform	-1.094***	-3.181***	-1.139***	-2.996**	-1.108***	-1.976
	(0.402)	(1.140)	(0.371)	(1.209)	(0.399)	(1.306)
Reform*EFL	0.240***	0.638***	0.239***	0.595**	0.243***	0.365
	(0.077)	(0.225)	(0.078)	(0.275)	(0.073)	(0.260)
EFL	-0.015	-0.096	-0.011	-0.085	0.012	-0.015
	(0.049)	(0.059)	(0.049)	(0.070)	(0.050)	(0.072)
Years of office	-0.009	-0.008				
	(0.016)	(0.017)				
Beginning of legislature			0.077	0.020		
			(0.144)	(0.953)		
Observations	108	108	108	108	108	108

Notes: Robust standard errors in parenthesis. (*) (**) (***) denote significance at the (10) (5) (1) percent level. All specifications include controls for macro-economic, demographic and political conditions, and a constant, not reported. OLS estimates in columns 1, 3, 5. 2SLS in columns 2, 4, 6.

Source: see the Data Appendix.

Table 5

Other indicators of education.

Dependent variable:	Re-election of the head of the government					
Indicator of education (EDU):	PISA scores in mathematics		Secondary school attainment		Tertiary school attainment	
Estimator:	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Pension reform	-1.932	-8.988	-0.325	0.207	-0.366	-0.549
	(2.958)	(11.120)	(0.418)	(0.956)	(0.268)	(0.755)
Reform*EDU	0.004	0.018	0.009	0.003	0.030*	0.052
	(0.006)	(0.023)	(0.007)	(0.014)	(0.015)	(0.049)
EDU	0.003	-0.000	-0.006	-0.004	0.002	-0.002
	(0.004)	(0.007)	(0.004)	(0.005)	(0.009)	(0.013)
Observations	64	64	108	108	108	108

Notes: Robust standard errors in parenthesis. (*) (**) (***) denote significance at the (10) (5) (1) percent level. All specifications include controls for macro-economic, demographic and political conditions, and a constant, not reported. OLS estimates in columns 1, 3, 5. 2SLS in columns 2, 4, 6.

Source: see the Data Appendix.

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