The political economy of pension reforms in Europe under financial stress

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Abstract

Despite a substantially unchanged problem load in the last 20 years, EU member states witnessed a recent surge in pension reforms. Since the Great Recession external market and political pressures started outcompeting national politics in pension-related decisions. Employing European Commission data on major pension reforms during 2006-15, we find that governments respond to higher risk premia charged by international financial actors. Macro-policy fundamentals, such as budget deficits, and micro-policy indicators, e.g. pension spending, instead, only signal the necessity to act. They trigger the reforms in the presence of EU conditionality, that is, in the presence of Excessive Deficit Procedures and Country-Specific Recommendations within the European Semester. These findings deepen our understanding of the Europeanization of social policy, contribute to the literature on the political economy of reforms and testify to the declining role of domestic factors in the politics of the welfare state.

Keywords: European Semester, pensions, welfare state, conditionality, political economy of reforms

1 Introduction

Academics and practitioners alike long assumed that pension reforms equal to political suicide. In the early 1980s, David Stockman, President Reagan's Budget Director, famously declared that he was "not going to spend a lot of political capital solving some other guy's problem in 2010". More than three decades later, raising the retirement age is still one of the politically riskiest moves, even in regimes not known for their high regard for democratic procedures, such as Vladimir Putin's Russia.

Despite this, in particular the European Union (EU) witnessed a growing number of pension reforms that dramatically accelerated during and after the global financial crisis (Carone *et al.* 2016). Yet, neither the underlying demographic problems precipitated overnight, nor was this the first speculative crisis hitting the Economic and Monetary Union (EMU), as testified by the dot.com bubble of the early 2000s.

To be fair, as monetary integration progressed, EU institutions grew more concerned with national retirement systems. Whereas Holzmann (2006) presented sound theoretical arguments detailing why the Maastricht fiscal regime requires convergent and reformed European pension systems, internal market Commissioner Bolkestein gave the rationale for greater intervention in his 2001 speech on defusing the 'pension timebomb'. Still, only with the sovereign debt crisis, external political and market pressures started to outcompete national politics regarding pension-related decisions.

In order to account for the new circumstances, we develop a theoretical framework that builds on Mosley's (2000; 2003) causal model of the relationship between international financial markets and national governments, to which we add the role of EU conditionality. In this model, financial market participants and EU institutions evaluate national policies (considering both macro-policy indicators, such as debt and deficit, and micro-policy pension-related measures). They respond, respectively, by applying an interest rate premium on government bonds and by issuing various recommendations through different conditionality mechanisms. In order to lower these pressures, governments legislate (among others) pension reforms, subject to domestic constraints, such as the electoral cycle, institutional veto points, partisanship, and the like. Through these reforms they try to rebuild their credibility by signalling to international financial markets and EU institutions that they are serious about current and future financial sustainability.

Within such a framework, we ask what the impact of market and political pressures on the direction and number (a proxy for their intensity) of pension-related measures is. We formulate three hypotheses. The first one assumes that governments take a proactive stance by spontaneously reacting to worsening economic fundamentals through reform. The second assumes an independent role for external pressures: stronger market pressures and/or political pressures tied to more stringent conditionality lead to more reform. The third one assumes that market pressures and/or economic fundamentals trigger reforms only in the presence of EU conditionality.

We then test these hypotheses building on a novel database of 'reform events' compiled by the European Commission, which details the major pension reforms that happened in the current EU-28 member states. Rather than being driven by domestic politics and institutions, we find that policymakers do respond to market signals as well as to worsening macro-policy fundamentals and micro-policy indicators.

When bond yields increase above a certain threshold, governments carry out pension reforms independently from economic adjustment programmes. Here, market-based pressures are so strong that they transcend hard political conditionality. Indeed, whereas the Memoranda of Understanding

(MoUs) signed between affected member states and the troika, consisting of the European Commission, the European Central Bank (ECB) and the International Monetary Fund (IMF) were probably contingent on the sovereign debt crisis, default risk premia charged by international investors are here to stay (even if somewhat muted), thereby exerting constant pressure on national accounts.

On the contrary, increasing deficit-to-GDP ratios and unbalanced pensions alone hardly trigger any reform effort. When they are accompanied (respectively) by Excessive Deficit Procedures and Country-Specific Recommendations (CSRs), however, they positively affect surplus-generating pension reforms − that is, reforms that generate a surplus, compared to the status quo, for the public budget. It seems, hence, that governments facing a heightened problem load, which is picked up by the EU institutions as well, have a higher propensity to reform than those facing only one pressure out of two. Such finding dovetails with the words of former Commissioner for Economic and Financial Affairs Pierre Moscovici, who argued that the messages conveyed by EU bodies are just a 'thermometer' measuring the 'fever' that affects a country.

2 What triggers pension reforms?

The literature on the political economy of pension reforms is humongous. A large number of studies have focussed on the domestic constraints to pension reforms, which have been often nested within a generic 'problem load' consisting of demographic and budgetary pressures (Bonoli and Shinkawa, 2006).

The argument went that the pension systems facing the highest problem pressure (the public pension pillars in most Western, Central and Eastern European retirement systems) were also those experiencing the greatest resistance to reforms. Due to path-dependence and institutional stickiness, reforms would skid on frozen landscapes and collide with immovable objects (Weaver, 1986; Pierson, 1998). Policymakers' ability to reform welfare was hindered by entrenched interests that emerged in its defence and by a negativity bias of the electorate that leads to punishment for cutbacks. Pure retrenchment measures may equal to electoral suicide, especially in pensions and other benefits insuring against life-cycle risks (Jensen, 2012).

The 'new politics of the welfare state' literature posited that reforms would then happen only when politicians use a combination of blame-avoidance, obfuscation and compensation tactics. Bonoli and Palier (2007) argued that reform-resistant Bismarckian pension schemes could only undergo slow-paced changes happening in stages and allowing for a long time lag between adoption and implementation. Even though sequencing and phasing-in still represent key strategies employed by policymakers, they play a somewhat limited role within the database of pension reforms analysed here (Carone *et al.*, 2016). This shows that throughout the recent spike in pension reforms, several reform elements coexist at once and that implementation times have often been drastically reduced.

More recent studies provide some clues on how this could happen. Giger and Nelson (2011) show that some forms of retrenchment are more popular than previously assumed. Lee *et al.* (2017) and Häusermann *et al.* (2019) note that benefit curtailments and expansions go hand in hand, leading to fewer electoral backlashes. The acceptability of reforms rises significantly in the presence of compensatory measures, including recalibration (addressing new social risks), targeting (redistribution towards lower-income beneficiaries) and increasing revenues (particularly effective to convince reluctant left-oriented voters). Interestingly, increasing women's retirement age is positively viewed as an element of societal modernization.

As detailed in the 'Dependent variable' subsection, our database confirms that a quarter of reforms are instances of pure retrenchment. The rest include elements that potentially defuse the opposition of voters. Yet, purely compensatory measures, including targeting and recalibration, appear in less than one fourth of reform events. That being the case, the increased frequency and similarity of reforms in the past decade suggest that external pressures, both political and market-based, have intensified, trumping some of the outcomes predicted by the scholarship on retrenchment. First, the surge in reforms was sudden and generalized, even in the absence of a substantially different problem load. Second, the responses to the common shock were strikingly similar and they significantly reduced the domestic 'filtering' of the external pressure (Armigeon and Baccaro, 2012).

Recent political economy contributions that closely resemble the gist of this study have discussed the impact of external pressures on the reform effort in several domains. Hallerberg and Scartascini (2017), who focus on tax reforms in Latin America in 1990−2004, and Duval *et al.* (2018), who study product and labour market policy in 26 advanced economies in 1970−2013, quantitatively analyse reform events. Both confirm that the benefit of banking or other financial/economic crises plays a major role in breaking political deadlocks and triggering reforms (see Drazen and Grilli, 1990). Additionally, both show that supranational conditionality − conveyed by the IMF, in the first case, and through the EU accession process and directives, in the second − have a direct impact on national legislation.

The 'benefit of crisis' argument is confirmed by growing research on European welfare states, even if its effects need to be qualified. Van Kersbergen *et al.* (2014) argue that retrenchment and cost containment have never been the only game in town during the sovereign debt crisis: compensation measures were common, possibly to mitigate domestic opposition.

The research on the Europeanization of social policy is instead less conclusive about the influence of external conditionality. Scholarship is split between those who claim that European economic integration eroded the member states' capacity to control national welfare states (Leibfried, 2017) and those who assert that neither hard law − few directives deal with the welfare state − nor softer instruments, such as the social Open Method of Coordination, had a conspicuous impact (Jæger and Kvist, 2003; Barcevičius *et al.*, 2014).

Yet, even diehard skeptics admit that the rules of the Stability and Growth Pact (SGP) have had a constraining effect. Hennessy (2014) convincingly explains that important pension reforms were undertaken in order to comply with the Maastricht criteria for joining the EMU during the 1990s. It was, hence, plausible that with a revamped SGP the reform effort would have intensified. In fact, since the inception of the European Semester, profound changes befell national European retirement systems, e.g. through policy innovations, such as the introduction of automatic stabilization mechanisms (European Commission, 2017; Carone *et al.*, 2016).

Still, there is no consensus on the European Semester's impact. Existing studies claim that its effects are limited at best. De la Porte and Natali (2014) assign explanatory power to the Excessive Deficit Procedure, whereby this indirectly sped up reforms in Denmark and directly led to European actors entering the policymaking process in Italy. Hassenteufel and Palier (2015) claim that that the EU has gained two means of pressure: first, the need for deficit reduction is now explicitly integrated into political discourse and policies and, second, the EU is able to demand evidence of reform. Still, they show that France has maintained flexibility on the timing and content of the reforms. Sacchi (2015) introduces the concept of 'implicit conditionality' (where ECB financial support is the carrot and the threat of an agreement with the IMF is the stick) to explain Italy's pension and labour market reforms during the sovereign debt crisis. Finally, in a four-country comparison of Germany, Italy, Poland and Sweden, Windwehr (2017) argues that the sovereign

debt crisis re-adjusted the balance between European influence and national autonomy, but only for the countries hit most by the crisis.

If each of the articles tells an important part of the story, none has analysed the impact of EU conditionality together with that of market pressures on national pension systems as precisely as a quantitative study embracing all member states for a significant number of years can. Indeed, the generalizability of these articles' findings is not warranted, as they do not cover the full variation for both the dependent and independent variables and may thus suffer from a selection bias, for four reasons. First, the range of conditionalities deployed by the EU institutions is not exhausted, as most case selections do not include the eight countries that were under a financial assistance programme. Second, by not employing any measure of the reform direction and intensity, these contributions cannot gauge the impact of individual political or market pressures on the reform effort in individual countries. Third, in terms of old-age pension systems, the case selections are limited to countries either with tight contribution-benefit links or that have, early on, introduced automatic stabilization mechanisms, a signature requirement of the European Commission to improve fiscal sustainability. Fourth, although the articles implicitly embrace a diachronic setup (pre- versus post-European Semester), none studies this explicitly.

3 Theorizing external pressures on pension reforms in Europe

Our theory builds on Mosley's (2000; 2003) causal model of the relationship between international financial markets and national governments. Whereas the original model is used to study the relationship between macro- and micro-policy indicators and long-term bond yields, here we study the impact of fundamentals and market pressures on pension reform events, subject to domestic constraints. We add to these, as shown in Figure 1, the increasing role of EU conditionality, in order to test whether political pressures have autonomous effects on policy decisions.

The model functions as follows. Global financial actors (investors, rating agencies, etc.) evaluate the risk of default of a determinate country. In the EU, this represents their main concern as inflation and currency risks basically disappeared under the Economic and Monetary Union (Mosley, 2004). Investors closely watch a number of indicators, of which the budget deficit, as defined by the Maastricht criteria, is key. Following their assessments, market actors respond by demanding an interest rate premium on government bond yields.

At the same time, the European Commission monitors the fundamentals underlying different types of macroeconomic imbalance, as well as numerous micro-policy indicators, among which pension-related indicators are closely scrutinized (Guidi and Guardiancich, 2018). Following their evaluation, it issues reform recommendations to the Member States through different conditionality mechanisms.

National policymakers are also well acquainted with macro- and micro-policy indicators, and are being sent signals by European institutions, international organizations, rating agencies, global investors, and so on, before the EU formally sends recommendations to reform and before interest premia climb to unsustainable levels. Hence, they may act proactively. Alternatively, as the markets and EU institutions issue their verdict, it will be their duty to react through monetary policy (not available in the EMU) or a mixture of taxation hikes and spending cuts.

Policymakers have conflicting goals: they do not want to disrupt public finances, but at the same time they are aware of the electoral costs that reforms may have. Hence, their nature, intensity and direction depend on domestic constraints that have been vastly explored in the literature, such as the electoral cycle, institutional veto points, partisanship and the like (see Häusermann *et al.*,

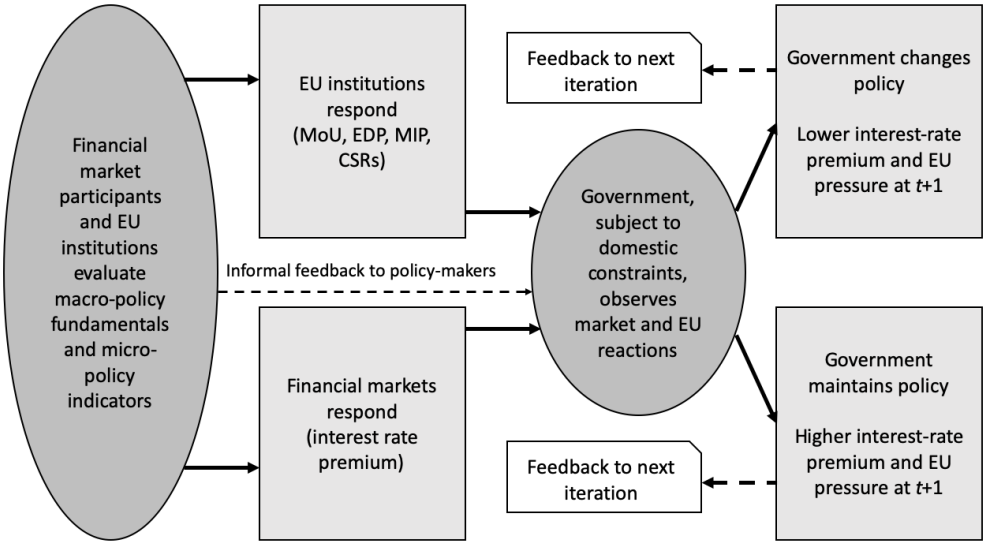

Figure 1: Causal model of the relationship between international financial markets, EU conditionality and national governments (based on Mosley, 2000)

2013).

This article focuses on the role of pensions in the model, asking whether, to what extent and in which combination international financial markets, supranational political pressures and the underlying macro-policy fundamentals and micro-policy indicators prompt a government to enact pension reforms.

Let us analyse the role of EU institutions and financial markets in the model separately. Since the Maastricht treaty, EU member states are subject to fiscal constraints that have been rendered explicit with the rules of the Stability and Growth Pact that underlies the EMU. Yet, after intense reforms during the 1990s, reform fatigue followed the introduction of the Euro (Vamvakidis, 2009), ascribable to a weakly enforceable SGP and favourable economic conditions. In fact, the early version of the SGP did not avert the Maastricht criteria from being systematically breached. It took the sovereign debt crisis to ramp up economic coordination.

From 2011 on, EU institutions have had at their disposal a host of new instruments to provide economic and policy guidance, epitomized by the European Semester framework. The introduction of several regulations and directives, known as the Six-Pack (2011), the Two-Pack (2013), as well as the Fiscal Compact (2012), strengthened the preventive and corrective arms of the SGP, increased the Commission's surveillance capacity through the new Macroeconomic Imbalance Procedure (MIP), and delineated a framework for the provision of financial assistance (Bauer and Becker, 2014).

The European Semester puts pressure onto the member states' budgetary and economic policymaking through stringent deadlines and pairs the guidance on economic policy with recommendations on structural reforms. EU institutions, and the European Commission in particular, saw their

decision-making powers significantly expanded, encompassing policy fields that were traditionally the exclusive domain of domestic politics, such as national social policy, including pensions (see Guidi and Guardiancich, 2018; de la Porte and Heins, 2015; Pochet and Degryse, 2013).

There are currently three identifiable layers of 'formalized' supranational political pressure that are relatively unchanging despite the many law modifications. Each of them is underscored by a set of economic indicators, which have different impacts on a country's fiscal sustainability. The first layer is the *preventive arm* of the SGP and of the MIP (see Essl and Stiglbauer, 2011), which are soft conditionality measures. Conditionality is conveyed through Country-Specific Recommendations that are forwarded on a yearly basis to the EU-28 member states. Their main purpose is to pre-empt that future imbalances form or current imbalances deteriorate. Although CSRs are explicit and formal, compliance is mostly voluntary. As shown by Guidi and Guardiancich (2018), pension-related CSRs are based on objective indicators that mainly refer to current and future pension liabilities.

The second layer is the *corrective arm* of the SGP and of the MIP, which are procedures representing instances of medium conditionality. The Excessive Deficit Procedure and the Excessive Imbalance Procedure (not triggered to date) require immediate policymaking action to avoid sanctions. Yet, in both cases countries still have some leeway on how to address recommendations. Severe uncorrected deviations, such as budgetary deficits exceeding a certain agreed ceiling, trigger the two procedures. These have an impact on the fiscal stability of a country and, indirectly, of the eurozone (see Kalan *et al.* 2018). Yet, high deficits or debt do not automatically preclude access to market financing, especially under conditions of sustained economic growth.

The third and last layer, involving the hardest type of conditionality, is represented by *economic adjustment programmes* involving a detailed Memorandum of Understanding (generally with the Commission, the ECB and the IMF). They are stipulated following an official request of the country undergoing financial stress. Compliance is basically non-negotiable. Being subject to an adjustment programme means that a country is risking to default as it is unable to service its public debt at market rates.

With the creation of the EMU, financial market actors started paying greater attention to pension system sustainability. They shifted from a 'strong but narrow' concern for macroeconomic indicators, most notably the deficit-to-GDP ratio, to a 'strong and broad' concern for supply-side policies, including welfare spending (Mosley, 2004). Rating agencies and global investors routinely scrutinize current and future pension-related indicators (see Aon Hewitt, 2017). In 2018, for example, Standard & Poor's explicitly warned the Italian government not to reverse the so-called Fornero pension reform. On the government's side, if debt monetization was an instrument of choice before the monetary union, within the EMU policymakers must respond to market signals exclusively through fiscal policy. Their reactivity significantly increased after the markets were not taking bailouts for granted any longer (Rommerskirchen, 2015).

So, what kind of link does exist between market pressures and pension reforms? Pension spending shows a high degree of persistence. Thus, precious few interventions (changes in indexation is one) have a significant and immediate impact on current expenditures, affecting only marginally the risk of default of a country. Moreover, active debt management has lengthened average debt maturity, meaning that even pronounced increases in interest rates are in all but the worst cases easily absorbed by member states. Yet, reducing bond yields is important to mitigate their knock-on effects on domestic banks' balance sheets and on consumers in terms of higher borrowing costs.

Consequently, we expect that both the market's evaluation of pension policy as well as a gov-

ernment's responses are not entirely concerned with overall debt and fiscal deficit levels or the risk of default. Rather they both require and show that a government is prepared to engage in politically costly behaviour that signals its commitment to fiscal prudence. This is complemented with the nature and content of EU pressures. Since the start of the European Semester, demands for structural reforms have become much more precise and act as proper guidelines pointing out those parts of a pension system in need of reform.

3.1 Hypotheses

From these theoretical premises we derive three hypotheses. The first one assumes that governments take a proactive approach to the worsening problem pressure. Hence, we hypothesize that:

H1: The more imbalanced the macro-policy fundamentals (i.e. the higher the debt and/or deficit as a percentage of GDP) and/or pension-related micro-policy indicators (i.e., the higher the current and/or future pension spending as a percentage of GDP) of a country, the greater its reform effort to improve a pension system's fiscal sustainability.

The second hypothesis assumes an independent role for external pressures: stronger market pressures and/or political pressures lead to more reform. Hence, we hypothesize that:

H2: A country's reform effort to improve its pension system's fiscal sustainability increases:

a) the higher the interest rate on its government bonds demanded by international financial markets;

b) the stronger the conditionality imposed on it through supranational political pressure.

The third hypothesis assumes that market pressures and/or economic fundamentals trigger reforms only when they underlie matching types of EU conditionality, i.e. when high bond yields are coupled with economic adjustment programmes, when high deficits are accompanied by EDPs and when pension imbalances are followed by CSRs. Thus, we hypothesize that:

H3: Contingent on the presence of matching supranational conditionality, a country's reform effort to improve its pension system's fiscal sustainability increases:

a) the higher the interest premium applied by international financial markets;

b) the more imbalanced the macro-policy fundamentals and/or pension-related micro-policy indicators.

4 Data and operationalization

4.1 Dependent variable

Measuring the evolution of welfare states is a daunting task, so it does not come as a surprise that most welfare state scholars have debated on what should be measured in the first place. The frustration with existing measures of welfare has been best vented by Lee *et al.* (2017, p. 1), who argue that "*[n]one of the existing measurements [of welfare state reforms] combines the qualities of recording concrete legislative changes with a large number of years and countries*".

Our study aims to do just that. We want to go beyond previous research on pension reforms, based primarily on case studies and qualitative evidence, with a time-series cross-section analysis

comprising many countries and years, and we want to consider the number and the direction (expansion or retrenchment) of pension reforms. To do so, we rely on the database of pension reforms by Carone *et al.* (2016), which has been put together by the Sustainability of Public Finances Unit of DG ECFIN. The database tracks major reforms of private and public pensions that took place between the early 1990s and 2015 in the current 28 member states of the EU,[1] assigned to five broad categories (eligibility, indexation, pension formula, resources and schemes). The database 'unpacks' reforms in their constitutive parts, therefore allowing to discriminate between simple interventions, which affect only marginal aspects of a pension system, and complex reforms, which involve many components at the same time (for a discussion of the external validity of the database and for an overview of pension reforms by type, see Table A3 and A4, and Figure A4 in the Online Appendix).

For our analysis, we considered only the data referring to the years from 2006 onward. Two reasons inform this choice. First, detailed information on reform events for 'new' member states is available from the moment they started accession negotiations (Croatia was the last one in October 2005). Second, the Commission began collecting comparable statistical data on pension expenditure and pension expenditure projections since that year.

We assigned to each instance of pension reform – that is, to every component of every reform 'package' – a score that summarizes its expected impact on the balance between pension assets and liabilities (a proxy for future sustainability). The score is negative ($m_i = -1$) if the measure creates a deficit, positive ($m_i = 1$) if the intervention generates a surplus and neutral ($m_i = 0$) if it has no or ambivalent impact.

There are many interventions that affect the fiscal balance of a pension system. The simplest notation representing a balanced 'pay-as-you-go'[2] scheme is (Barr, 2001):

$$sWL = PN$$

where s is the social security contribution rate, W is the average nominal wage, L is the number of workers, P is the average pension benefit and N is the number of pensioners. Here, demographic ageing, common to all European countries, creates an imbalance in the system by reducing the number of workers L and increasing the number of pensioners N in the coming decades.

For the purpose of our coding, we consider as surplus-generating all measures that aim to either increase the values on the left-hand side of the equation (the social security contributions, including any other budget transfer) or decrease the values of the right-hand of the equation (the expenditures), and as deficit-generating all measures that do the opposite.[3] Hence, there certainly is an association (but no coincidence) between surplus-generating reforms and cuts to pension entitlements.

In this bare-bones system, examples of surplus-generating measures are:

[1] The period is rather comprehensive. In fact, the latest Ageing Report (European Commission, 2018) shows that the number and significance of reform events is gradually tapering off.

[2] In PAYG schemes current contributions are used to pay current benefits, so, theoretically, no accumulation of savings occurs.

[3] Although the formula above applies to contributory pensions only, and it does not cover pensions financed through general taxation (e.g. non-contributory schemes, contribution credits, incentives for supplementary pensions), some reforms of the latter type appear in our database. The logic with which we code them is analogous to that of contributory pensions: increases in their generosity constitute a deficit for the general budget that is imputable to the cost of ageing, and reductions to a surplus.

- higher social security contributions, increasing s – for instance, foreseen for Cypriot public pensions (2009 and following years);
- raised statutory retirement age, which decreases N and possibly increases L – such as the adjustments occurred in Italy (several reforms after 2007);
- changes in the calculation formula, reducing P – e.g. a longer pensionable earnings base in Slovenia (from 2013).

Instead, measures generating deficits are:

- lower, non-actuarial decrements for early retirement, increasing P (possibly increasing N and decreasing L) – for instance, the reductions in penalties for early retirement in Croatia (since 2007);
- reductions in the retirement age for special categories, increasing N and possibly decreasing L – the German *Mütterrente* assigning mothers a greater number of pension points (introduced in 2014);
- increased contributions to mandatory supplementary pillars, which reduce s flowing into the PAYG scheme – e.g. contributions to Lithuanian funded pensions (resumed and increased in 2013).

Purely technical interventions, such as new governance rules for private pensions (for example, applied to Dutch funds in 2013), or measures whose final effect is ambiguous and/or have secondary policy objectives (for instance, discounts on social contributions to firms employing older workers, such as those introduced in Spain in 2007) are coded 0.

Our final data set is composed of 280 country-year observations, which include all EU-28 member states from 2006 to 2015. A breakdown of the distribution of reform patterns shows that:

- 156 are no-reform cases;
- 2 are technical, neutral cases;
- 32 are pure retrenchment cases (7 of indexation only);
- 20 are pure expansionary cases;
- 70 have elements of compensation or modernization, that is:
  - 5 raise/harmonize the retirement age for women;
  - 38 increase resources, i.e. they create surpluses through higher taxes/contributions;
  - 29 include compensation elements that generate deficits, where:
    - 8 introduce generic compensation measures, e.g. benefit or subsidy increases;
    - 9 include targeting measures by, for example, rising pension minima;
    - 12 contemplate recalibration measures, thus targeting new social risks for women, atypical workers, etc.

Hence, compensation measures are present in 23.4 percent of reform events. Of these, 41 percent target new social risks and 31 percent poverty in old age. Generic compensation thus appears in 6.5 percent of all reform events.

Figure 2 gives an overview of the number of measures passed each year. Expectedly, surplus-generating reforms outnumber deficit-generating ones in the period of interest. The first are concentrated in the crisis years (2009-2014), while the second are fairly stable during the period of observation, except for a surge in 2014, when Germany revived some early retirement options, Latvia reinstated contributory ceilings, the Czech Republic increased indexation, etc.

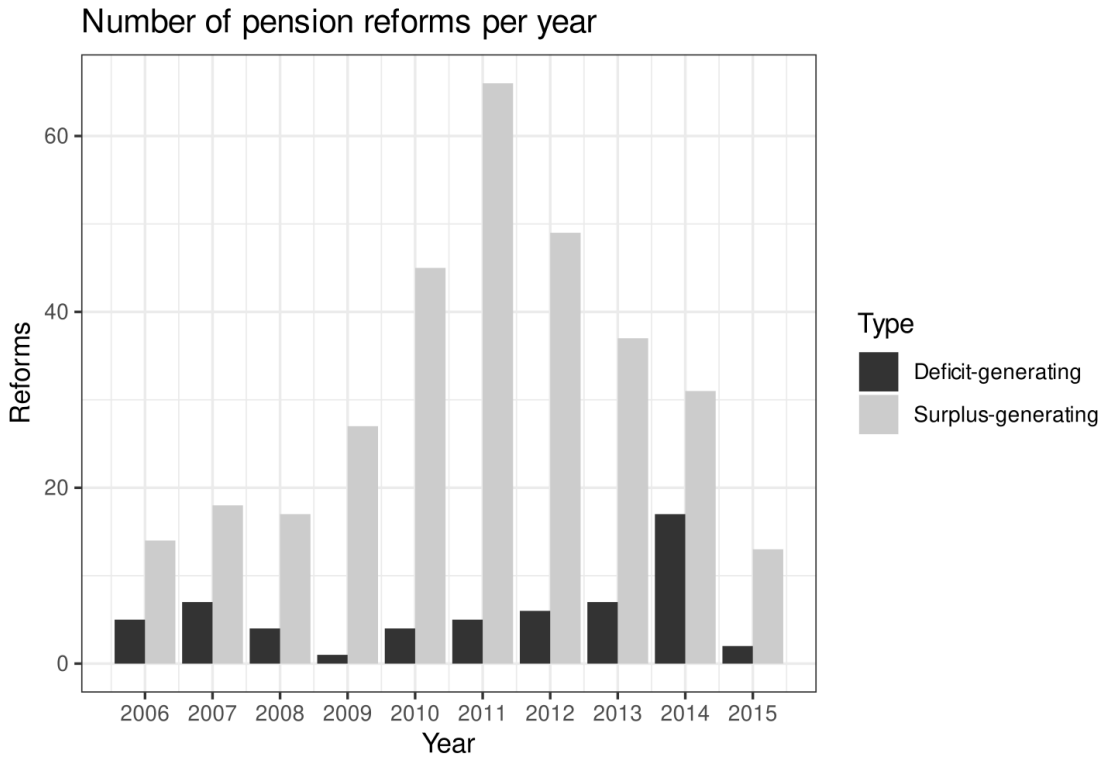

Figure 2: Number of surplus- and deficit-generating reforms per year (2006-2015)

As for the measurement of the reform effort, if some reform, adopted in country c in year t, was passed, the value of the dependent variable y for that country c and year t is equal to the sum of all the N measures m, which can take on the values $\{-1; 0; 1\}$, of the reform passed:

$$y_{ict} = \sum_{i=1}^{N} m_{ict}$$

So, for instance, if in a given year a country passed a reform in which four measures create a surplus in the system and one creates a deficit, the country-year value is equal to 3. If no reform took place, or if the same number of deficit- and surplus-generating measures are passed, the value is equal to 0 (for a coding example, see the Online Appendix).

There are practical and theoretical reasons for why the equal weighting of components with unequal fiscal implications is a relatively good approximation for measuring the *intensity* of the reform effort. Estimating the fiscal effect of each reform event would entail unaffordable personnel and financial costs, a problem highlighted by the European Commission (2017). Studies that do that

are rare. Häusermann *et al.*'s (2019) article is an exception, but the authors analyse one reform event only, where all the calculations were known in advance. Because of these difficulties, scholars resort to cruder approximations. Hallerberg and Scartascini (2017), for example, employ an ordinal variable that takes a value equal to −1 when the reforms are aimed at reducing the overall tax burden, 1 when they increase it, and 0 otherwise.

This article adopts an intermediate approach, going beyond a trichotomous variable but not using impact estimations, as their calculation would be impracticable. Since, as shown in Guidi and Guardiancich (2018), the number of CSRs asking for surplus-generating pension reforms correlates with the severity of the fiscal position of a national retirement system, it is a reasonable assumption that the net sum of surplus- and deficit-generating pension reforms approximates the intensity of a government's reform effort.

Such dependent variable is more accurate than employing benefit generosity or welfare state spending on GDP (see Hallerberg and Scartascini, 2017). First, there are several types of retrenchment and expansion that are not directly reflected in either expenditure or generosity of benefits (Lee *et al.*, 2017). Examples are measures affecting social security contributions, ex-post tax rates and so on, which impact on the revenue side of the equation above. Second, the budgetary effects of reforms may happen much later in time than their legislation, which is a particularly felt phenomenon precisely in pensions due to long phase-in periods. Third, legislative activity shows a clear intent by the government to affect pension spending in a particular direction and to signal this to citizens, markets and supranational institutions. At the same time, effective pension spending or benefit levels can go up or down in the years following a reform for various reasons, for instance due to a surge of early retirement during an economic crisis.

Table 1: Descriptive statistics of the main variables employed in the statistical analysis

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Balance of pension reforms	280	0.925	2.251	−3	0	1	14
Pension expenditure*	277	10.481	2.676	4.900	8.400	12.200	17.700
Pension expenditure (2050–10 diff.)	262	2.726	3.393	−4.556	0.617	3.934	13.500
Debt (% of GDP)*	280	57.553	33.445	3.700	36.100	78.675	179.000
Budget balance (% of GDP)*	280	−3.279	3.958	−32.100	−5.225	−1.000	5.100
GDP growth*	280	1.579	3.995	−14.814	−0.013	3.723	11.889
10Y bond yields	270	4.293	2.461	0.369	2.924	4.961	22.498
Interest paym. (% of GDP)*	280	2.251	1.283	0.100	1.300	3.100	7.300
CSRs on pensions*	280	0.839	1.802	−1	0	0	8
Right–wing government	279	5.576	1.529	1.053	4.348	6.935	8.440
Veto players	277	4.209	1.219	2.000	3.000	5.000	8.000
Union density	242	29.768	19.420	4.487	15.613	36.448	74.149

Note: Variables with * are measured at $\mathbf{t} - 1$.

4.2 Explanatory variables

To test our three hypotheses, we employ the following explanatory variables (see Table 1 for an overview). Concerning *H1*, we employ two micro-policy indicators relating to the pension system's sustainability, which previous research (Guidi and Guardiancich, 2018) has shown to form the basis of the pension-related CSRs, and three macro-policy indicators. The pension system indicators are the current pension expenditure (expressed as a percentage of national GDP) and the difference

between the projected pension expenditure in 2050 and the value for a baseline year (2010).[4] While the first is a proxy for the current sustainability of a pension system, the second is an attempt to measure the reform effort of a country: if a country is expected to reduce its pension expenditure in the next 30 years, this indicates that it has already carried out reforms that make it sustainable in the long run. The macro indicators are the balance (deficit or surplus) of the public budget as a percentage of GDP (Eurostat, 2018d), the public debt as a percentage of GDP (Eurostat, 2018c), and GDP growth (Eurostat, 2018e). All the three variables have been lagged by one year.

To test *H2*, we use the 10-year bond yields (Eurostat, 2018f) as the most reliable indicator of how much pressure financial markets put on a country. For this variable, we calculated yearly averages from monthly data.[5] To disentangle the signalling and short-term effect of a rise in bond yields from the long-term pressure that markets exert on countries, we control for interest payments on public debt (expressed as a percentage of GDP) (Eurostat, 2019).

Finally, to test (*H3*) to what extent EU pressures reinforce the effects hypothesized in *H1* and *H2*, we employ three indicators that signal different degrees of conditionality: *a)* the number of recommendations in CSRs related to the pension system (Guidi and Guardiancich, 2018);[6] *b)* whether a country is under an Excessive Deficit Procedure in a given year;[7] *c)* whether a country is in an economic adjustment programme in a given year.[8] Since we hypothesize that these forms of pressure exert an impact in combination with existing macro or micro imbalances, we interact each of them with the indicator that is supposed to trigger it. More specifically, recommendations in CSRs are interacted with the two indicators of pension system sustainability; budget balance is interacted with the existence of an Excessive Deficit Procedure; 10-year government bond yields are interacted with the activation of an economic adjustment programme. In each of these cases, we aim to test if the EU intervention reinforces the effect of structural and market pressures or if, on the contrary, it fails to further incentivize reform efforts.

We also use several control variables relating to domestic and international institutions. We include as a covariate a dummy indicating whether a country adopts the euro to control for several phenomena that could have affected the euro area differently from the rest of the EU — such as a higher reliance on international markets for public debt financing, or the monetary policy adopted

[4] Current total pension expenditure as a percentage of GDP is based on Eurostat (2018a; 2018b) data, lagged by one year. Pension expenditure projections are taken from the Commission's Ageing Reports of 2006, 2009, 2012 and 2015 (European Commission, 2006; 2009; 2012; 2015). Projections for the year 2050 are present in all documents.

[5] We acknowledge that an alternative measure are bond spreads, which account for the fact that sovereign bond rates vary across the economic cycle. Thus, they reveal the extent to which sovereigns pay different rates, independently from global or regional conditions. In the EU, spreads are usually calculated using the German *Bund* as benchmark. Since Germany is one of our cases, we calculated bond spreads vis-à-vis the 10-year US Treasury bond yields (US Department of the Treasury, 2019). Absolute yields and spreads over US bonds are highly correlated ($\rho = 0.93$) and replacing yields with spreads leaves our finding substantially unchanged (see Table A1 Online Appendix).

[6] This indicator is a numeric variable calculated as the difference between the number of sub-recommendations contained in CSRs that ask a country to improve its pension system sustainability and the number of sub-recommendations that ask a country to improve the adequacy of pension benefits (a measure that increases the long-term cost of pension systems). This variable has been lagged by one year: we model the impact of year t recommendations on year $t + 1$ reforms.

[7] Data on EDPs are on the Commission's website.

[8] We decided against coding recommendations except for those contained in the European Semester. In the case of EDPs predating the European Semester, recommendations were limited to demanding reductions in deficit. As for the social OMC and the Lisbon Strategy cycles, neither applied stringent deadlines, required country-specific structural pension reforms, nor systematically assessed progress.

from 2012 on by ECB President Draghi. In line with the literature on the impact of partisanship, we may expect the presence of social-democratic parties in government[9] as well as trade union density (as a proxy for labour militancy)[10] to negatively impact surplus-generating measures. In order to test whether political budget cycles affect pension reforms we include a dummy variable indicating that a country will hold a legislative election in the following year, during which fewer reforms are expected.[11] An additional control for the institutional decision-making capacity of a country is the number of veto players:[12] we expect, all else equal, to have fewer reforms the higher is the number of policymakers that need to agree on a change of the status quo (Tsebelis, 2002).

5 Empirical analysis

To test our hypotheses, we estimate linear regression models with random effects for countries,[13] as summarized by the notation below:

$$\begin{aligned} y_{ic} &= \alpha + X_{ic}\beta + \eta_c + \varepsilon_{ic} \\ \eta_c &\sim N(0, \sigma_\eta) \\ \varepsilon_{ic} &\sim N(0, \sigma_\varepsilon) \end{aligned}$$

where y is the dependent variable, i.e. the balance of pension reform components (positive, if surplus-generating, and negative, if deficit-generating) passed in country c in a given year; α is a constant; X is the matrix of explanatory variables of each model (see Table 2); β is a vector of coefficients; η is a vector of 28 country random effects; ε is the residual error term. We present a random effects specification after having compared the coefficients of the random effects model with those of a fixed effects model through a Hausman test (Hausman, 1978). Being the test not significant ($p = 0.66$), we fail to reject the null hypothesis that both models yield consistent estimates, and we prefer the random effects one for its parsimoniousness.

To test our three hypotheses, we regressed our response variable on the indicators presented in the previous section, estimating models that include the explanatory variables in the logical order illustrated in the 'Hypotheses' section. Thus, we first estimate a model in which only the macro- and micro-policy indicators are included (Model 1); subsequently, we add to these variables the

[9] Governments' left-right positioning are calculated as the averages of the scores (on a 0-10 scale) of the parties supporting the government, weighted by their number of seats in parliament. Data have been obtained from ParlGov (Döring and Manow, 2016).

[10] For union density, we combined data from two sources: Visser (2016) and the OECD (2018). Some country-years were missing in one dataset and not in the other, and vice versa. When a value was present only in one dataset, we used the available value; when it was present in both datasets, we averaged the values.

[11] Values have been taken from the variable *legelec* in the Database of Political Institutions (Cruz *et al.*, 2018).

[12] The indicator we employ is the variable *checks* in the Database of Political Institutions (Cruz *et al.*, 2018).

[13] Models have been estimated with the package plm (Croissant and Millo, 2008) in R. To deal with missing values, we have imputed 50 data sets with package Amelia (Honacker *et al.*, 2011) in R and pooled the results of the regressions. The dependent variable and three independent variables (budget balance, bond yields and interest payments) have been transformed with the Yeo-Johnson transformation (Yeo and Johnson, 2000) to improve the normality of their distribution.

proxies for external market pressure, bond yields and cost for interests (Model 2); then we estimate a model in which four indicators are interacted with instances of EU conditionality (Model 3); in the final model, we include the control variables and remove the interaction terms that turned out to be not statistically significant in the previous model (Model 4).

In all models, we present the results with panel-corrected standard errors (Beck and Katz, 1995). As a first check, we performed the 'generalized information matrix' test suggested by King and Roberts (2015) to test for model misspecification.[14] None of our models appears to suffer from specification problems. A second check consisted in running our final model using an alternative specification for the dependent variable: the variable was coded as an ordinal variable taking values $\{-1; 0; 1\}$[15] and the coefficients of the explanatory variables were estimated using an ordered logit model. The results are in line with those of the linear model (see Table A2 Online Appendix). Finally, we ran the four models in Table 2 after excluding the six cases[16] for which the value of "0" in the dependent variable did not indicate the absence of reforms, but a compensation between surplus- and deficit-generating measures. The results are practically unchanged.

As we can see in Table 2, if we consider only macro- and micro-policy indicators (Model 1), surplus-generating reforms seem to be related to higher budget deficits and poorer reform effort. With the inclusion of bond yields and debt servicing costs as a percentage of GDP (Model 2), however, only the estimates of budget balance and bond yields are statistically significant. When we add the interactions with EU conditionality (Model 3), the results further change. For the bond yields indicator, we find that its impact is not amplified by the existence of an economic adjustment programme (as the interaction term is not significant). EU conditionality does instead boost the impact of budget deficit and pension expenditure. As for the first, we find that the activation of an Excessive Deficit Procedure makes countries with higher deficits pass more reforms. Concerning pension expenditure, we find that its impact is greater (more expenditure leads to more surplus-generating reforms) the higher is the pressure that the EU puts on a country by issuing CSRs targeting pension policy. The inclusion of a number of control variables in Model 4 does not change the effects described above.

To better interpret the effect of the main predictors, it is useful to look at the figures in the Online Appendix. Figure A1 reveals that, in the absence of an Excessive Deficit Procedure, budget deficit has no effect on pension reforms. When an EDP is triggered, though, and provided that the previous year's deficit was higher than ~2 percent, there is a negative effect of budget balance on reforms: the severer the deficit, the more surplus-generating measures are passed. Figure A2 shows the effect of bond yields. Here we can see that, when yields reach ~7.3 percent, further increases are likely to produce surplus-generating pension reforms. Interestingly, if yields get lower than ~2.4 percent, further decreases may instead induce countries to relax their pension system's sustainability and pass deficit-generating reforms. Finally, Figure A3 indicates that CSRs have a strong impact on reforms: in particular, they reinforce the effect of pension expenditure. When a country receives no CSRs on pensions, the impact of pension expenditure on reforms is modest and confined to intermediate levels of spending. If a member state receives three recommendations on pensions, and if it has an expenditure higher than ~9.3 percent of its GDP, the relationship between expenditure and surplus-generating reforms becomes positive. Countries with similar levels of pension expenditure that receive five recommendations or more have an even higher tendency to pass surplus-generating reforms.

Our results lend very little support to *H1*, as we find that macro- and micro-policy indicators *alone*

[14] The GIM test was performed with the function `GIM()` in package RobustSE in R.
[15] This operationalization is similar to the one proposed by Hallerberg and Scartascini (2017).
[16] UK 2007, Bulgaria 2010, Croatia 2013, Lithuania 2013, Czech Republic 2014, Estonia 2014.

Table 2: Random effects linear regression models

	Dependent variable:			
	Balance of pension reforms‡			
	(1)	(2)	(3)	(4)
Pension expenditure (t − 1)	0.021 (0.039)	0.051 (0.040)	−0.001 (0.037)	−0.004 (0.037)
Pension expenditure (2050–10 diff.)	0.034* (0.019)	0.025 (0.019)	0.011 (0.017)	0.014 (0.021)
Debt (% of GDP) (t − 1)	−0.001 (0.003)	−0.001 (0.005)	−0.003 (0.005)	−0.004 (0.006)
GDP growth (t − 1)	−0.011 (0.020)	−0.004 (0.019)	−0.009 (0.019)	−0.008 (0.021)
Budget balance (% of GDP)‡	−0.102*** (0.025)	−0.081**** (0.024)	0.009 (0.033)	0.003 (0.038)
10Y bond yields‡		0.517*** (0.138)	0.456** (0.190)	0.692*** (0.192)
Interest payments (% of GDP)‡		−0.078 (0.257)	0.157 (0.251)	0.176 (0.267)
CSRs on pensions (t − 1)			−0.468** (0.212)	−0.414** (0.210)
Excessive Deficit Procedure			−0.091 (0.224)	−0.055 (0.234)
Adjustment programme			−1.386 (1.497)	−0.071 (0.326)
Right-wing government				0.054 (0.047)
Union density				0.006 (0.004)
European semester				0.185 (0.192)
Euro				0.114 (0.157)
Electoral year (t − 1)				−0.047 (0.169)
Veto players				0.059 (0.056)
CSRs (t − 1) × Pension expenditure			0.048*** (0.018)	0.045** (0.018)
CSRs (t − 1) × Pension exp. (2050–10 diff.)			0.007 (0.013)	
EDP × Budget balance (% of GDP)‡			−0.118** (0.049)	−0.113** (0.051)
Adj. programme × 10Y bond yields‡			0.594 (0.576)	
Constant	−0.133 (0.356)	−1.224*** (0.467)	−0.756 (0.492)	−2.001*** (0.663)
R squared	0.1	0.142	0.208	0.222
Adj. R squared	0.083	0.119	0.166	0.168
F statistic	30.296	44.838	69.543	74.545
Country RE st.dev	0	0.003	0	0
Observations	280	280	280	280

Note: Linear regression models with random effects for countries and panel corrected standard errors (in parentheses).
Variables with ‡ have been Yeo-Johnson transformed. Significance scores: *p<0.1; **p<0.05; ***p<0.01

can hardly trigger reforms (budget deficit has no effect if not coupled with an EDP, and pension expenditure alone has a very modest effect). We instead fail to reject the null hypothesis in the case of *H2*: bond yields appear to be an important predictor of both deficit- and surplus-generating pension reforms, although this occurs only when yields exceed certain thresholds. Regarding *H3*, we have mixed evidence: the strongest form of conditionality, adjustment programmes, does not strengthen the impact of government bond yields; instances of medium and soft conditionality (EDP and CSRs), instead, are key in activating reform efforts in the case of, respectively, high deficits and high pension expenditure.

6 Discussion of results and conclusions

Our findings demonstrate that, after reaching a certain threshold, pressures exerted by international markets through bond yields are a strong factor driving reforms. Here, the request for financial assistance does not exert independent pressure, meaning that there is no need for formal recommendations for countries to act. Actors, such as international organizations, rating agencies, global investors, signal that a reform is needed before a bailout becomes unavoidable.

Among the 9 percent of cases of persistently high bond yields, there are several instances where no financial assistance was in place (Bulgaria 2009, Hungary 2006 and 2011-12, Lithuania 2009, Romania 2007–8, etc.). Reforms followed basically everywhere. Yet, political recommendations should not be dismissed. Formal conditionality provides clear reform guidelines to countries under stress. A look at major reform events reveals that the euro area member states affected by significant pension imbalances that received financial assistance (Cyprus, Greece and Portugal) introduced an automatic stability mechanism during the period of observation.

Even more interesting is that bond yields spurred policymakers to act when they reached key psychological thresholds, especially when combined with other supranational pressures. In this respect, the Trichet-Draghi (the outgoing and incoming ECB presidents) letter sent to the Italian Premier Silvio Berlusconi in August 2011 is emblematic. The missive recommended to increase and equalize the statutory retirement age of women and to limit seniority pensions. Failure to act made government bond yields rise critically and precipitated a dramatic government crisis. As the 7 percent mark that spurred Greece, Ireland and Portugal to seek financial assistance was surpassed, the door swung open to the sweeping reforms under the technocratic government of Mario Monti (Sacchi, 2015).

Following the generalized reduction in bond yields across the EU since 2013 (also the result of the low interest policy and asset purchase programmes of the ECB), in line with our findings, a number of member states have reversed some surplus-generating reforms. This should not be interpreted as a return to profligacy or as a fundamental relaxation of market discipline, though. First, the two most common cases of reversal (the resumption of contributions flowing to the mandatory private second pillars in several post-socialist countries and the end of the indexation freeze) were entirely contingent on the weathering of the Great Recession. Second, recent events point to the continuing importance of financial markets within the political economy of pensions. The right-populist Italian government that formed after the 2018 general election set out to reinstate seniority pensions and undertake other generous expenditure programmes. The plans provoked a stormy reaction. Italian bond yields skyrocketed, numerous actors (the IMF, international investors, rating agencies) disapproved of the move, and the Commission threatened to trigger an Excessive Deficit Procedure, for the first time based on the debt criterion. These reactions led the government to narrow the scope for early exit, and significantly reduce the overall planned budget deficit.

Looking at less extreme forms of market and political pressure, we find that both worsening macro-policy fundamentals and micro-policy indicators trigger reforms, provided that they are coupled with formal conditionality procedures.

Examples pertaining to the SGP's corrective and preventive arms abound. Even before bond yields started fluctuating widely in Slovenia, yearly budget deficits exceeding 6 percent of GDP in 2009-11 and the associated Excessive Deficit Procedure led to the planned overhaul of the pension system, a thorn in the country's finances since its independence (Guardiancich, 2017b). Not dissimilarly, the Country-Specific Recommendations highthen the urge to reform but only in those countries where pensions are becoming financially unsustainable. Instances of member states where pension spending has not yet reached critical levels and where there is no political resolve to comply with CSRs, e.g. Bulgaria and Romania failing to harmonize the retirement ages between men and women or Croatia not reducing special privileges for retired war veterans, lend credence to the low-to-medium average implementation rates (Al-Kadi and Clauwaert, 2019).

Compared to existing studies, these findings substantially improve our understanding of EU conditionality and pension policymaking under financial stress. From the onset of the sovereign debt crisis and the deployment of the European Semester's toolkit, European countries have entered a new era of supranational influence through a combination of market and political pressures. Unlike most studies underscoring the importance of informal conditionality, ours shows that some forms of formal pressure play a significant role, thereby reinforcing the impact of underlying macro- and micro-policy indicators on a country's reform effort. Additionally, we introduce a novel way of measuring a specific type of reform events, thereby providing a useful new tool to the scholars of the political economy of reforms in general, and of welfare state retrenchment in particular.

The article's main theoretical contribution is to challenge the methodological nationalism that seems to permeate the existing literature. There are likely reasons for the persistence of such 'bias'. First, international financial markets and supranational institutions have started to display a 'strong and broad' concern for supply-side policies in advanced political economies only relatively recently. Second, the strength of the external pressures analysed in this contribution has ebbed and flowed over the past two-three decades within a general trend towards greater incisiveness. The literature has often dismissed these pressures as still subordinated to national politics or, at most, depicted them as a fleeting phenomenon. Our article demonstrates that this is no longer the case: even though the intensity of supranational influence varies considerably, future analyses should take it into due consideration as a constituent element of the 'new politics of the welfare state'.

Finally, it is useful to emphasize the empirical and theoretical shortcomings that prospective research may address. Two pieces of the interaction between national pensions and external pressures are worth investigating. The influence exerted by past pension reforms, both surplus- and deficit-generating, on the interest rate applied to sovereigns has not been sufficiently explored, especially in light of the fact that it may represent an instance of endogenous causation. Additionally, little attention has been devoted to the role played by supranational actors in the reforms of non-PAYG, that is mainly funded pensions, which represent a growing share of national pension-policy mixes.

Since ours is a quantitative analysis, the general trends that we find can be further unpacked. Detailed case studies would unearth the mechanisms underlying compliance. Do member states follow CSRs because they interiorize the problems singled out by the Commission, because they rely on evidence-based policymaking, or because they have a reputation to uphold? By contrast, what are the precise reasons for which governments fail to comply? And when they do, do they use the European Union as a blame-avoidance strawman? Furthermore, studying the congruence

between the content of the recommendations and domestic reforms may shed light on the discretion that states still enjoy under different types of supranational pressure.

In addition to case study analyses, the article opens up other avenues for research. The methods employed in this article can serve identifying patterns and determinants of variation in other policy domains. Labour market reforms would be an excellent area of research. Moreover, the study can be extended in time. As macroeconomic coordination has undergone distinct phases since the Maastricht treaty, we would greatly benefit from understanding its impact on national policy outcomes in each of them.

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Appendix

Marginal effects of budget balance, bond yields and pension expenditure on the balance of pension reforms

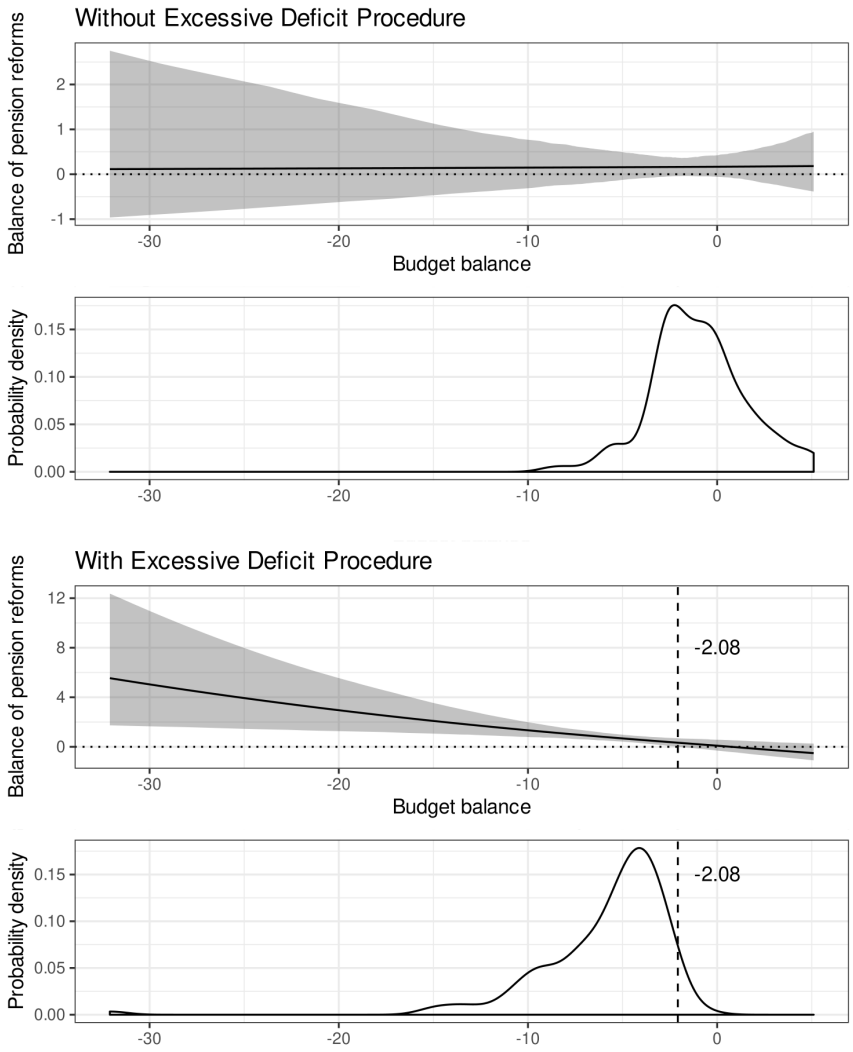

Figure A1: Marginal effect of budget balance, without and with Excessive Deficit Procedure, on the balance of pension reforms, based on Model 4. The graph below the marginal effect ones show the probability density function of the explanatory variable above.

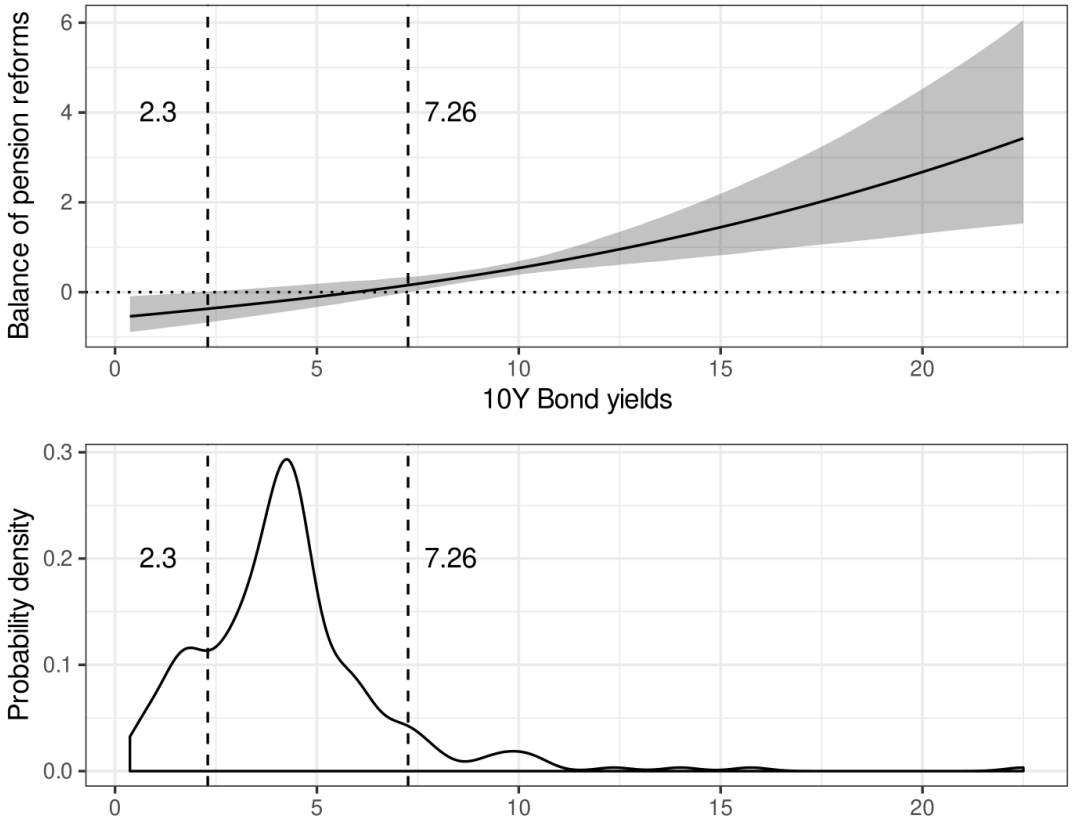

Figure A2: Marginal effect of bond yields on the balance of pension reforms, based on Model 4. The graph below the marginal effect one shows the probability distribution function of the explanatory variable above.

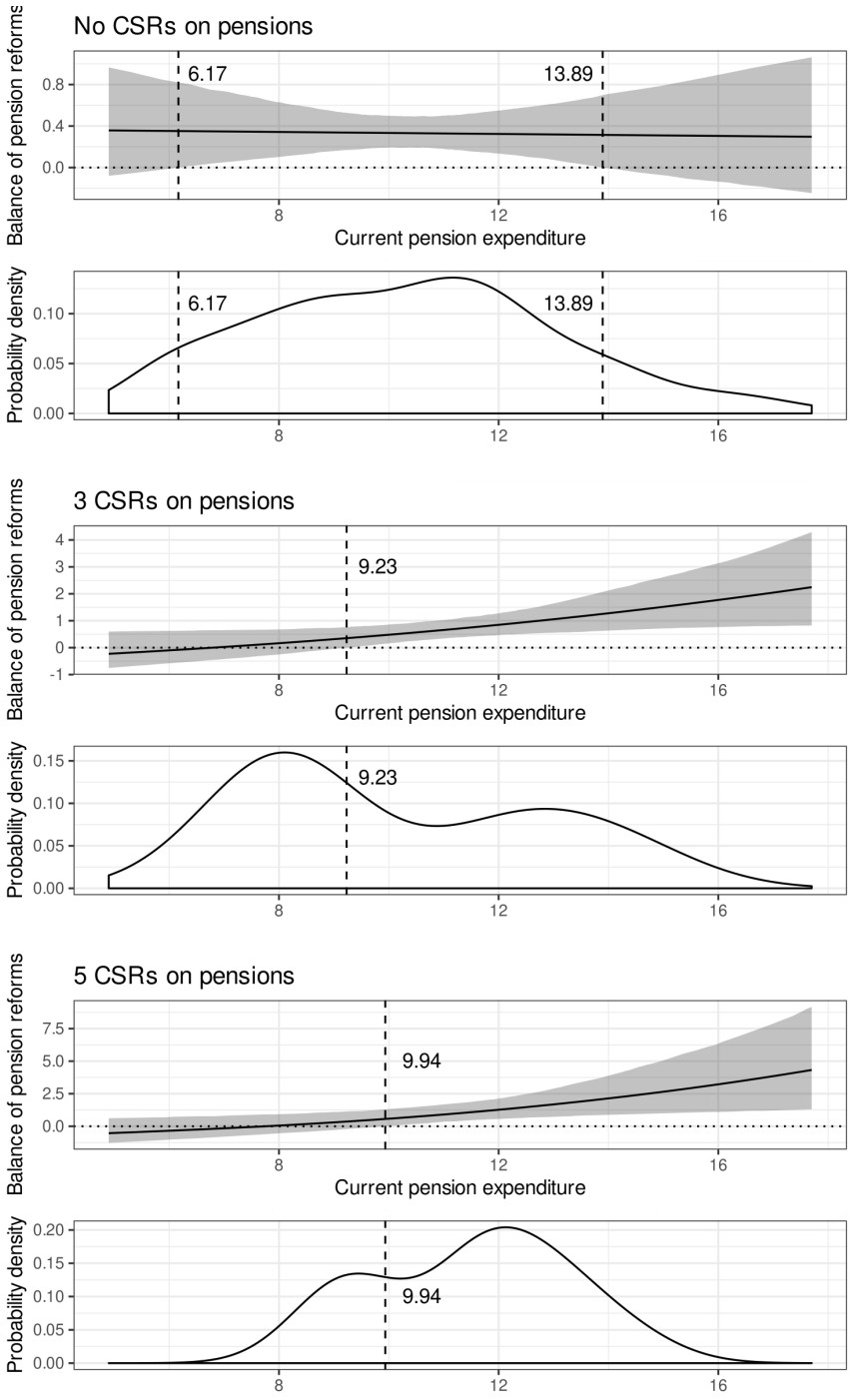

Figure A3: Marginal effect of current pension expenditure, for different numbers of pension policy recommendations in CSRs, on the balance of pension reforms, based on Model 4. The graph below the marginal effect ones show the probability distribution function of the explanatory variable above.

Alternative specification of market pressure using spreads over US Treasury bonds

Table A1: Random effects linear regression model

	Dependent variable:			
	Balance of pension reforms‡			
	(1)	(2)	(3)	(4)
Pension expenditure (t − 1)	0.021 (0.039)	0.053 (0.041)	0.003 (0.037)	0.001 (0.037)
Pension expenditure (2050–10 diff.)	0.034* (0.019)	0.033** (0.019)	0.019 (0.017)	0.021 (0.021)
Debt (% of GDP) (t − 1)	−0.001 (0.003)	−0.003 (0.005)	−0.006 (0.005)	−0.005 (0.006)
GDP growth (t − 1)	−0.011 (0.020)	0.000 (0.019)	−0.004 (0.019)	0.001 (0.021)
Budget balance (% of GDP) (t − 1)‡	−0.102*** (0.025)	−0.071*** (0.025)	0.023 (0.033)	0.012 (0.038)
Spread over US 10Y Treasury bonds‡		0.208*** (0.065)	0.167** (0.076)	0.216*** (0.077)
Interest payments (% of GDP) (t − 1)‡		0.038 (0.248)	0.267 (0.233)	0.225 (0.268)
Excessive Deficit Procedure			−0.103 (0.224)	−0.064 (0.237)
Adjustment programme			−0.706 (0.863)	0.162 (0.310)
CSRs on pensions (t − 1)			−0.517** (0.211)	−0.420** (0.210)
Right-wing government				0.055 (0.047)
Union density				0.005 (0.004)
European semester				−0.060 (0.187)
Euro				0.080 (0.155)
Electoral year (t − 1)				−0.040 (0.170)
Veto players				0.051 (0.056)
CSRs on pensions (t − 1) × Pension expenditure (t − 1)			0.050*** (0.018)	0.044** (0.018)
CSRs on pensions (t − 1) × Pension expenditure (2050–10 diff.)			0.007 (0.014)	
EDP × Budget balance (% of GDP)‡			−0.126** (0.049)	−0.123** (0.051)
Adj. programme × Spread over US 10Y bonds‡			0.397 (0.342)	
Constant	−0.133 (0.356)	−0.463 (0.388)	−0.065 (0.350)	−0.796 (0.534)
R squared	0.1	0.136	0.205	0.212
Adj. R squared	0.083	0.114	0.163	0.157
F statistic	30.296	42.997	68.214	70.084
Country RE st.dev	0	0.003	0	0
Observations	280	280	280	280

Note: Linear regression models with random effects for countries and panel corrected standard errors (in parentheses).
Variables with ‡ have been Yeo-Johnson transformed. Significance scores: *p<0.1; **p<0.05; ***p<0.01

Alternative specification of Model 4 (ordered logit model)

Table A2: Ordered logistic regression model

	Dependent variable: Direction of pension reform	
	Coefficients	Standard errors
Pension expenditure (t − 1)	–0.022	0.082
Pension expenditure (2050–10 diff.)	0.025	0.048
Debt (% of GDP) (t − 1)	–0.001	0.012
GDP growth (t − 1)	–0.044	0.042
Budget balance (% of GDP) (t − 1)‡	0.078	0.085
10Y bond yields‡	1.564***	0.425
Interest payments (% of GDP) (t − 1)‡	0.19	0.58
CSRs on pensions (t − 1)	–0.904**	0.38
Excessive Deficit Procedure	–0.222	0.512
Adjustment programme	–0.91	0.646
Right-wing government	0.152	0.093
Union density	0.001	0.008
European Semester	0.568	0.373
Euro	–0.012	0.335
Electoral year (t − 1)	0.204	0.29
Veto players	0.166	0.12
CSRs on pensions (t − 1) × Pension expenditure (t − 1)	0.096***	0.033
EDP × Budget balance (% of GDP) (t − 1)‡	–0.24**	0.119
–1 | 0	1.976	1.394
0 | 1	5.702***	1.442
Akaike Information Criterion	456.7	
Observations	280	

Note: Ordered logit regression. Variables with ‡ have been Yeo-Johnson transformed. Significance scores: *p<0.1; **p<0.05; ***p<0.01

External validity of the European Commission pension reforms database

One potential objection to the employment of the database on major pension reforms used by the European Commission in Carone et al. (2016) is that the relationship between EU policy-making tools and pension reforms might be a result of Commissions selection bias and therefore spurious.

Hence, we checked for the external validity of the dataset with several of the existing accounts of pension reforms and did not find any marked or systematic omissions of the major interventions. For example, in the case of Poland and Slovenia, Tables A3 and A4 show the reform measures counted by the Commission, which coincide almost exactly with those counted in recent contributions by Guardiancich (2017a; 2017b).

Table A3: Coding of Poland's pension reforms

Scope	**Type of measure (our classification)**	**Type of measure (Commission's classification)**	**Description of measure**	**Score**	**Year**
Public pensions	Early retirement schemes	Eligibility	Introduction of bridging pensions replacing early pensions, but with smaller coverage (mainly for miners)	1	2009
Public pensions	Calculation formula	Resources	Introduction of NDC subaccounts with new rates of contributions, increased from 12.22% to 17.22%	1	2011
Private pensions	Fiscal sustainability (generic)	Resources	Private pension contributions reduced from 7.3% to 2.3%	1	2011
Private pensions	Incentives for complementary pillars	Schemes	Introduction of new voluntary schemes, the Individual Pension Insurance Accounts (IKZE)	0	2011
Public pensions	Indexation	Indexation	Pensions increased by a fixed amount	1	2012
Public pensions	Harmonization of retirement age for men and women	Eligibility	Increase of the retirement age from 60 / 65 for women / men to 67 in 2040 / 2020	1	2012
Public pensions	Disability / survivor pension schemes	Resources	Increase of the contribution rate on disability and survivors' pension schemes	1	2012
Private pensions	Fiscal sustainability (generic)	Schemes	Part of the accumulated assets in private funds transferred to the Social Insurance Fund (ZUS) (the share invested in government bonds)	1	2013
Private pensions	Fiscal sustainability (generic)	Schemes	Participation to Open Pension Funds (OFEs) becomes voluntary (between April and June) to redirect future contributions towards NDC accounts	1	2014

Table A4: Coding of Slovenia's pension reforms

Scope	**Type of measure (our classification)**	**Type of measure (Commission's classification)**	**Description of measure**	**Score**	**Year**
Public pensions	Indexation	Indexation	Reduced indexation in 2010 (50% wages and 50% prices) and 2011 (25% wages and 75% prices)	1	2010
Public pensions	Indexation	Indexation	Freeze in indexation for 2012	1	2012
Public pensions	Special pension schemes	Pension formula	Temporary reduction of annual supplement to certain categories of pensioners (entirely budget-financed)	1	2012
Public pensions	Harmonization of retirement age for men and women	Eligibility	Increase of statutory retirement age from 61.5 / 63.5 for women / men to 65 in 2019 / 2015 for both genders (with at least 15 years of contributions)	1	2013
Public pensions	Effective retirement age	Eligibility	Increase of early retirement age from 58 / 58.5 for women / men to 60 by 2018 / 2017 for both genders (with 40 years of contributions)	1	2013
Public pensions	Calculation formula	Pension formula	Simplified valorization coefficients (now equal to wages growth)	0	2013
Public pensions	Calculation formula	Pension formula	Increase of pensionable earnings base from 18 to 24 most favorable consecutive years by 2019	1	2013
Public pensions	Calculation formula	Pension formula	Increase of penalties for early pensions (0.3% by month of retirement before 65, with 40 years of contribution)	1	2013
Public pensions	Calculation formula	Pension formula	Increase of bonuses for delaying retirement (1% for each 3 months of work delay, after 60 with 40 years of contributions)	1	2013
Public pensions	Early retirement schemes	Pension formula	Introduction of options for partial retirement	0	2013

Public pensions	Indexation	Indexation	Shift from wage indexation rule to 60% wages plus 40% prices	1	2013
Public pensions	Indexation	Indexation	Continued (partial) freeze in indexation for 2014-15	1	2014

According to our dependent variable score, Table A4 provides the example of the ZPIZ-2 reform in Slovenia, which came into effect in January 2013 and was negotiated by Minister of Labour Andrej Vizjak. It is composed of nine different measures that can be viewed in the column 'Description of measure'. Seven of these have a univocally surplus-generating effect compared to the status quo and are accorded a score of 1. Two measures (the simplification of a convoluted valorization formula and the introduction of new options for partial retirement) have inherently ambiguous fiscal effects, and therefore cannot be treated either as surplus- or deficit-generating. Hence, these obtain a score of 0. Summing up the nine reform measures, they add up to a score of 7.

The reform example provides one further insight. Individual reform measures are so different from one another that a weighing of each, without a proper simulation of its fiscal effects, would by itself be arbitrary. As an illustration, it is virtually impossible to state whether the fiscal effect of lower indexation is larger, smaller or equal to that of the introduction of penalties for early retirement.

Disaggregated reforms

After having classified pension reforms as described in the previous section, we integrated the database by recoding pension reforms in line with their area of intervention, following the categorization proposed by Guidi and Guardiancich (2018). This led us to identify the 14 categories shown in Figure A4.

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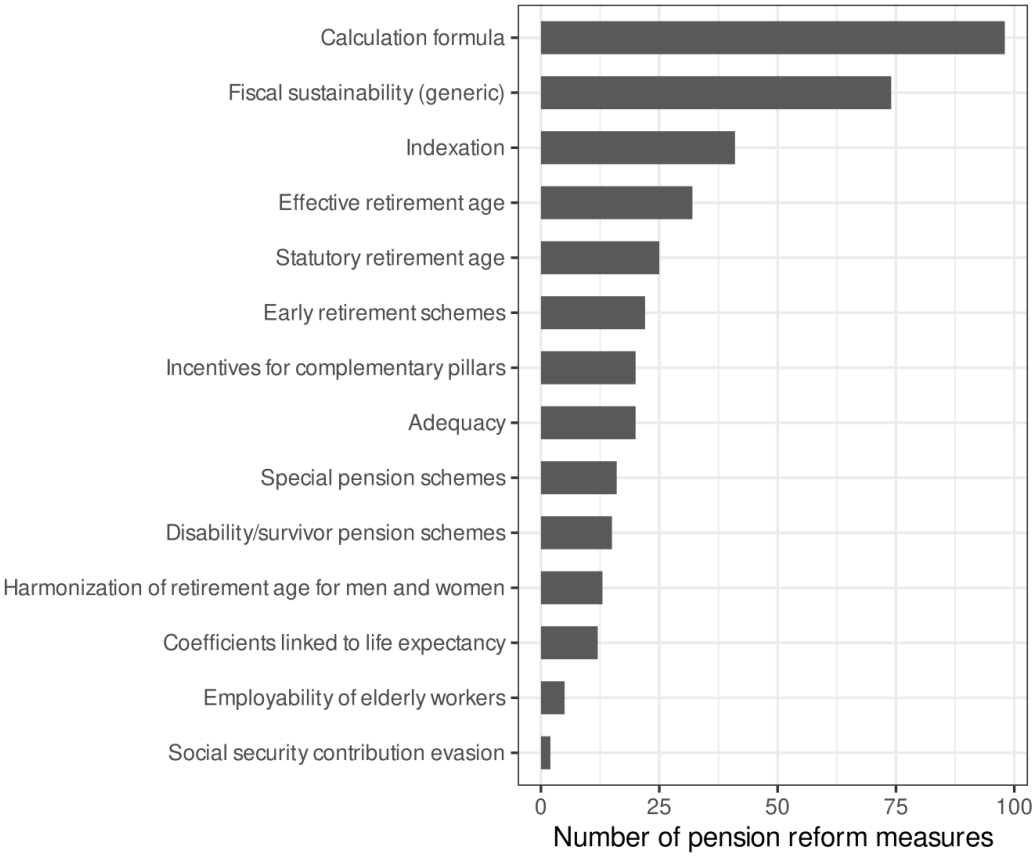

Figure A4: Marginal effect of current pension expenditure, for different numbers of pension policy recommendations in CSRs, on the balance of pension reforms, based on Model 4. The graph below the marginal effect ones show the probability distribution function of the explanatory variable above.