Voting in the aftermath of a pension reform: the role of economic literacy

Elsa Fornero *
Anna Lo Prete **

This draft: February 2017 ***

Abstract

We show that the electoral cost of a pension system reform is significantly lower in countries where the level of economic 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 conditions, characteristics of the political system, political and demographic factors. Interestingly, these findings are not robust when we use other indicators of human capital – such as general schooling - supporting the argument that economic and financial knowledge has distinctive features that may help reducing the electoral cost of political changes that have a relevant economic impact on the population at large.

JEL classification: D72; H5; I2.
Keywords: pension systems; reforms; re-election; economic and financial literacy.

* University of Torino and CeRP - Collegio Carlo Alberto; email: elsa.fornero@unito.it.
** University of Torino and CeRP - Collegio Carlo Alberto; email: anna.loprete@unito.it
*** Preliminary, please do not quote without permission. We thank participants at the Netspar International Pension Workshop 2017 and our discussant Roel Beetsma, Antoine Bozio, Agnieszka Chlon-Dominczak, Robert Gal, Tabea Bucher-Koenen, Robert Holzmann, Mauro Mastrogiacomo, Theo Nijman, Steinar Strøm, Tarmo Valkonen, for their helpful comments.The usual disclaimer applies.

1. Introduction

Reforms are meant not only to change laws but also, and more importantly, to change people's behavior, and their effectiveness crucially depends on the ability of citizens, i.e. public opinion, to recognize the necessity of reforms, their general design and their "sense of direction". Without this basic understanding, reforms wither (Fornero, 2015). The electorate's ability to understand essential economic concepts may also be a relevant element for the evaluation of the "electoral costs" of economic reforms that typically require sacrifices today in expectation of future benefits. Reforms are often viewed as difficult to implement because the burden they impose on citizens may make the government unpopular, independently on the merits of 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 focus on major policy changes to the pension system that took place in European 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 in the previous legislature 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 costs does not decisively support the view of a "political toll". 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, on average, and find mixed results when they consider different types of reforms: 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 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 inflation 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. Alesina *et al*. (2006) find that periods of crisis witness a spur of efforts to introduce policy changes. Bonfiglioli and Gancia (2016) study the association between deregulation of financial and real markets and economic uncertainty and documents 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 that 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 OECD, the IMF, and the WB, are targeted at improving financial sustainability by reducing future pension spending without putting at risk the adequacy of retirement incomes.

We find no 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 literacy 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 other dimensions of education 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). And 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).

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

The contribution of our work is thus twofold. We contribute both to the studies on the association between reforms and re-election in advanced countries, and to the studies that emphasize the role of economic and financial knowledge to people understanding of economic issues that affect their everyday decisions. And we propose a qualitative taxonomy of pension reforms that allows for cross-country comparisons of major changes to the pension system.

The paper is organized as follows. We define the variables we use in the empirical analysis in Section 2. Next, 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. Conclusions are to be found in Section 5.

2. Data

Our dataset includes information on parliamentary elections held between 1990 and 2010 and their determinants. We collected data on pension reforms, education, macroeconomic, demographic, and political factors 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. We use two definitions of re-elections. According to the first one, a government is re-elected if the incumbent head of government is still leading the country's government after the elections. The second one considers whether the newly appointed head of the government belong to the same party as her predecessor, to account for the possibility that the same party is still in a position to appoint the head of government in the current legislature. Both these variables take value one if the government is re-elected, and zero if it is not.

Pension reforms. We build our pension reform variable following an *ex ante* approach. We 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.

The resulting reform variable takes value one if a major change in the pension system occurred during the previous 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 taking into account also the sustainability and adequacy content of the reforms under analysis, and by enlarging both the country and the period samples.

An alternative approach to the definition of the reform variable would be to consider *ex post* measures of the impact of a policy change on the economy. 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) resulting from a reform. For instance, in Duvall (2008)'s study 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]

[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".

[2] Duvall (2008) classifies only 8 changes as major reforms to retirement schemes in the 21 OECD countries over the 1985-2003 period he considers. Besides the restrictive criterion applied, the timing of such changes is related to the

We overlook such admittedly difficult, albeit important, assessments 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 measure of pension programs.

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 economic-financial literacy (EFL) or simply financial literacy (FL). In our case, we refer to the first indicator, although not directly measured, because we cannot rely on the more recent direct measures, through surveys, of the level of financial literacy among the population. As a measure of EFL we use an indicator that allows for cross-country comparisons, the measure of "economic literacy among the population" compiled by the IMD World Competitiveness Yearbook. This indicator is built on the basis of interviews to senior representatives of the national business community who are asked to evaluate the level of EFL among the population on a 1-10 scale. We also consider people's achievements in other dimensions of education, to show that different dimensions of education are differently relevant to the association between re-election and pension reform events that we analyze. Besides basic economic-specific competences, the IMD World Competitiveness Yearbook collects data on "education in finance" and builds a measure of the level of competences needed to master financial subjects to the degree requested to work in private enterprises.

Unfortunately, we cannot exploit 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. Instead, we use 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 mathematics, as it could be the case for the evaluation of a pension reform. 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.

---

enactment of specific measures that might have been enforced several years after the reform package they belong to was voted into law.

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 economic literacy.

First of all, we control for macroeconomic conditions. One may expect people living in countries which 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 measures of the level of economic activity and of its variation in the years before the elections, such as the output gap to GDP ratio and its change. 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.

Then, we include information of the main aspects of the political system and electoral rules, using data drawn from the Database of Political Institutions by the World Bank (see Beck *et al.*, 2001, and Cruz *et al.*, 2016). Following previous studies on the determinants of re-election (Brender and Drazen, 2008; Buti *et al.*, 2010), we consider some characteristics of the political system as the presence/absence of compulsory voting, the parliamentary versus presidential system of government, the parliament length of office.

Next, we consider information on the political juncture in which the incumbent government was operating. To measure the power of the incumbent government 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 government to total 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 which impose a burden on all citizens irrespectively of their income level. To include information on the political orientation of the incumbent government, we define "left-wing" a government whose head is from a Communist, Socialist, or Social-democratic party, and include a dummy variable for the so-defined "left orientation". We also consider if a reform was enacted by a newly appointed government at the beginning of its tenure or not, to investigate whether the electoral cost of a reform depends on how long ago it was introduced with respect to current electoral round. And we control for the potential relevance of an "early break up" of the government elected in the previous election round, by considering if the current elections took place after the former parliament dissolved earlier with respect to the expiration of the constitutionally specified term of office.

Other dimensions relevant to our analysis are the potential support of opposition parties to a reform, the popularity of the incumbent government, the perception of people about the relevance and the necessity for a reform to be implemented. These are, of course, aspects difficult to measure and proxy for. To gather information on the nature, content, and intensity of policy-related discussions, for instance, 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 which are related to the ones that we cannot measure. 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 so-called "polarization" between the executive party and the four parties which won more seats. As regards the popularity of the government and the intensity of policy-related discussions, 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. And we include the projections of old 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.

3. Descriptive evidence and empirical strategy

We collected data on 117 parliamentary (general) elections which 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 48 times and at least once in every country of the sample with the exceptions of Finland and Norway.

We relate electoral outcomes to the introduction of major changes to the pension system. We classified as "major" the 28 pension reforms which 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 2003-04. We do not distinguish between contractionary or expansionary reforms, although in the country and period sample we consider there has been no reversal, nor we have information on whether the pension reform was part of a broader reform package which included other economic sectors. 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,[3] while we recorded 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 42 election rounds out of 117. The countries where the head of the government was confirmed in office more frequently are Austria, 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. Without any purpose to derive more than descriptive insights, in our sample there is a slightly negative association between the percentage of elections which result in the re-election of the incumbent government and the percentage of elections which 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.[4]

This preliminary 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, pension reforms, and education, and show that the introduction of education, measured by indicators of economic-specific competences, uncovers interesting insights about the association between re-elections and pension reforms.

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 human capital that the population displays on average (EFL) by including an interaction term between our pension reform variable and the EFL indicator. In empirical models that read

$$REEL_{jt} = REF_{jt'} \times EFL_{jt} + X_{jt} + \varepsilon_{jt} \ ,$$

we expect the coefficient of the interaction term 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.

[3] The results in Section 4 are robust to the exclusion of these reform events.
[4] 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' of the previous legislature, where $t - n \leq t' \leq t$, and n represents the constitutionally specified term of office of the legislature. X_{jt} represents a set of control variable that may or may not vary across countries j=1, …, J and over time t=1, …, T. For instance, it includes country-specific characteristics of the political system, indicators of the power and the political orientation of the incumbent government, and macroeconomic 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 and the previous year.

We estimate the empirical models above by using linear probability models. Results would be qualitatively similar if we use Probit and Probit random effects estimators. Ordinary Least Squares (OLS) and Least Square Dummy Variable (LSDV) estimators, that in general can be preferable to non-linear estimators when running regressions on panel data and when using instrumental variables (see the discussion in Angrist and Pischke, 2009), will allow us to compare straightforwardly results from specifications that control or not for the effect (if any) of country unobserved heterogeneity and common year effects.

4. Results

Results 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 which occurred in a year during the previous legislature (not reported) confirm, in the context of our study on pension reforms, 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 the previous legislature.

In Table 1 we present results from OLS estimation of the main specifications of interest, that is, when we allow the relation between reforms and electoral outcomes to differ across countries on the basis of the level of EFL among the population. The introduction of an interaction term between EFL and the variable pension reform provides interesting insights on the association between re-election, reforms, and education. In column (1), economic literacy 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. Moreover, once we allow the association between reforms and

re-election to depend on EFL, we find that pension reforms are negatively and significantly associated to the probability of re-electing the head of the government that enacted them.

The positive sign of the coefficient of the reform-education interaction term indicates that the negative association between reforms and re-elections is less negative in countries where the population on average has more economic-specific competences. Thus, in countries with higher economic literacy the electoral cost of a major pension reform is lower. 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 concepts.

In the next columns of Table 1, we test if our findings hold when we include in the analysis other potential determinants of re-election: macroeconomic conditions (column 2), characteristics of the political system (column 3), and political conditions in which the incumbent government was operating (column 4). In column (2) we find that the level of the output gap is positively and significantly associated to re-election probabilities, indicating 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). In column (3) there is no evidence that whether the political system is presidential, eligible voters are obliged to cast a ballot in legislative elections, or the country is a newest or older democracy matter to re-election probabilities. The result in column (3), where we consider whether re-election is associated to compulsory voting, the form of government, the length of constitutionally defined tenure, and the results in column (4), where we include information on the incumbent government's margin of majority, political orientation, if the reform was enacted early in the legislature and where we control for early break-ups, show that in our sample these controls are not significantly associated to re-election. In all specifications and in column (5), where we include all the macroeconomic and political controls listed above together, the only significant associations are those between re-election, pension reforms, and economic literacy.

Since the political and economic control variables we considered so far may not capture all the country-specific unobserved heterogeneity of re-election probabilities across countries, in the next columns of Table 1 we present estimates from linear probability models that include country fixed effects (column 6) and country and time effects (column 7). Again, the results of a negative association between pension reforms and the probability to elect the incumbent head of the government for another term in office, and of a positive interaction between reforms and economic literacy hold. To give a sense of magnitude of the effects that we are estimating,

acknowledging that interpretation of the coefficients of a linear probability model should be taken with some caveat, the results in column (7) suggest that the probability to re-elect the incumbent government, in our sample is one third higher in the country with the higher level of EFL, which is Finland in 2003, and two thirds lower in the country with the lower level of EFL, which is Hungary in 2010.

In the first column of Table 2, we add to the set of control variables considered so far an indicator of demographics projections, to account for the possibility that a future and 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 our data, this attempt to include demographics does not affect our main finings, nor is significantly associated to re-election. In column (2) we include a measure of the polarization of political positions among the main parties elected in the previous legislature, and we consider if at least one civil unrest was recorded that had a nation-wide scope and that took the form of a mass demonstration which could be classified as political expression. This latter 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 association between re-election, pension reforms and EFL holds also in these specification, where the additional control variables are not related to re-election to a significant extent. The same is true in column (4), where we consider the number of years of democratic history in order to test the finding in Brender and Drazen, 2005, that re-election is more frequent in new democracies.

Next, in Table 2, we present LSDV estimates from a model where we use an alternative dependent variable, namely, the probability to elect a head of the government who belongs to the same party of the incumbent prime minister, independently on his or her identity. This variable allows accounting for the possibility that the party who was leading the government is still able to appoint the head of the government, who may retire or not be confirmed for reasons other than the enactment of a reform. The results from our main specifications are basically unaffected.

In the last columns of Table 2, we relax the implicit assumption we made so far that reforms are exogenous to re-election probabilities, and address potential endogeneity issues. It may be the case, indeed, that changes in policy are driven by electoral considerations. Given the very nature of pension reforms, such concerns should be minor. It is difficult to argue that a major reform of the pension system may be expected to have lower electoral losses than reforms in other policy areas. Anyway, to rule out this possibility, we follow Buti *et al.* (2010) and run our regressions on a sub-sample of countries that belong to the European Union, 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 to discretionary national policies imposed to 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 result in columns (5) show that our main results are robust.

We also try to find variables that are related to reforms and not to re-election probabilities, and move to an instrumental variable approach to the estimation of our main empirical models. Finding good instruments for our reform variable is not an easy task. To isolate the exogenous component of major policy changes to the pension system, we will consider cross-country differences between welfare systems, and common forces driving pension systems' changes over time. As country-specific characteristics we group countries according to their welfare state typology, and identify five groups: Conservative, Social Democratic, Southern European, Liberal-Anglo Saxon, Scandinavian, and East European (see Esping-Andersen, 1990, Bonoli, 1997, Ferrera, 1996, and the discussion in Gordon *et al.*, 2006). As exogenous force driving pension systems' change and pre-retirement financial accumulation decisions over time, we use the OECD average number of births to the total population ratio lagged by 30 years. Finally, we include in the set of instruments also the interactions between the welfare state typology and past birth rates. IV estimates in column (6) of Table 2, despite the low explanatory power of the instruments, suggest that the associations between the probability of re-election, pension reforms, and economic literacy, are still holding.

The above analysis indicates that EFL plays a role in explaining the association between electoral outcomes and pension reforms. As we discussed 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 3, we consider other indicators of human capital which capture people achievement in other dimensions of education: education in finance, PISA scores on mathematical performance, secondary and tertiary school attainment. Table A.4 shows correlations between the pension reform variables and these 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 economic literacy, education in finance, PISA scores in mathematical performance, and tertiary schooling are high. Thus, countries with a higher percentage of highly educated people seem to display also higher levels of EFL. Secondary schooling, instead, is less positively associated to the other measures of human capital. In Table 3 we present estimates

from our empirical models where we use in the place of economic literacy 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.

Summing up, our results provide evidence in favor of a role of economic and financial-specific competences in explaining the association between pension reforms and their electoral cost. Cross-country heterogeneity in EFL helps highlight that pension reforms may reduce the probability of the incumbent government to be re-elected, less strongly so where people have more skills to understand the economic content of the reforms they will assess and possibly reward or punish while casting a ballot in national elections.

5. Concluding remarks

Our analysis of legislative elections held between 1990 and 2010 in advanced countries shows that the probability of the incumbent government of winning the elections is negatively associated with the introduction of major changes to the pension system during the previous legislature (as suggested in the aphorism by Jean Claude Juncker, quoted at the beginning of this paper) but less strongly so in countries with a higher level of economic and financial literacy.

The results 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 we use more general indicators of school attainment or students' performance in Mathematics.

Of course EFL is not the only ingredient necessary to enact successful reforms, but the evidence appears to support the argument that the understanding of economic and financial concepts is a necessary condition to reduce the electoral cost of political changes that have a relevant economic impact on people's life cycle, such as reforms to the pension system. In future work it will be interesting to explore related issues, for instance, by collecting information on other reforms that may have took place as part of the same policy package, or during the same legislature of the pension reforms we consider, such as changes in labour, real, and financial market regulation. And to use "harder" indicators of economic and financial knowledge, as soon as data for cross-country analyses will be made available by the PISA and other programmes.

Our analysis contains a clear policy implication. EFL 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. EFL is not, *per se*, a sufficient condition for the success of reforms; illiteracy can, conversely, thwarts their effectiveness by exerting sufficient pressure on politicians to either establish an excessively long phase-in period or undo reforms approved by a previous government.

References

Alesina, Alberto, Silvia Ardagna and Francesco Trebbi (2006). Who Adjusts and When? The Political Economy of Reforms. *IMF Staff Papers* 53:1-29.

Alesina, Alberto, Dorian Carloni and Giampaolo Lecce (2013). The Electoral Consequences of Large Fiscal Adjustments. In Alberto Alesina and Francesco Giavazzi (eds.), *Fiscal Policy after the Financial Crisis*, NBER: University of Chicago Press, 531-570.

Angrist, Joshua D. and Jörn-Steffen Pischke (2009). *Mostly Harmless Econometrics*, New Jersey: Princeton University Press.

Barro, Robert and Jong-Wha Lee (2013). A New Data Set of Educational Attainment in the World, 1950-2010. *Journal of Development Economics* 104: 184-198.

Beck, Thorsten, George Clarke, Alberto Groff, Philip Keefer, and Patrick Walsh (2001). New Tools in Comparative Political Economy: The Database of Political Institutions. *World Bank Economic Review* 15(1): 165-176.

Bonfiglioli, Alessandra and Gino Gancia (2016). Economic uncertainty and structural reforms. Universitat Pompeu Fabra Economics Working Paper No. 1494.

Bonoli, Giuliano (1997). Classifying Welfare States: a Two-dimension Approach. *Journal of Social Policy* 26(3): 351–372.

Brender, Adi and Allan Drazen (2005). Political budget cycles in new versus established democracies. *Journal of Monetary Economics* 52(7): 1271-1295.

Brender, Adi and Allan Drazen (2008). How Do Budget Deficits and Economic Growth Affect Reelection Prospects? Evidence from a Large Panel of Countries. *American Economic Review* 98(5): 2203-20.

Bucher-Koenen, Tabea and Annamaria Lusardi (2011). Financial literacy and retirement planning in Germany. J*ournal of Pension Economics and Finance* 10(4): 565–584.

Buti, Marco, Alessandro Turrini, Paul Van den Noord, and Pietro Biroli (2010).Reforms and re-elections in OECD countries. *Economic Policy* 25(1): 61-116.

Cruz, Cesi, Philip Keefer and Carlos Scartascini (2016). Database of Political Institutions Codebook, 2015 Update (DPI2015). Inter-American Development Bank.

Duval, Romain (2008). Is there a role for macroeconomic policy in fostering structural reforms? Panel evidence from OECD countries over the past two decades. *European Journal of Political Economy* 24(2): 491–502.

Esping-Andersen, Gosta (1990). *Three Worlds of Welfare Capitalism*. Cambridge: Polity Press.

Fair, Ray C. (1982). The effect of economic events on votes for president. *Review of Economics and Statistics* 64: 322-325.

Ferrera, Maurizio (1996). The 'Southern Model' of Welfare in Social Europe. *Journal of European Social Policy* 6(1): 17–37.

Fornero, Elsa (2015). Reform, Inform, Educate. A New Paradigm for Pension Systems' Sustainability, in Bernd Marin (ed.), *The Future of Welfare in a Global Europe*, Ashgate.

Fornero, Elsa and Chiara Monticone (2011), Financial literacy and pension plan participation in Italy, *Journal of Pension Economics and Finance*, 10: 547-564.

Giofré, Maela (2017). Financial education, investor protection and international portfolio diversification. *Journal of International Money and Finance* 71: 111–139.

Gordon L. Clark, Alicia H. Munnell, and J. Michael Orszag (2006). The Oxford Handbook of Pensions and Retirement Income: Volume 13. Oxford: Oxford University Press.

Jappelli, Tullio (2010). Economic Literacy: An International Comparison. *Economic Journal* 120: F429-F451.

Katrougalos, George and Gabriella Lazaridis (2003). *Southern European Welfare States: Problems, Challenges and Prospects*. New York: Palgrave Macmillan.

Lo Prete, Anna (2013). Economic literacy, inequality, and financial development. *Economics Letters* 118(1): 74-76.

Lusardi, Annamaria and Olivia Mitchell (2007). Baby Boomer Retirement Security: The Roles of Planning, Financial Literacy, and Housing Wealth. *Journal of Monetary Economics* 54(1): 205-224.

OECD (2016). Mathematics performance (PISA) (indicator). Online database, doi: 10.1787/04711c74-en (accessed on November 2016).

Prati, Alessandro, Massimiliano G. Onorato and Chris Papageorgiou (2013). Which reforms work and under what institutional environment? Evidence from a new data set on structural reforms. *Review of Economics and Statistics* 95(3): 946-968.

Van Rooij, Marteen, Lusardi, Annamaria, and Rob Alessie (2011). Financial literacy and stock market participation. *Journal of Financial Economics* 101: 449-472.

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 enacted in the years before the parliamentary elections took place.

The list of the reform events is available in Table A.2, while details on the pension reform variable are available in the Online Appendix.

The indicators of economic literacy and education in finance are compiled by the IMD World Competitiveness Yearbook. 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). 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). These indicators are available for a limited number of years: economic literacy is measured on a yearly basis between 1995 and 2008; education in finance is measured on a yearly basis between 1998 and 2008; PISA scores on mathematical performance are available for 2003, 2006, 2009, 2012; Barro and Lee's measures of school attainment are recorded every five years from 1950 to 2010. The results are robust to filling the missing information by keeping the last value constant in the years of no records (results in Table 4) and to limiting the period of analysis to the available first and last value.

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), which is an updated version of the original Beck *et al.* (2001)'s database. Macroeconomic variables are drawn from the OECD and the IMW World Economic Outlook databases. Data on "civil unrest" refer to political expression events which took the form of strikes and mass demonstrations at the national level; they 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).

Data on demographic projections refer to old dependency ratios, that is to 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. 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	6	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 during the previous legislature, by country

Country	*Year of parliamentary 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 119/1995)
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	2004	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	117	0.23	0.42	0	1
Re-election of the head of the government	117	0.36	0.48	0	1
Re-election, the head of the gov. from the same party	117	0.49	0.50	0	1
Compulsory voting	117	0.11	0.32	0	1
Presidential form of government	117	0.36	0.48	0	1
Consitutional tenure	117	4.26	0.44	4	5
Margin of majority	116	0.56	0.12	0.25	1
Left orientation	116	0.47	0.50	0	1
Newly appointed	117	0.08	0.28	0	1
Early break-up	117	0.37	0.48	0	1
Polarization	112	1.25	0.91	0	2
Civil unrest	90	0.19	0.39	0	1
Age of democracy	117	45.45	25.61	2	80
Output gap, level	107	0.11	2.74	-7.24	9.18
Output gap, change	104	-0.06	1.23	-2.40	3.48
Government balance	104	-0.19	0.83	-2.13	2.07
Inflation	111	3.73	5.37	-0.62	47.49
Demographic projections	117	40.14	7.66	24.36	62.44
Economic literacy	117	5.34	1.27	2.88	7.96
Education in finance	117	6.02	1.34	3.3	8.20
PISA scores on mathematical performance	117	503.14	23.97	445.5	545.83
Secondary schooling	117	53.56	13.14	20.75	88.99
Tertiary schooling	117	16.75	6.07	4.59	40.07

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

Table A.4
Correlations between pension reforms and indicators of competence

	Pension reform	Economic literacy	Education in finance	PISA scores	Secondary schooling	Tertiary schooling
Pension reform	1					
Economic literacy	-0.07	1				
Education in finance	-0.04	0.54***	1			
PISA scores	-0.01	0.71***	0.39***	1		
Secondary schooling	-0.02	0.17*	0.02	0.22**	1	
Tertiary schooling	0.01	0.55***	0.33***	0.47***	0.13	1

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

Figure 1
Pension reforms and re-elections, frequencies.

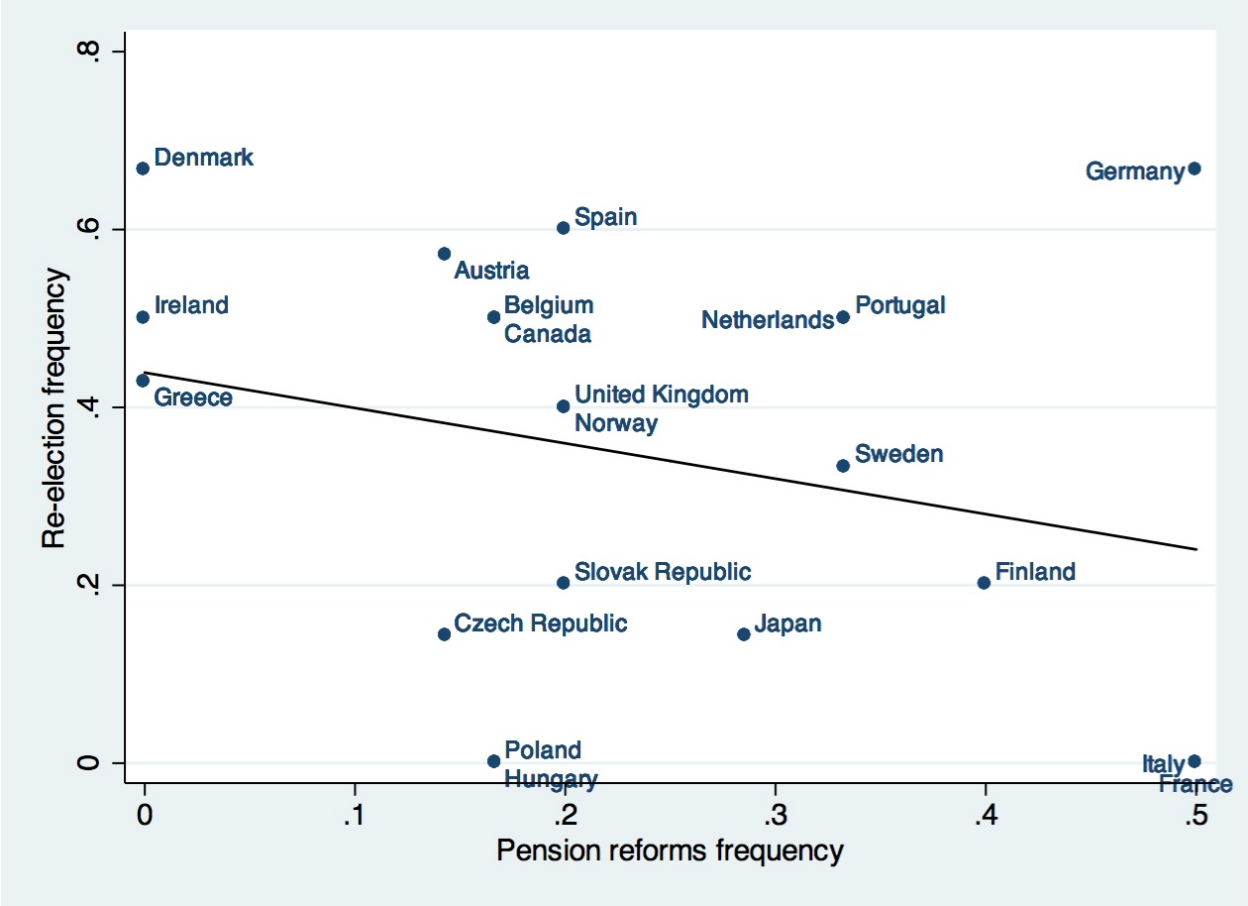

Table 1
Reforms, economic literacy, and re-election.

	Dependent variable: Re-election of the head of the government						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Pension reform	-1.054	-1.148	-0.984	-1.049	-1.055	-1.306	-1.643
	(0.374)	(0.378)	(0.383)	(0.374)	(0.400)	(0.358)	(0.539)
Economic literacy	0.010	0.010	0.012	0.005	0.007	0.048	0.099
	(0.038)	(0.043)	(0.040)	(0.039)	(0.046)	(0.061)	(0.082)
Reform*literacy	0.221	0.238	0.210	0.222	0.229	0.285	0.367
	(0.078)	(0.078)	(0.078)	(0.076)	(0.080)	(0.065)	(0.098)
Output gap, level		0.041			0.039	0.016	-0.002
		(0.019)			(0.022)	(0.023)	(0.031)
Output gap, change		-0.021			-0.022	-0.026	-0.046
		(0.027)			(0.028)	(0.025)	(0.043)
Gov. balance		0.037			0.030	0.011	0.020
		(0.050)			(0.054)	(0.051)	(0.046)
Inflation		0.012			0.006	0.016	-0.010
		(0.022)			(0.024)	(0.018)	(0.031)
Compulsory voting			0.109		0.068		
			(0.164)		(0.195)		
Presidential			-0.068		-0.045		
			(0.099)		(0.111)		
Consitut. tenure			-0.024		-0.038		
			(0.098)		(0.103)		
Margin of majority				-0.415	-0.310	-0.288	-0.329
				(0.368)	(0.580)	(0.628)	(0.848)
Left orientation				0.024	0.063	0.102	0.099
				(0.089)	(0.094)	(0.093)	(0.120)
Newly appointed				-0.042	-0.102	-0.067	-0.108
				(0.176)	(0.160)	(0.109)	(0.209)
Early break-up				0.032	0.020	-0.019	-0.112
				(0.092)	(0.106)	(0.134)	(0.158)
Country effects						X	X
Time effects							X
Observations	117	106	117	116	106	106	106

Notes: Robust standard errors in parenthesis. LPM estimated in columns from (1) to (5), and LSDV estimates in columns (6) and (7). All specifications include a constant, not reported.

Table 2
Robustness checks.

Dep. Var.	Head gov.	Head gov.	Head gov.	Same party	Head gov.	Head gov.
Estimator	LSDV	LSDV	LSDV	LSDV	LSDV	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Pension reform	-1.545	-1.724	-1.545	-1.274	-1.801	-5.676
	(0.543)	(0.911)	(0.543)	(0.676)	(0.630)	(3.236)
Economic literacy	0.085	0.225	0.085	0.033	0.162	0.153
	(0.088)	(0.190)	(0.088)	(0.079)	(0.236)	(0.133)
Reform*literacy	0.345	0.404	0.345	0.306	0.386	1.100
	(0.098)	(0.212)	(0.098)	(0.112)	(0.114)	(0.657)
Demo. projections	-0.031	-0.050	-0.031	-0.027	-0.015	0.005
	(0.029)	(0.073)	(0.029)	(0.025)	(0.057)	(0.058)
Polarization		-0.190				
		(0.155)				
Civil unrest		-0.028				
		(0.248)				
Age of democracy			0.007			
			(0.037)			
Observations	106	75	106	106	74	106

Notes: Robust standard errors in parenthesis. All specifications include controls for political, macroeconomic, and demographic conditions, as well as country and time effects, not reported.

Table 3
Other measures of education

Indicator of education:	Education in finance	PISA score	Tertiary schooling	Secondary schooling
	(1)	(2)	(3)	(4)
Pension reform	-0.552	-5.579	-0.176	-0.930
	(0.679)	(3.349)	(0.520)	(0.633)
Indicator iof education	-0.103	-0.021	-0.033	-0.033
	(0.136)	(0.016)	(0.017)	(0.017)
Reform*literacy	0.122	0.012	0.022	0.022
	(0.111)	(0.007)	(0.031)	(0.012)
Observations	106	106	106	106

Notes: Robust standard errors in parenthesis. All specifications include controls for political, macroeconomic, and demographic conditions, as well as country and time effects, not reported.