

# ESSAYS IN THE POLITICAL ECONOMY OF PENSION SYSTEMS

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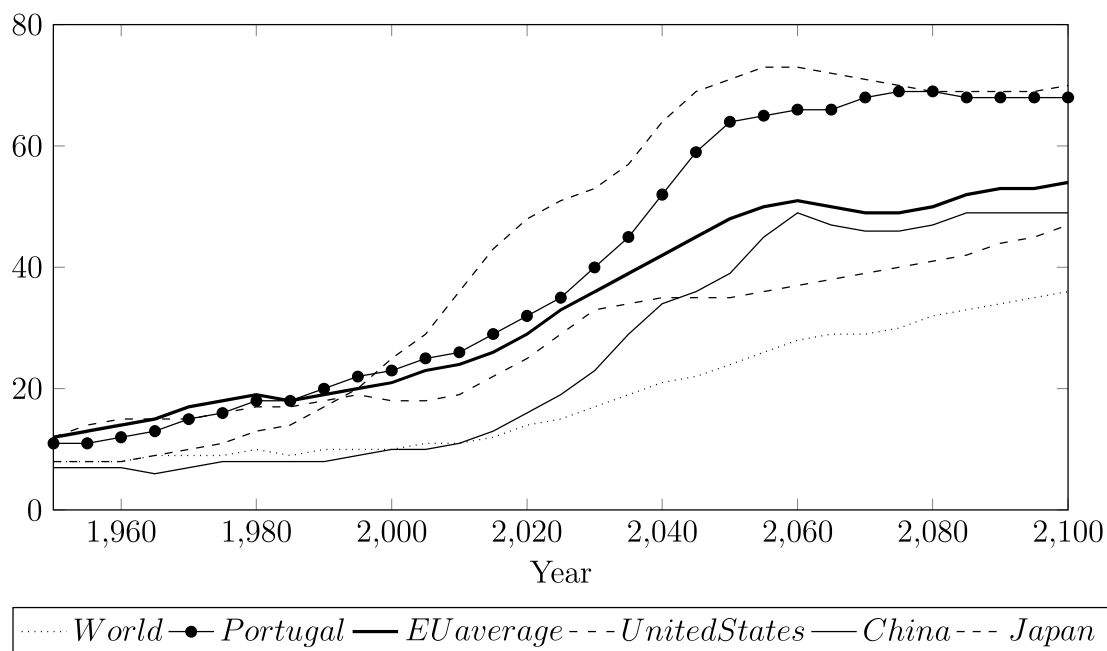
# Introduction

The improvements in life expectancy and the decrease in fertility rates challenge the long-term sustainability of pay-as-you-go public pension systems. According to the United Nations, in the next 30 years the average old-age dependency ratio in the European Union (EU) countries, i.e. the number of individuals with 65 years or more per 100 individuals aged 15 to 64 years old, is expected to double. Portugal is no exception and faces a particular acute increase in its projected old-age dependency ratio (see Figure 1). In case one wonders if projections of old-age dependency ratios are overestimations, it is instructive to look at projections made in the late 1980s: as shown in Galasso (2010), in 2007 some countries have already surpassed the estimated figures for 2020. Portugal is one of them.

A majority of EU countries have introduced reforms to increase the sustainability of their pension systems (European Commission, 2013). However, important challenges remain and there is the need for further reforms. In fact, in 2014 more than half of the EU Member States received recommendations from the European Commission to reform their pension systems, in order to ensure that they are sustainable while providing socially adequate pensions (European Commission, 2014). The so-called Country Specific Recommendations for Portugal included a call to develop a durable solution to ensure the medium-term sustainability of the pensions system (European Commission, 2014b).

Reforms of the pension systems are complex. They operate in the long-term horizon and, in particular in the context of highly integrated economies as those of the EU, create incentives that are sometimes not obvious. Also, these reforms usually face fierce opposition, as they entail immediate costs for a group of individuals while (uncertain) gains can only be seen in the longer-term, possibly only

Figure 1: Old age dependency ratio in selected countries and regions - long-term projections



Source: United Nations, Department of Economic and Social Affairs, Population Division 2013, World Population Prospects: The 2012 Revision

by future generations. Political feasibility is therefore a crucial challenge not only for the implementation of pension reforms but also to ensure that those already enacted are not reversed over time (as it was recently the case in Germany).

Our research aims at providing insights to policy makers for the successful conduct of the needed reforms. Our theoretical contribution (Chapters 1 and 2) focuses on the political economy of pension systems in a context of highly integrated economies. The empirical contribution (Chapter 3) provides evidence on the determinants of public support for pension reforms.

In the first Chapter, we study the challenges that cross-country labor mobility pose to the existence of national pension systems. This is particularly relevant in the EU context, where labor is allowed to move across Member States and where different models of pension systems coexist. In our contribution, we endogenize the pension system, through majority voting. Voters are non-myopic, in the sense that they fully take into account the implications of their voting decisions for labor mobility (in Chapter 2 we assess the impact of having less sophisticated voters).

We take into account redistribution across generations but also within generations (across income levels). In our setup, the countries are similar in all respects except in their degree of income redistribution. We focus on mobility of those with lower-skills, which represent the largest share of foreign born population (OECD, 2012).

Departing from a situation where, absent income redistribution and political economy effects, a pension system would never exist (i.e. market returns are above the returns of a non-income redistributive pension system), we show that mobility can ensure the necessary political support for the creation of a pension system in the less redistributive (Bismarckian) country, a result that, absent mobility, would never occur. In the more redistributive (Beveridgean) country, mobility does not necessarily undermine the political support for pensions but makes the conditions for this support more stringent. The Beveridgean country attracts the low-skilled of the other country but full migration only occurs if the market return is sufficiently low.

These possible changes in the support for the pension system, together with the effect of mobility, have an impact on the welfare of individuals in the different countries. Indeed, we show that while labor mobility is always politically sustainable in the non-redistributive country (as there is not a majority of voters harmed with the opening of the borders), its political sustainability is at stake in the country performing income redistribution through the pension system. The political sustainability of the opening of the borders would thus have to rest on possible compensatory measures to at least some of those who saw their welfare decreased with mobility.

In the second Chapter, we build on the analysis presented in Chapter 1, to highlight the relevance of voters foresight. Pension systems are very complex and mobility incentives are not easy to fully grasp, in particular as they also depend on the conditions in third countries. Thus, it may be reasonable to consider that voters are myopic, i.e. that they do not anticipate the impact of labor mobility. As expected, this may have important consequences for the existence of pensions in the different countries. In the Bismarckian, myopic voting eliminates the possibility of a pension system to be created, which would benefit the old individuals of the country and harm the young low-skilled. In the Beveridgean, myopic vot-

ing ensures that the pension system is never destroyed due to the possibility of mobility. This impacts migration flows, which would be eliminated with perfect foresight, and changes the welfare of the old and the young high-skilled individuals in the Beveridgean country, that would be, respectively, worse and better-off under perfect foresight voting.

The welfare analysis for the myopic voting setting also provides us another interesting insight - being a more sophisticated voter (i.e. non-myopic) is not welfare improving for the low-skilled young. However, the young high-skilled and the old can have welfare gains by promoting the literacy or illiteracy of the young low-skilled and, in this way, affect the voting outcome.

The comparison of the results in Chapters 1 and 2 highlight that the information taken into account by voters when deciding for their support to the pension system, either factual or perceived, is crucial to the final outcomes.

Beyond this comparison, Chapter 2 also allow us to generalize the degree of income redistribution of the countries considered. Instead of studying only a full Bismarckian and a full Beveridgean country, we also look at two countries, one more redistributive than the other, but both performing income redistribution. We show that countries offer pensions as long as they are sufficiently Beveridgean and as long as the returns from the market are sufficiently low. This implies that a central planner able to determine the degree of income redistribution in a country is able to affect the existence of the pension system. In particular, by increasing (decreasing) its redistributive nature it may ensure majority support for (against) the system. However, this ability is curbed when the returns of the market are sufficiently high, which ensures that there is always a majority against the system (irrespective of its redistributive nature).

In the third Chapter, we contribute to the literature aiming at better understanding the factors that determine public opinion support for reforms that increase the long-term sustainability of the pension system. The literature has shown the importance of the following factors: (i) self-interest, in the sense that individuals are less willing to support reforms that directly harm them; (ii) ideology, in particular along the right-wing/left-wing divide, with those on the left of the political spectrum being less keen to support a retrenchment of the pen-

sion system; and, finally, (iii) information about the pension system, with more informed individuals seeming more prone to support reforms. Priming effects, i.e. the possibility of influencing voting behavior by exposing individuals to certain ex-ante stimulus, have also been studied, suggesting that they indeed play a role in shaping individual support and public opinion outcomes. Examples span from the impact of media coverage on the outcome of elections to replies to opinion surveys being shaped by the order in which the issues are presented.

In this dissertation, we conduct two randomized control trials to test the role of information and the relevance of priming effects. We find evidence to support the argument that increasing the information levels of voters has important effects on their willingness to support reforms. In addition, our results also indicate that priming effects should not be neglected, in particular for those in the extremes of the political spectrum.

These contributions, which complement a vast number of studies on the political economy of pension systems, may allow more informed decisions by policy makers faced with the challenge of designing and successfully implementing the needed reforms retrenching national pension systems.

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# Chapter 1

## Impact of cross-country low-skilled labor mobility on asymmetric pension systems

### ABSTRACT

This paper analyzes the impact of international low-skilled labor mobility on the majority support for a pension system in individual countries and on the welfare of the different agents. The two countries differ in the amount of redistribution from the high to the low-skilled population embedded in their pay-as-you-go social security systems, whose size (tax rate) is decided by majority voting, anticipating the impact on mobility. We show that labor mobility can create the conditions for a majority to favor pensions in a Bismarckian country, due to the ageing of the population caused by the departure of the young mobile. In a Beveridgean country, mobility does not necessarily undermine the support for the system, but may make the conditions for its existence more stringent, even if no individual migrates in equilibrium. Finally, we show that while labor mobility is always politically sustainable in the non-redistributive country, its political feasibility is at stake in the country performing income redistribution through the pension system wherever the interest rate is not sufficiently large.

*JEL Classification:* H55, R23, D72, H73.

*Keywords:* Pension systems, Labor mobility, Fiscal competition, Political economy.

## 1.1 Introduction

Most pension systems and, more broadly, the welfare systems in European Union countries were introduced in the turn from the 19th to the 20th century and were consolidated in the 1950's, in a context where the integration of markets was just beginning. Today, at the European Union level, free mobility of goods, services, capital and labor is increasingly a reality. Nevertheless, despite the significant achievements so far, the European integration is still hampered by different national regulations, non-harmonized national taxation policies and national welfare systems.<sup>1</sup> Social security policy decisions remain a national responsibility and the most ambitious EU-wide initiatives entail a great degree of flexibility, like the so-called Open Method of Coordination.

This integration has important implications for national policies. In particular, when designing a national pension system with integrated markets, one must take into account not only the objectives and sustainability of the system (as with non-integrated markets), but also the incentives that the different national designs create in different markets, in particular the factors markets. Standard fiscal competition literature would advise that the relevant market of the tax base should determine the level of government at which the policy is set up. Asymmetric systems, size and redistribution-wise, may therefore impact the allocation of labor and impact the welfare of the agents and of countries in non-expected ways. Two questions then arise: is labor mobility empirically relevant in the EU context? And how different are the EU pension schemes?

On the first question, it is sometimes argued that despite the theoretical free mobility of labor, some barriers (like cultural differences, for example) are still dominant. According to European Commission (2013), net migration is the main driver of population growth in the EU-27. In fact, in 2011 the natural increase of the population contributed to only one-third of the population growth in the EU-27. In the same year, migrants from other EU countries represented 3,4% of the EU population, with the situation varying greatly from country to country (migration from countries outside the EU accounted for 6,6%). The relevance of the mobility

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<sup>1</sup>In addition to this, even the single currency or the Schengen convention are not applied uniformly across the European Union.

## CHAPTER 1. PENSION SYSTEMS - NON-MYOPIC VOTERS

of labor within EU countries is, therefore, non-negligible. However, migration entails both pecuniary and non-pecuniary costs (settling costs, being far from home, learning a new language). Thus, mobility induced from different welfare systems (in our case, the pension system) arises only if the potential benefits are significant. Wildasin (1997) estimated the net public pension wealth (negative for net contributors to the system and positive for net beneficiaries) for some EU countries and concluded that, for some particular combinations of origin and destination countries, the gains of moving from one country to the other may reach 25% of lifetime wealth. There is indeed evidence that welfare is one of the factors contributing to labor mobility (see, for instance Meyer, 2000 or Giorgi and Pellizzarib, 2009) and welfare-induced migration has been widely discussed by the public opinion in countries such as the UK or Germany.

On the second question, the European Union is indeed a good example of asymmetric pension systems. Even if one may speak of an European social model with distinctive features from the rest of the world (as discussed, for example, in Cousins (2005), pp. 239-241), we are far from a common European welfare state. The welfare states in the EU remain a national responsibility and, as we will see next, they differ substantially across countries, both in size and in level of redistribution.

In our analysis, we focus on public pensions given “the prominent role of the State in pension provision in the EU countries” (European Commission, 2015).

Table 1.1 displays the size of public pension systems, measured by the share of expenditure in the GDP. Public pensions have a significant weight on EU economies, surpassing 11% of GDP for the EU28. And the situation is quite diverse at country level: the country with the highest share (Greece) spends more than twice as much as the country with the lowest share (Netherlands).<sup>2</sup>

There are also important differences across countries regarding the redistributive nature of the public pension systems. A fully Beveridgean system provides a flat rate pension, whereas a fully Bismarckian system is purely earnings-related. In the EU, “in a few Member States, notably in Denmark, the Netherlands, Ireland

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<sup>2</sup>It should be noted that pensions are not only provided through public systems and thus the inclusion of private pension schemes, which are significant in some countries, may give a different picture.

CHAPTER 1. PENSION SYSTEMS - NON-MYOPIC VOTERS

Table 1.1: Public pensions expenditure as a share of GDP in 2013 - EU countries

Netherlands	6,9	Luxembourg	9,4	Slovenia	11,8
Lithuania	7,2	Cyprus	9,5	Spain	11,8
Ireland	7,4	Malta	9,6	Finland	12,9
Estonia	7,6	Bulgaria	9,9	Portugal	13,8
United Kingdom	7,7	Germany	10,0	Austria	13,9
Latvia	7,7	Denmark	10,3	France	14,9
Slovakia	8,1	Croatia	10,8	Italy	15,7
Romania	8,2	Poland	11,3	Greece	16,2
Sweden	8,9	Hungary	11,5	<b>EU28</b>	11,3
Czech Republic	9,0	Belgium	11,8	<b>Euro Area</b>	12,3

Source: European Commission (2015).

and the United Kingdom, the public pension system provides in the first instance a flat-rate pension, which can be supplemented by earnings-related private occupational pension schemes (in the UK, also by a public earnings-related pension scheme – State Second Pension – and in Ireland by an earnings-related pension scheme for public service employees).”<sup>3</sup> Table 1.2 shows that only five countries allow for the same replacement ratios for high and low earners (namely Germany, Hungary, Italy, Poland and Spain). In all the other countries presented, low earners have higher replacement ratios. In countries such as Ireland and Denmark the difference is as high as 50 percentage points.<sup>4</sup>

In terms of financing of the public pension system, pay-as-you-go (PAYG) is the most common approach (European Commission, 2015). In a PAYG setting, the mobility of labor entails different effects depending on the direction (emigration vs. immigration), skill composition and size of the migration flow.<sup>5</sup>

<sup>3</sup>European Commission (2015).

<sup>4</sup>Only in two countries, the Netherlands and Sweden, the inclusion of all mandatory schemes significantly reduces the differences between high and low earners. In Denmark, the difference increases. For all the other countries, there is no difference.

<sup>5</sup>The integration of capital markets is particularly interesting in a context where the financing of the systems differs from one country to the other, namely to study the interaction of PAYG and fully funded (FF) schemes. See, for example, Casarico (2000) for competing PAYG and FF systems or Pemberton (2000), for the analysis of the shift from PAYG to FF. Competing PAYG systems may also be studied in a context of integrated capital markets, as in Pemberton (1999).

## CHAPTER 1. PENSION SYSTEMS - NON-MYOPIC VOTERS

Table 1.2: Gross pension replacement rates in 2013 - difference between high and low earners - subset of EU countries

	<b>Public schemes</b>	<b>Total mandatory</b>		<b>Public schemes</b>	<b>Total mandatory</b>
Denmark	-50,0	-56,2	France	-17,3	-17,3
Ireland	-48,9	-48,9	Portugal	-13,4	-13,4
Netherlands	-39,4	-5,0	Slovak Republic	-10,8	-10,8
Czech Republic	-37,7	-37,7	Finland	-9,4	-9,4
United Kingdom	-32,7	-32,7	Austria	-2,6	-2,6
Greece	-28,7	-28,7	Germany	0,0	0,0
Belgium	-28,0	-28,0	Hungary	0,0	0,0
Slovenia	-25,3	-25,3	Italy	0,0	0,0
Luxembourg	-24,7	-24,7	Poland	0,0	0,0
Sweden	-22,9	-2,3	Spain	0,0	0,0
Estonia	-17,4	-17,4	<b>EU27</b>	-17,8	-16,0

Source: OECD (2013); OECD pension models; difference between replacement rates of two workers making, respectively, 150% and 50% of the average worker earnings; in percentage points (replacement rates are expressed in percentage of individual earnings).

## 1.2 Related literature

There is an extensive literature analyzing both intergenerational (across generations) and intragenerational redistribution (across income levels). An interesting example of the first is Homburg and Richter (1993) who propose an OLG model in a multi-jurisdiction setting with integrated markets. Households are homogeneous, ruling out redistribution across income levels, and the PAYG pension scheme is designed with exogenous and time invariant pension contributions (pension benefits adjust passively to ensure the balancing of the system). They conclude that only a centralized pension system is efficiency preserving. Breyer and Kolmar (2002) build on this work, showing that the harmonization of contributions is not only a necessary condition (as shown before by Homburg and Richter, 1993) but also a sufficient one to ensure efficiency. They further extend the model to allow for mobility costs, finding much more restrictive conditions for an efficient allocation of resources.

Cremer and Pestieau (1998) develop a static model of intragenerational re-

distribution, to study the political economy of social insurance, introducing the so-called *Bismarckian factor*. The type of social insurance, with Bismarckian and Beveridgean systems at the extremes, is chosen at a constitutional stage (*behind the veil of ignorance*) and the tax rate to finance the system is then decided through majority voting. They conclude that the type of mobility (poor vs. rich) plays an important role on the tax competition outcome. Furthermore, at the constitutional stage countries adopt more than optimal Bismarckian systems but these systems are not necessarily more tax competition proof. Cremer and Pestieau (2003) study the sustainability of Bismarckian and Beveridgean systems within an economic union when the low-skilled are mobile. They show that, in general, low-skilled move to the Beveridgean country. Only in a setting where the rich in the Bismarckian country do not participate in the system and the Beveridgean country offers no social insurance, it is possible that all poor households move to the Bismarckian country. In both papers, wages are fixed.<sup>6</sup>

Razin and Sadka (2000) and Kolmar (2007), building on the literature of static settings, develop dynamic models thereby combining inter and intragenerational redistribution. They work in a setting with fixed factor prices and exogenously given time invariant tax rates. In the first paper, migration is a one-time episode, of a given fixed amount. With fixed factor prices, the authors show that an inflow of low-skilled workers is beneficial for all skill levels and for young and old households. However, with flexible factor prices, the result does not necessarily hold for the young (through simulations, the authors show that the low-skilled young loose but the young high-skilled, in a large open economy setting and for certain parameters, may still gain). Kolmar (2007) extends the static analysis in Cremer and Pestieau (2003) to a dynamic setting, confirming the main results: under reasonable assumptions and parameters, low-skilled agents move to the Beveridgean country.<sup>7</sup>

With endogenous tax rates, the future pension depends on the unknown future tax rate and thus the households' budget constraint is ill-defined. Boldrin and Rustichini (2000) have shown the rather restrictive conditions needed to guar-

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<sup>6</sup>For a model without labor mobility, please refer, for instance, to Casamatta et al (2000a).

<sup>7</sup>For models without labor mobility, please refer, for instance, to Conde Ruiz and Profeta (2007) and Casamatta (2000b).

antee equilibrium in an OLG setting. To circumvent the problem, more applied contributions suppose that the future tax rate is either taken as given by the voters (Tabellini, 2000) or fixed forever (Casamatta et al, 2000b). Conde Ruiz and Profeta (2007), building on Conde Ruiz and Galasso (2003, 2005) show that the results of the one time voting can be generalised to a repeated game, with a system of punishment and rewards.

In this paper, we build on the dynamic models developed by Razin and Sadka (2000) and Kolmar (2007) and introduce a voting stage over the tax rate that finances the pension system. Also, we introduce non-myopic voters to this dynamic setting, i.e. voters that take into account the impact of their voting choice on mobility incentives.<sup>8</sup>

With this model we aim at answering two research questions. First, we want to understand the conditions under which the pension systems are politically sustainable and the impact of cross-country low-skilled labor mobility on these voting equilibria. Second, we want to assess the impact of mobility on the welfare of the different agents, allowing us to ascertain the conditions for free low-skilled labor mobility to be politically feasible.

The remainder of the paper is organized as follows. Section 1.3 presents the model. In Sections 1.4 and 1.5 we derive the migration and the voting equilibria and in Section 1.6 we assess the welfare impact of mobility. Finally, Section 1.7 concludes.

### 1.3 The model

We build an overlapping generations model with two small open economies, integrated in the world capital markets. The countries are symmetric except for the type of public pension system - one is Bismarckian, with pensions related to earnings, and the other is Beveridgean, providing flat pensions and performing income redistribution. The national public pension systems are endogeneized, with voters choosing the tax rate that finances it. As in Cremer and Pestieau (2003),

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<sup>8</sup>For a modelization of non-myopic voters in a static setting, please refer to Cremer and Pestieau (1998) and Epple and Romer (1991). Chapter 2 assesses how myopic voting affects the voting and mobility equilibria.

low-skilled labor is mobile.<sup>9</sup> Voters have perfect foresight, in the sense that they incorporate the mobility incentives in their voting decisions.

The timing of our model is as follows: first, agents vote on their preferred tax rate, which is chosen once and forever (as in Casamatta et al, 2000b); then, in the beginning of their working lives, mobile workers move to the country that ensures higher welfare;<sup>10</sup> finally, the young agents of each country work in their country of residence. If a pension system exists, they pay taxes that are used to finance the pensions of the old. The retirement benefit is paid by the country where the individual worked during the first period of life and where she paid her contributions.<sup>11</sup>

### 1.3.1 The Households

In each country ( $A$ , the Bismarckian, and  $B$ , the Beveridgean) there are two types of workers, the high ( $h$ ) and the low-skilled ( $l$ ). The autarchy ratio of young to old agents (henceforth the autarchy inverse dependency ratio) is given by the constant rate  $1 + n$ . In terms of voting coalitions, our demographic assumptions are that the young outvote the old ( $n > 0$ ) and that the young low-skilled plus the old outvote the young high-skilled.<sup>12</sup>

If the voter is indifferent across tax rates, she decides not to vote (implicitly assum-

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<sup>9</sup>As presented in OECD (2012), low-skilled workers represent, in general, the largest share of foreign-born population in the EU countries.

<sup>10</sup>We assume that agents vote before mobility, in their home country. This is in line with the current setting of the European Union, where voting is mainly linked to citizenship and migrants have limited voting rights. Migrants from other EU-countries are allowed to vote in local and European elections only. Even in the presence of voting rights, effective participation varies greatly among EU countries. Third-countries migrants (i.e. migrants from outside the EU) have even more restricted voting rights. In addition, the share of migrants acquiring citizenship in the EU (that entitle them to voting rights) is very limited. In 2009, it was less than 3%, ranging from 0,3% in Czech Republic to 5,8% in Portugal (Eurostat, 2011, p.247).

<sup>11</sup>This is in line with the current framework within the European Union (the residency principle, as opposed to the origin principle). This is also the reason why we can disregard mobility after retirement, since pensions will always be paid by the countries where the household worked. If we think of sources of heterogeneity between countries others than the pension schemes (different VAT rates, health system, climate), then the old may as well have incentives to move.

<sup>12</sup>These assumptions are in line with Eurostat data: for the EU28, in 2014 the high-skilled, i.e. those with a least tertiary education, represent only 26% of the working age population (aged 15 to 64); also, there are around 28 people aged 65 or more for each 100 working age agents.

ing that there is an infinitesimal cost of casting a vote). Households can also vote with their feet, by moving to the other country in the beginning of their working lives. We assume that, when indifferent, they do not migrate. We follow Cremer and Pestieau (2003) and assume that only low-skilled workers are mobile.<sup>13</sup>

The households live for two periods. When young (period 1) they work (supplying inelastically one unit of labor), contribute to the pension system and save or borrow; when old (period 2) they retire, receive a pension benefit and consume (pay) their savings (loans), plus interest.<sup>14</sup>

The households' lifetime utility is given by:<sup>15</sup>

$$U_t^i = \ln(c_t^i) + \beta \ln(d_{t+1}^i), \quad i = h, l \quad (1.1)$$

where  $c$  and  $d$  denote, respectively, consumption in the first and second periods of life and  $\beta$  represents the intertemporal discount factor. For tractability reasons, we will assume that  $\beta = 1$ .

The household budget constraints are given by:

$$c_t^i = w_t^i(1 - \tau) - s_t^i, \quad i = h, l \quad (1.2)$$

$$d_{t+1}^i = s_t^i R_{t+1} + p_{t+1}^i, \quad i = h, l \quad (1.3)$$

where  $w$  represents the wage (there are different wages for the different skill levels),  $R$  the market return,  $s$  are savings,  $\tau$  is the tax rate paid by the young to finance the pension system and  $p$  is the pension received upon retirement by the old.

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<sup>13</sup>Other options may be found in the literature: for example, Cremer and Pestieau (1998) analyze both types of mobility separately in a static framework with fixed wages, while Kolmar (2007) considers mobility of high and low-skilled simultaneously with fixed factor prices and exogenous tax rate.

<sup>14</sup>In order to isolate the effects of pension schemes, distortions coming from the labor-leisure choice are assumed away.

<sup>15</sup>For simplicity of notation we henceforth omit the country index. We will return to the country indexes wherever interpretation is not straightforward.

### 1.3.2 The Firms

Firms are perfectly competitive and produce a single homogeneous good according to a common, time invariant constant returns to scale (CRS) production function that uses both capital and labor,  $F(K_t, L_t)$ , respecting the Inada conditions. Labor in each country is measured in efficiency units:

$$L_t = aN_t^h + N_t^l, \quad a > 1 \quad (1.4)$$

where  $a$  denotes the productivity of the high-skilled (henceforth, the “skill premium”), common to both countries, and  $N_t^l$  and  $N_t^h$  represent the low and high-skilled population, respectively. For future reference  $\theta_t$  represents the ratio of low- to high-skilled agents. In particular,  $\theta_t^a$  stands for the autharchy ratio,  $\theta_t^m$  represents the migration equilibrium fraction of low- to high- skilled agents and  $\bar{\theta}_t$  reflects the maximum  $\theta$ , i.e. a situation where all low-skilled moved to one country.

Profit maximization implies that marginal productivities match factor prices, namely the internationally given interest rate  $R$  and the wage level,  $w$ . Notice that  $aw^l = w^h$ . We can omit the time subscript as with two small open economies with CRS, the Capital-Labor ratio  $K/L$  remains constant. This also means that mobility has no impact on productive efficiency and we are able to focus solely on redistributive motives for mobility.

### 1.3.3 The Government

In each country, the government provides pensions to the old households that worked in the country financed by the contributions of the young residents (the so-called Pay-As-You-Go system). Country  $A$  is purely Bismarckian, providing earnings related pensions, whereas country  $B$  is purely Beveridgean, providing a flat pension, equal across income levels. The pension level that guarantees a balanced government budget (i.e. total contributions in a given period match total pensions paid in that same period) is:

$$p_{t+1}^{A,i} = \tau w^i \frac{L_{t+1}}{L_t}, \quad i = h, l. \quad (1.5)$$

$$p_{t+1}^B = \tau \bar{w}_{t+1} \frac{N_{t+1}}{N_t} \quad (1.6)$$

where  $\bar{w}$  represents the average wage:

$$\bar{w}_{t+1} = \frac{N_{t+1}^h w^h + N_{t+1}^l w^l}{N_{t+1}} = w^l \frac{L_{t+1}}{N_{t+1}} \quad (1.7)$$

and  $N_t = N_t^h + N_t^l$ .

The tax rate  $\tau$  determines the size of the pension system: the larger the tax rate, the bigger the system. In addition to the tax rate, pensions in both countries increase with the inverse dependency ratio (which is affected by mobility). They are also affected by the wage level: in the Bismarckian country pensions increase with the individual wage level (hence, for the high-skilled, with the skill premium  $a$ ) while in the Beveridgean country the pension increases with the average wage (which increases with the wage level and the skill premium and decreases the higher the proportion of low-skilled). We implicitly assume that any adjustments to the pension system to ensure its sustainability (i.e. that the system is balanced) are accommodated on the benefit side (the pension level) and not on the contribution side (given that the tax rate is fixed).<sup>16</sup>

Throughout the paper we make the conservative assumption that  $R > 1 + n$ . This ensures that, absent redistribution and political economy motives, pension

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<sup>16</sup>An alternative to formulation (1.5), which still ensures a balanced government budget, is to consider that the different types of workers (high- and low-skilled) contribute to separate systems:

$$p_{t+1}^{A,i} = \tau w^i \frac{N_{t+1}^i}{N_t^i}, \quad i = h, l. \quad (1.8)$$

This does not seem to be the case in most systems and, thus, we focus on the formulation given by (1.5).

systems would not exist.

### 1.3.4 Voting with immobile labor

As a benchmark, we present the voting decisions when labor is immobile. The motivations of the voters are useful to understand what happens when mobility is introduced.

In order to find the voting equilibrium, we turn to the households maximization problem. In period  $t$ , the representative household maximizes lifetime utility (1.1), subject to the budget constraints (1.2) and (1.3) and, also, subject to the pension offered in her country, (1.5) or (1.6). As stated before, voters are non-myopic in the sense that they take into account migration incentives in their voting decisions.

When labor is not mobile,  $\frac{N_{t+1}}{N_t}$  and  $\frac{L_{t+1}}{L_t}$  are both equal to the inverse autarchy ratio of young to old agents  $(1 + n)$ , the autarchy dependency ratio. Old agents always favor the largest possible system as they are not subject to the pension contribution tax.

Turning to the young generation, it is immediate that having a pension system is never a good deal, except if redistribution across incomes compensates the returns differential. This can only happen for low-skilled in the Beveridgean country when:

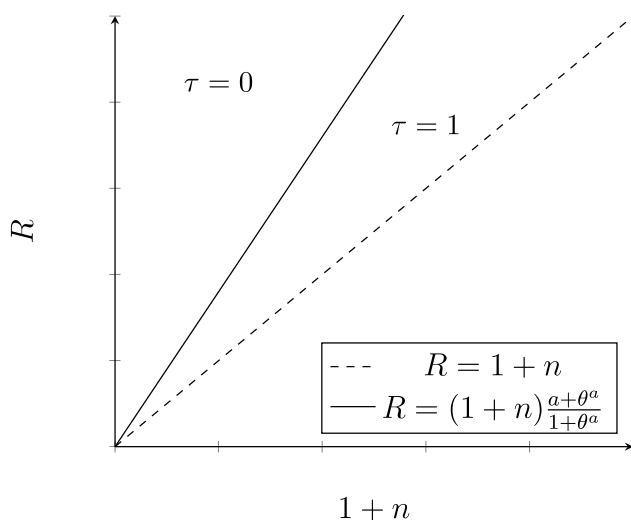
$$\frac{\bar{w}_{t+1}}{w^i}(1 + n) > R \tag{1.9}$$

Which can be re-written as:

$$R < (1 + n) \frac{a + \theta^a_{t+1}}{1 + \theta^a_{t+1}} \tag{1.10}$$

where  $\theta^a_{t+1}$  represents the autharchy ration of low to high-skilled agents. Figure 1.1 displays the voting decisions of young low-skilled in the Beveridgean country. The higher the skill premium and the lower the ratio of low- to high-skilled households, the more likely it is for the young low-skilled to support the system (the

Figure 1.1: Voting of the young low-skilled in the Beveridgean country without labor mobility



solid black line rotates to the left). This happens because the gains from redistribution also increase. Condition (1.10) is sufficient to ensure a pension system in the Beveridgean country: the young high-skilled, that vote against the system, are outvoted by the young low-skilled plus the old.

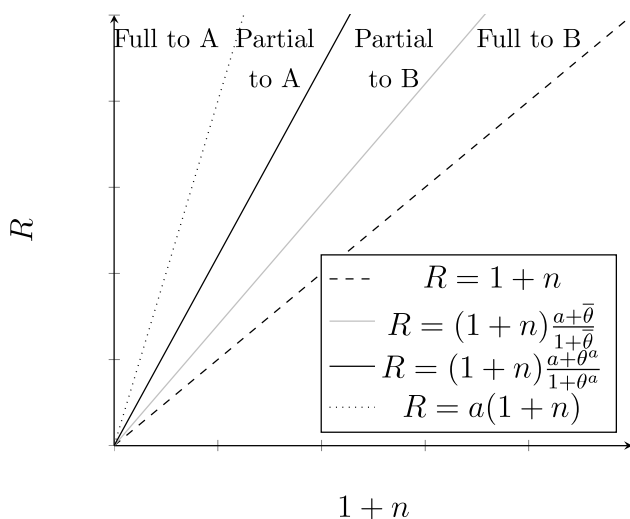
In a nutshell, in the absence of labor mobility, the Bismarckian country never provides pensions. The Beveridgean country has a pension system if and only if the gains from income redistribution for the young low-skilled are sufficiently high.

For future reference, let us discuss which country better suits the different agents. First, note that if there are no pension systems, the countries are equal in all respects and thus the utility of each agent type is the same across countries. If the Beveridgean offers a pension system, then the old are better-off in that country as they see their utility increased. For the young, it depends on their net contribution to income redistribution: the young low-skilled fare better in the Beveridgean whereas young high-skilled have higher utility in the Bismarckian.

## 1.4 Mobility equilibrium

We now consider that the low-skilled can freely move between the two countries. It turns out that, when the Beveridgean adopts a pension system, the low-skilled may

Figure 1.2: Mobility equilibria: direction and size of migration of low-skilled young when the Beveridgean offers a pension system



migrate to the Bismarckian country (if the Beveridgean does not offer a pension system, there is no mobility as there is no system in either country). This is summarized in Proposition propmobaux.

**Proposition 1.4.1** (Mobility equilibrium when the Beveridgean offers a pension system - exogenous pension size). *Consider two small open economies, a Bismarckian and a Beveridgean country. When the size of the pension system is exogenous, low-skilled may flow in either direction. There is migration from the Beveridgean to the Bismarckian when income redistribution is too low to compensate for the low market returns, i.e.  $R > (1+n)^{\frac{a+\theta^a}{1+\theta^a}}$ .*

The mobility equilibria are presented in Figure 1.2.<sup>17</sup>

The mobility equilibrium depends on four parameters: the skill premium,  $a$ , that, together with the ratio of low- to high-skilled agents  $\theta$ , determines the degree of redistribution across income levels; the inverse autarchy dependency ratio  $1+n$ , that determines the redistribution across generations. Note that the higher or lower number of contributors to the system due to mobility only affects the current

<sup>17</sup>Please note that the number of low-skilled cannot be negative (zero is the lower-bound, which implies that all young low-skilled moved out of the country) nor can migration exceed the sum of the total number of agents of that skill-type in the two countries (which occurs when all low-skilled move to the country), i.e.  $0 \leq \frac{R-a(1+n)}{1+n-R} \leq \bar{\theta}^B$ , where  $\bar{\theta}^B = \frac{N^{A+B,l}}{N^{B,h}}$ .

generation of pensioners; by the time the current young retire, the dependency ratio is back to its natural level. And, finally, the international interest rate ( $R$ ) that represents the returns on market investments.

Given that there are no pensions in the Bismarckian country and that  $R > 1+n$ , if the Beveridgean country offers a pension system then the young low-skilled move to the Bismarckian country as long as income redistribution is too low to compensate for the low market returns. Conversely, for sufficiently high income redistribution compensating for the lower market returns, the young agents move to the Beveridgean country. When redistribution is sufficiently high (respectively, low), all low-skilled live in the Beveridgean country (respectively, Bismarckian country).

To arrive to these results, we have to first assess what happens in the Bismarckian country, where the voting decision of the young is not affected by mobility. In fact, the way mobility affects the young agents is through its effect on the average wage. In that country, the average wage does not play any role and, therefore, for young agents the preferred tax rate is  $\tau = 0$ .<sup>18</sup> For old agents, the preferred tax rate depends on mobility, which determined the number of contributors to the system. However, as long as there is no full migration to the Beveridgean country, the young still form a majority and there is no pension system in the Bismarckian. The exception is when all the young low-skilled of the Bismarckian move to the Beveridgean - we discuss this case later.<sup>19</sup>

For the moment, let us assume that the Bismarckian country does not have a pension system and find the equilibria in the Beveridgean country. A mobile agent compares the utility she may get in the two countries. In the Bismarckian country, utility is given by:

$$U_t^{A,l} = \ln\left(w^l \frac{1}{2}\right) + \ln\left(w^l R \frac{1}{2}\right) \quad (1.11)$$

where we have used the optimal saving decision.

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<sup>18</sup>Recall that  $R > 1 + n$ .

<sup>19</sup>These mobile workers are indifferent about the tax rate of their origin country and thus do not cast a vote. In this context, the majority coalitions may change. Whenever this is true, we discuss the conditions for a new equilibrium in the Bismarckian country.

Utility in the Beveridgean country can be written as:

$$U_t^{B,l} = \ln(w^l(1 - \tau^B) - s_t^{B,l}) + \ln(s_t^{B,l}R + \tau^B \bar{w}_t(1 + n)) \quad (1.12)$$

where, from the first order conditions of the household maximization problem, savings are given by:

$$s_t^{B,l} = w^l \frac{R(1 - \tau^B) - \tau^B \frac{L_t^B}{N_t^B}(1 + n)}{2R} \quad (1.13)$$

If the pre-mobility utility in the Bismarckian is larger (smaller) than in the Beveridgean, then low-skilled agents move to the Bismarckian (Beveridgean). In equilibrium, utilities in both countries are equalized, unless all low-skilled agents locate in one of the countries.

An interior migration equilibrium is given by the equalization of utility levels as given by (1.11) and (1.12):

$$N_t^{B,l} = N_t^{B,h} \frac{R - a(1 + n)}{1 + n - R} \quad (1.14)$$

or

$$\theta_t^{B,m} = \frac{R - a(1 + n)}{1 + n - R} \quad (1.15)$$

where  $\theta^m$  represents the equilibrium fraction of low- to high- skilled agents. Expressions (1.14) and (1.15) define an interior equilibrium, which arises when:

$$R \in \left[ (1 + n) \frac{a + \bar{\theta}}{1 + \bar{\theta}}, (1 + n) \frac{a + \theta^a}{1 + \theta^a} \right] \quad (1.16)$$

If  $R$  is below the lower bound, all low-skilled move to the Beveridgean country. If  $R$  exceeds the upper bound then all low-skilled migrate to the Bismarckian.

## 1.5 Voting equilibrium

In this section we show that three voting scenarios may arise when labor is mobile: no pension system in either country; a pension system only in the Beveridgean; or a pension system in both countries, the latter an outcome which was not possible in the no mobility case. These results are summarized in Proposition 1.5.1.

**Proposition 1.5.1** (Impact of mobility on voting). *Consider two small open economies, a Bismarckian and a Beveridgean country, with endogenous tax rates and non-myopic voters. Mobility changes the size of the pension system. In particular, wherever  $R < (1+n)\frac{\alpha+\bar{\theta}}{1+\bar{\theta}}$  and the old outvote the young high-skilled, mobility allows for the creation of a pension system in the Bismarckian country (which would not exist with immobile labor); wherever  $(1+n)\frac{\alpha+\bar{\theta}}{1+\bar{\theta}} < R < (1+n)\frac{\alpha+\theta^a}{1+\theta^a}$  and the young high-skilled outvote the old, mobility implies that there is no pension system in the Beveridgean country (which would exist with immobile labor). This result holds even though, under these conditions, no mobility occurs in equilibrium.*

For the Bismarckian country, only with labor mobility can a pension system exist. In the Beveridgean country, labor mobility makes the conditions for the existence of the system (weakly) more stringent. It is interesting to note that mobility may have an impact on the existence of the pension system even for those cases where households choose not to migrate. Under the conditions of Proposition ??, the tax rate in the Beveridgean country changes from  $\tau = 1$  to  $\tau = 0$  because the threat of an inflow of low-skilled from the Bismarckian to the Beveridgean in case of  $\tau > 0$  makes the young low-skilled of the Beveridgean indifferent across all possible tax rates (as  $\tau = 0$  with no mobility provides them the same utility as any other  $\tau > 0$  with inflow mobility) and thus they have no incentive to cast a vote.

The results of the mobility equilibrium with endogenous pension size are summarized in Proposition 1.5.2 and can be directly derived from Proposition 1.4.1 together with the outcome of the voting equilibrium discussed above.

**Proposition 1.5.2** (Mobility equilibrium with endogenous pension size)). *Consider two small open economies, a Bismarckian and a Beveridgean country, with*

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*endogenous tax rates and non-myopic voters. If  $R$  is sufficiently high,  $R > (1+n)\frac{a+\theta^a}{1+\theta^a}$ , there is no pension system in the Beveridgean country and no mobility occurs. If  $R$  is not sufficiently high, low-skilled move to the Beveridgean country.*

To arrive to the conclusions presented in Proposition 1.5.1, we first determine the voting equilibria in the Beveridgean country using (1.14) and the results of the mobility analysis of the previous subsection. Note that mobility does not depend on the tax rate - as long as it is positive, the incentives to move depend solely on the possible gains from income redistribution. Thus, old agents vote for the maximum tax rate ( $\tau = 1$ ) and young high-skilled agents vote for no pension system ( $\tau = 0$ ), as they do in closed economy. For the low-skilled, there are three possible outcomes (summarized in Figure 1.3).

When low-skilled agents have an incentive to move to the Bismarckian country if the tax rate in their home country is positive, they always prefer to stay and vote for  $\tau = 0$ . This yields the same final utility as if they would move. Thus, there is no pension system in the Beveridgean country, as the young outvote the old.

If the migration equilibrium is interior, the young low-skilled of the Beveridgean are indifferent amongst tax rates in their country since they are not affected by it (their final utility is the utility of the other country, which does not change with mobility) and thus they have no incentive to cast their vote. The voting outcome depends on the relative number of young high-skilled and old: if the young high-skilled outvote the old there is no pension system; otherwise, it is  $\tau = 1$ .

Finally, if the migration equilibrium is a corner solution with full migration to the Beveridgean country, young low-skilled agents of the Beveridgean are not indifferent between tax rates as they stay in their home country. This happens when redistribution is sufficiently high; hence, they vote for  $\tau = 1$ . If the Beveridgean offers pensions, there is full mobility from the Bismarckian to the Beveridgean country. Young low-skilled from the Bismarckian do not vote, as they get the utility of the other country. In that case, the voting equilibria in the Bismarckian country remains unchanged (i.e. no pension system) if and only if the young high-skilled of that country outvote the old. If, conversely, the old outvote the young high-skilled, then the tax rate  $\tau = 1$  constitutes the new equilibrium in the

country. Do the young low-skilled agents still want to move to the Beveridgean, in case the Bismarckian offers a pension system? The answer is yes - if they would all move in their best case scenario (i.e. a tax rate equal to zero), the result is only reinforced with the new tax rate. In the Beveridgean country, this new voting equilibrium has no impact as the only thing that matters is that all young low-skilled move to the country if there is a pension system in the Beveridgean (and the final utility is higher than in the other country). Given that those in favor of the system form a majority (young low-skilled plus the old), the voting outcome in the Beveridgean is  $\tau = 1$  (and there is full mobility to the Beveridgean).

Figure 1.3: Voting of the young low-skilled in the Beveridgean country with labor mobility

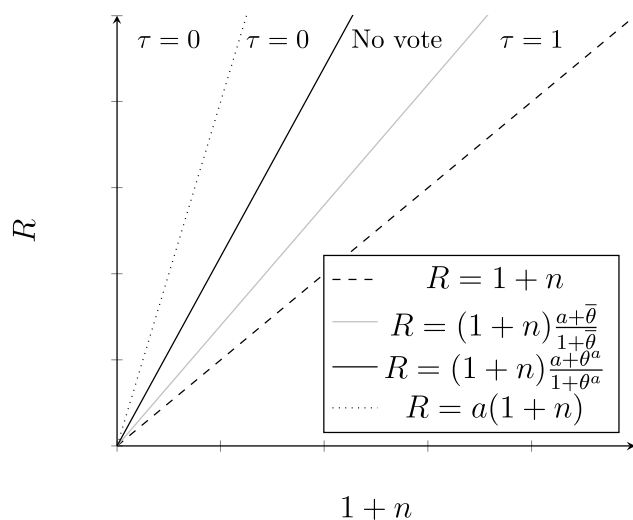
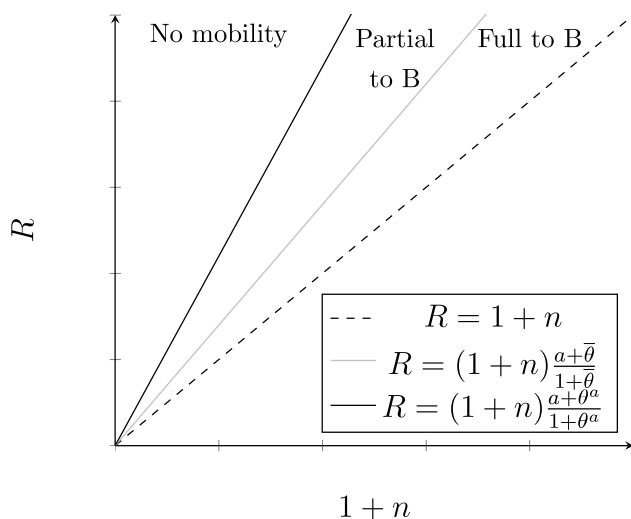


Figure 1.2 can now be updated with the voting results discussed above. As summarized in Figure 1.4, a pension system never exists in the Beveridgean country when the return of the market is sufficiently high ( $R > (1+n)^{\frac{a+\theta^a}{1+\theta^a}}$ ) and, therefore, no mobility will take place. Endogeneizing the pension system thus implies that, where mobility occurs, the flow goes from the Bismarckian to the Beveridgean country.

Putting together the results of Propositions 1.5.1 and 1.5.2, one sees that even when there is no mobility in equilibrium, the pension system may disappear in the Beveridgean country. In addition, in the Bismarckian country, a pension system can only exist if the country becomes older, by having all the mobile young leaving

Figure 1.4: Mobility equilibria with endogenous pension size: direction and size of migration of low-skilled young



to the Beveridgean.

## 1.6 Welfare analysis

Finally, we assess the welfare associated with the different voting and mobility equilibria studied above.

### 1.6.1 Which country better suits the different agents?

We start with a comparison of the level of welfare obtained by the different types of agents. Are the agents of one country better-off than the agents of the other country?

Mobility ensures that all the young low-skilled agents enjoy the same utility.<sup>20</sup> The interesting question relates to the relative welfare of the young high-skilled and the old. Table 1.3 summarizes the results.

Without a pension system in the two countries, the utility levels are equal across

<sup>20</sup>This happens because they either all locate in the same country or they get the same utility in both countries, the latter because they equalize cross-country utility levels by moving or because neither country offers a pension system.

countries. If only the Beveridgean adopts a pension system, the young high-skilled of that country are always worse-off than their counterparts in the Bismarckian country that do not have to pay for income redistribution. Concerning old agents, the old of the country with pensions are better-off than the ones in the country that does not provide pensions, where they get no old-age benefit.

If the two countries adopt a pension system, there is full mobility to the Beveridgean. As before, the young high-skilled are better-off in the Bismarckian country, without income redistribution. Conversely, the old low-skilled of the Beveridgean are better-off than their counterparts in the Bismarckian as they have a pension based on the average wage (and not on their type wage) and have more contributors to the system (all low-skilled moved to the Beveridgean). Finally, the comparison between the utility of a old high-skilled depends on the trade-off between number of contributors and pensionable wage - for a large enough skill premium, the pensionable wage effect dominates; if the skill premium is not large enough, the number of contributors effect dominates.

### 1.6.2 Political feasibility of cross-country labor mobility

Finally, we assess the impact of labor mobility on the welfare of the natives of the different countries: who are the winners and the losers of opening the borders to low-skilled labor? The goal in this section is to understand the conditions for mobility to be politically feasible, i.e. when a majority of agents is not harmed with the low-skilled worker flows (as it would undermine the necessary political support). The question of the impact of low-skilled migration has been widely debated in the context of the EU, with some countries assessing the possibility of closing their borders to other EU countries or at least to increase migration restrictions, thus departing from the concept of free labor mobility in the EU.

Our results are summarized in Proposition 1.6.1.

**Proposition 1.6.1** (Impact of mobility on welfare). *Consider two small open economies, a Bismarckian and a Beveridgean country, with endogenous tax rates and non-myopic voters. Then, wherever  $R < (1 + n) \frac{\alpha + \theta^\alpha}{1 + \theta^\alpha}$ , there is always a majority in the Beveridgean country against cross-country low-skilled labor mobility.*

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*In the Bismarckian country there is never a majority against cross country low-skilled labor mobility. Furthermore, wherever  $R < (1+n)\frac{\alpha+\bar{\theta}}{1+\bar{\theta}}$ , those benefited from mobility outvote those against it.*

For young agents, mobility affects two critical factors. The first is the size of the relevant pension system. The relevant pension system is the home country for those that do not move and the host country for those that move. The tax rate to which the agents are subject may change because the agents move to a country with a different tax rate but also because mobility changes the voting equilibrium. The second factor is the pensionable wage of the Beveridgean country. In that country, the pensionable wage is the average wage, which depends on the relative number of low and high-skilled agents working in the country.

For old agents, in addition to the two factors already mentioned for the young population, there is a third critical factor, namely the flow of migrants, which impacts the ratio of contributors to beneficiaries. This is irrelevant for the young, as migration occurs when they are young; their children are the ones who pay for their pensions and thus all that matters for them in this respect is the natural inverse dependency ratio,  $1+n$ .

Table 1.4 summarizes the results. In a nutshell, cross-country low-skilled labor mobility is always politically feasible in the Bismarckian country as there is never a majority of native harmed with mobility. Only when the interest rate is sufficiently low, there is a welfare impact for some groups of agents and this impact is, in general, positive. The only exception occurs when the old outvote the young high-skilled and a pension system emerges in the country, harming the young high-skilled (which nevertheless do not form a majority). This implies that, in the Bismarckian country, not only there is never a majority harmed with mobility but, when  $R$  is sufficiently low, those that benefit from mobility outvote those that are harmed by it.

In the Beveridgean country, except for the cases where the interest rate is sufficiently large (and thus the voting equilibrium of the immobile labor setting with no pension system in both countries is sustained), there is always a welfare impact for the different groups of agents. For the cases where there is an inflow from the Bismarckian country, old agents are better-off while young agents see their

welfare being reduced. But, as explained before, for mobility to have an impact on the pension systems and on welfare, it does not necessarily have to occur. Even for those cases where there are no incentives for labor to move, free labor mobility may have welfare consequences if it brings the tax rate in the Beveridgean country to zero. This is harmful for all agents except the young high-skilled (that nevertheless do not form a majority), which are better-off without the system.<sup>21</sup>

One can then conclude that, in the Beveridgean country, cross-country low-skilled labor mobility is harmful for a majority of the population if  $R$  is not sufficiently large, implying that there is an inflow of low-skilled to the country or that the existence of the system in the country is jeopardized, going from a positive tax rate to a zero tax rate. Under these conditions, labor mobility can only be politically feasible if appropriate compensatory measures are devised.

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<sup>21</sup>Recall that the change from  $\tau = 1$  to  $\tau = 0$  happens because the threat of an inflow of low-skilled from the Bismarckian to the Beveridgean in case of  $\tau > 0$  makes the young low-skilled of the Beveridgean indifferent across all possible tax rates (as  $\tau = 0$  with no mobility provides them the same utility as any other  $\tau > 0$  with inflow mobility) and thus they have no incentive to cast a vote.

Table 1.3: Welfare comparison - mobile labor

	Voting (closed $\Rightarrow$ open)	Majorities	Mobility	Young high-skilled	Old low-skilled	Old high-skilled
$R < (1+n) \frac{a+\hat{a}}{1+\theta}$	$(0,1) \Rightarrow (1,1)$	$h < o$	To B (corner)	$U^A > U^B$	$U^A < U^B$	$U^A > U^B$ for $a > \hat{a}$ $U^A < U^B$ for $a < \hat{a}$
$(1+n) \frac{a+\hat{a}}{1+\theta} < R < (1+n) \frac{a+\theta^a}{1+\theta}$	$(0,1) \Rightarrow (0,1)$	$h > o$	To B (corner)	$U^A > U^B$	$U^A < U^B$	$U^A < U^B$
$R > (1+n) \frac{a+\theta^a}{1+\theta}$	$(0,1) \Rightarrow (0,1)$	$h < o$	To B (interior)	$U^A > U^B$	$U^A < U^B$	$U^A < U^B$
	$(0,1) \Rightarrow (0,0)$	$h > o$	None	$U^A = U^B$	$U^A = U^B$	$U^A = U^B$
	$(0,0) \Rightarrow (0,0)$		None	$U^A = U^B$	$U^A = U^B$	$U^A = U^B$

Notes:  $\hat{a} = \frac{3}{2} + \frac{1}{2} * \sqrt{9 + 8\theta^a}$

Table 1.4: Impact of mobility in the utility levels of the native of the Bismarckian and Beveridgean countries

	Voting (closed $\Rightarrow$ open)	Majorities	Mobility	Bismarckian country			Beveridgean country			Bis. country Majority harmed?	Bev. country Majority harmed?
				Young $U^t$	Old $U^h$	Old $U^t$	Young $U^t$	Old $U^h$	Old $U^t$		
$R < (1+n) \frac{a+\hat{a}}{1+\theta}$	$(0,1) \Rightarrow (1,1)$	$h < o$	To B (corner)	+	+	+	-	+	+	NO	YES
	$(0,1) \Rightarrow (0,1)$	$h > o$	To B (corner)	+	=	=	-	-	+	NO	YES
$(1+n) \frac{a+\hat{a}}{1+\theta} < R < (1+n) \frac{a+\theta^a}{1+\theta}$	$(0,1) \Rightarrow (0,1)$	$h < o$	To B (interior)	=	=	=	-	+	+	NO	YES
	$(0,1) \Rightarrow (0,0)$	$h > o$	None	=	=	=	-	-	-	NO	YES
$R > (1+n) \frac{a+\theta^a}{1+\theta}$	$(0,0) \Rightarrow (0,0)$		None	=	=	=	=	=	=	NO	NO

Notes: = means that the utility is the same with or without labor mobility; + means that utility is higher with labor mobility; and - means that utility is lower with labor mobility. o - number of old voters; h - number of young high-skilled voters.

## 1.7 Concluding remarks

We assess the consequences of decentralized asymmetric pension systems in a context of partial labor mobility. We show the conditions for a pension system to arise, as a function of the market returns and of inter- and intragenerational redistribution and, also, of the structure of the population (skill level and age). With non-myopic voters, the voting equilibrium may change with the possibility of mobility: in fact, the system may be created in the Bismarckian country, as the ageing of the population caused by the departure of the young mobile may create a majority in favor of pensions. Also, pensions may be destroyed in the Beveridgean country, as the conditions for its existence become more stringent. In this case, it is interesting to note that mobility changes the voting equilibrium even though no migration actually occurs.

In the cases where at least one of the countries adopts a pension system, young low-skilled workers migrate to the most generous country (i.e. the country with higher income redistribution) but we do not necessarily have a corner solution, with all low-skilled young in the Beveridgean. This only happens if the potential gains from income redistribution are sufficiently high.

When the interest rate is sufficiently low, the Beveridgean (but not the Bismarckian) has a majority harmed by mobility. Thus, labor mobility can only be politically sustainable if appropriate compensatory measures are devised.

Some of our assumptions are important to the results achieved. We assume that the intergenerational redistribution is (contrary to the intragenerational redistribution) equal in both countries, since the autarchy dependency ratio is the same. Also, this autarchy dependency ratio is equal for low and high-skilled agents. The introduction of asymmetric natural growth rates across countries and across skill types would lead to more intricate incentives concerning voting and mobility decisions. Another important assumption concerns the production technology. The substitutability between both types of labor, low and high-skilled, has important welfare implications due to the positive relation between the wage levels. The type of mobility is also relevant to the results since, in our setting, only the agents that benefit from intragenerational redistribution are allowed to migrate. We could also explore the possibility of compensations across agents and/or countries.

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## Chapter 2

# Impact of cross-country low-skilled labor mobility on asymmetric pension systems - myopic voters

### ABSTRACT

This paper assesses the impact of myopic voting on the majority support for a pension system and on the associated cross-country mobility equilibria, in a model with international low-skilled labor mobility. The two countries considered differ in the amount of redistribution from the high to the low-skilled population embedded in their pay-as-you-go social security systems, whose size (tax rate) is decided by majority voting, not anticipating the impact on mobility. In the Bismarckian country, myopic voting has no impact of the mobility outcome but eliminates the possibility of a pension system to be created, which would benefit the old of the country and harm the young high-skilled. In the Beveridgean country, myopic voting ensures that the system is never destroyed due to the possibility of mobility. This impacts migration flows, which would be eliminated with perfect foresight, and changes the welfare of the old and the young high-skilled in the Beveridgean, that would be, respectively, worse and better-off under perfect foresight voting.

*JEL Classification:* H55, R23, D72, H73.

*Keywords:* Pension systems, Labor mobility, Fiscal competition, Political economy.

## 2.1 Introduction

The financial literacy of agents is, in general, low (see, for instance OECD, 2012 or, for an application on the impact of financial illiteracy on retirement decisions, Lusardi and Mitchel, 2007). Knowledge about the features of the pension systems is also lacking. Boeri et al (2001, 2002), for instance, conclude that there is a significant lack of information about pensions in the four European countries they have studied (France, Germany, Italy and Spain). According to the results of a survey on a sample of Portuguese voters (presented in Chapter 3), only 17% of the respondents know the approximate value of the old-age dependency ratio and only 34% are aware of the contribution rate to the social security system.

It is thus important to understand the implications of voting decisions by myopic voters, not able to ascertain *ex-ante* the impact of the pension system on mobility, in the voting and mobility equilibria derived in Chapter 1. Indeed, myopic agents are a common assumption in the literature (see, for example, Epple et al, 1984). This is the focus of this paper.<sup>1</sup>

## 2.2 The model

This paper builds on the model developed in Chapter 1.<sup>2</sup> As before, there are overlapping generations and two small open economies, integrated in the world capital markets. They are populated by heterogeneous workers that consume a single homogeneous good, produced by competitive firms. Low-skilled workers decide in which country to live. The government of each jurisdiction provides pensions to the elderly, financed by the young generation. The pension systems of both countries may diverge in size and in the level of redistribution across income levels. The size is determined by majority voting. Voters, contrary to those in Chapter 1, are myopic, in the sense that they do not anticipate the impact of the tax rate on labor mobility. On top of allowing us to compare the results of the two models, this simplification allow us to generalize the size of

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<sup>1</sup>in Chapter 1, we assume non-myopic voters. The same approach is followed by Cremer and Pestieau, 1998 and Epple and Romer, 1991 in static models.

<sup>2</sup>We clearly identify those assumptions that differ from the previous specification.

the redistributive component of the system. The level of income redistribution is intrinsic to the country, with one country being more Bismarckian (less income redistributive) than the other (in Chapter 1, countries are either fully Bismarckian or fully Beveridgean).

The timing of the model is as follows: first, agents vote on their preferred tax rate, that is chosen once and forever. Then, in the beginning of their working lives, mobile workers move to the country that ensures higher welfare.<sup>3</sup> Finally, young agents of each country work in their country of residence. If a pension system exists, they pay taxes that are used to finance the pensions of the old. The retirement benefit is paid by the jurisdiction where the individual worked during the first period of life and where she paid her contributions.<sup>4</sup>

### 2.2.1 The Households

There are two types of workers in each country, the high ( $h$ ) and the low-skilled ( $l$ ). The autarchy ratio of young to old agents (henceforth the autarchy inverse dependency ratio) is given by the constant rate  $1 + n$ . Concerning voting coalitions, we assume that the young outvote the old ( $n > 0$ ) and that the young low-skilled plus the old outvote the young high-skilled. Households can also vote with their feet, by moving to the other country in the beginning of their working lives. We focus on low-skilled workers mobility, following Cremer and Pestieau (2003)<sup>5</sup>

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<sup>3</sup>We assume that agents vote before mobility, in their home country. This is in line with the current setting of the European Union, where voting is mainly linked to citizenship and migrants have limited voting rights. Migrants from other EU-countries are allowed to vote in local and European elections only. Even in the presence of voting rights, effective participation varies greatly among EU countries. Third-countries migrants (i.e. migrants from outside the EU) have even more restricted voting rights. In addition, the share of migrants acquiring citizenship in the EU (that entitle them to voting rights) is very limited. In 2009, it was less than 3%, ranging from 0,3% in Czech Republic to 5,8% in Portugal (Eurostat, 2011, p.247).

<sup>4</sup>This is in line with the current framework within the European Union (the residency principle, as opposed to the origin principle). This is also the reason why we can disregard mobility after retirement, since pensions will always be paid by the countries where the household worked. If we think of sources of heterogeneity between countries others than the pension schemes (different VAT rates, health system, climate), then the old may as well have incentives to move.

<sup>5</sup>Other options may be found in the literature: for example, Cremer and Pestieau (1998) analyze both types of mobility separately in a static framework with fixed wages, while Kolmar (2007) considers mobility of high and low-skilled simultaneously with fixed factor prices and exogenous tax rate.

The households live for two periods. When young (period 1) they work (supplying inelastically one unit of labor), contribute to the pension system and save or borrow; when old (period 2) they retire, receive a pension benefit and consume (pay) their savings (loans), plus interest.<sup>6</sup>

The households' lifetime utility is given by:<sup>7</sup>

$$U^i = \ln(c_t^i) + \beta \ln(d_{t+1}^i), \quad i = h, l \quad (2.1)$$

where  $c_t^i$  and  $d_{t+1}^i$  denote, respectively, consumption in the first and second periods of life for agent type  $i$  (high-skilled, low-skilled agent) and  $\beta$  represents the intertemporal discount factor. As in Chapter 1, we assume that  $\beta = 1$ .

The household budget constraint is given by:

$$c_t^i = w_t^i(1 - \tau) - s_t^i, \quad i = h, l \quad (2.2)$$

$$d_{t+1}^i = s_t^i R_{t+1} + p_{t+1}^i, \quad i = h, l \quad (2.3)$$

where  $w_t^i$  represents the wage of type  $i = h, l$  in period  $t$ ,  $R_{t+1}$  is the market return in period  $t + 1$ ,  $s_t^i$  are savings of agent  $i$  in period  $t$ ,  $\tau$  is the tax rate paid by the young to finance the pension system and  $p_{t+1}^i$  is the pension received upon retirement by the old of type  $i$ .

### 2.2.2 The Firms

Firms are perfectly competitive and produce a single homogeneous good according to a common, time invariant constant returns to scale (CRS) production function that uses both capital and labor,  $F(K_t, L_t)$ , respecting the Inada conditions. Labor in each country is measured in efficiency units:

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<sup>6</sup>In order to isolate the effects of pension schemes, distortions coming from the labor-leisure choice are assumed away.

<sup>7</sup>For simplicity of notation we henceforth omit the jurisdiction index. We will return to the country indexes wherever interpretation is not straightforward.

$$L_t = aN_t^h + N_t^l, \quad a > 1 \quad (2.4)$$

where  $a$  denotes the productivity of the high-skilled (henceforth, the skill premium) and is common to both countries, and  $N_t^l$  and  $N_t^h$  represent the low and high-skilled population, respectively. For future reference  $\theta_t$  represents the ratio of low- to high-skilled agents. In particular,  $\theta_t^a$  stands for the autharchy ratio,  $\theta_t^m$  represents the migration equilibrium fraction of low- to high- skilled agents and  $\bar{\theta}_t$  reflects the maximum  $\theta$ , i.e. a situation where all low-skilled moved to one country.

Profit maximization implies that marginal productivities match factor prices, namely the international interest rate  $R$  and the wage level,  $w$ . Notice that  $aw^l = w^h$ . We can omit the time subscript as with two small open economies with CRS, the Capital-Labor ratio  $K/L$  remains constant. This also means that mobility has no impact on productive efficiency and we are able to focus solely on redistributive motives for mobility.

### 2.2.3 The Government

In each jurisdiction, the government provides pensions to the old households that worked in the country, financed by the contributions of the young residents (the so-called Pay-As-You-Go system). Pensions have two components: an earnings related part (Bismarckian component) and a flat benefit part (Beveridgean component). The pension formulation that balances the government budget (i.e. total contributions in a given period are equal to total pensions paid in that same period) is given by:

$$p_{t+1}^{j,i} = \tau^j \left[ \alpha^j w^i \frac{L_{t+1}^j}{L_t^j} + (1 - \alpha^j) \bar{w}_{t+1}^j \frac{N_{t+1}^j}{N_t^j} \right], \quad j = A, B; i = h, l \quad (2.5)$$

where  $\bar{w}$  represents the average wage:

$$\bar{w}_{t+1}^j = \frac{N_{t+1}^{j,h} w^h + N_{t+1}^{j,l} w^l}{N_{t+1}^j} = w^l \frac{L_{t+1}^j}{N_{t+1}^j}, \quad j = A, B \quad (2.6)$$

and  $N_t^j = N_t^{j,h} + N_t^{j,l}$ .

Country  $A$  is more Bismarckian ( $\alpha^A > \alpha^B$ ), assigning more weight to the Bismarckian component than country  $B$ , which is more Beveridgean. For simplicity, we refer to country  $A$  as the Bismarckian country and country  $B$  as the Beveridgean.<sup>8</sup>

The tax rate  $\tau$  determines the size of the pension system: the larger the tax rate, the bigger the system. In addition to the tax rate, the pension increases with the wage level and the (efficiency adjusted) inverse dependency ratio, possibly affected by mobility. The average wage decreases the higher the proportion of low-skilled agents and increases with the skill premium.

We implicitly assume that any adjustments to the pension system to ensure its sustainability (i.e. that the system is balanced) are accommodated on the benefit side (the pension level) and not on the contribution side (given that the tax rate is fixed).<sup>9</sup>

## 2.3 Voting equilibria

To determine the voting equilibrium, we solve the households maximization problem. In period  $t$ , the representative household maximizes lifetime utility (2.1), subject to the budget constraints (2.2) and (2.3) and to the pension offered in the country, (2.5). As in Chapter 1, we assume  $R > 1 + n$ .

As voters are myopic, i.e. do not incorporate the impact of the tax rate on mobility outcomes, their voting decisions with and without labor mobility do not

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<sup>8</sup>The pension formulation of Chapter 1 is a special case of this formulation, where  $\alpha^A = 1$  and  $\alpha^B = 0$ .

<sup>9</sup>An alternative to formulation (2.5), which still ensures a balanced government budget, is to consider that the different types of workers (high- and low-skilled) contribute to separate systems. The Bismarckian component would then be written as  $w^i \frac{N_{t+1}^i}{N_t^i}$ . This does not seem to be the case in most systems. Hence, we focus on the formulation given by (2.5).

differ. It is instructive to start with the case where countries  $A$  and  $B$  are, respectively, purely Bismarckian and purely Beveridgean ( $\alpha^A = 1$  and  $\alpha^B = 0$ ), which allows for direct comparison with the non-myopic setting in Chapter 1.

### 2.3.1 Pure Bismarckian and pure Beveridgean pension systems

The analysis resembles that in Chapter 1, with immobile labor. The results are summarized in Proposition 2.3.1.

**Proposition 2.3.1** (Voting equilibria with pure pension systems). *Consider two small open economies, a pure Bismarckian and a pure Beveridgean country, with endogenous tax rates and myopic voters. The Beveridgean offers pensions if and only if the gains from income redistribution for a young low-skilled are sufficiently high, i.e.  $R < (1+n)\frac{a+\theta}{1+\theta}$ . The Bismarckian never provides pensions.*

Old agents always favor the largest possible system as they are not subject to the pension contribution tax. For the young generation, the first order conditions with respect to the tax rate for, respectively, an agent in country  $A$  and country  $B$  are:

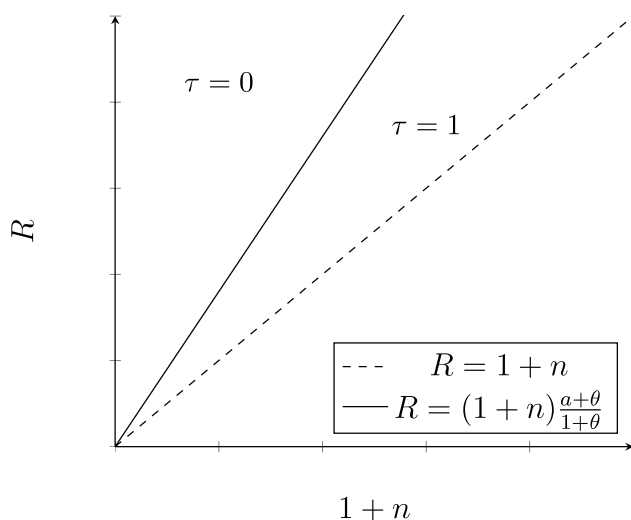
$$(1+n) = R \tag{2.7}$$

$$\frac{\bar{w}_{t+1}}{w^i}(1+n) = R \tag{2.8}$$

Given that we are assuming  $R > (1+n)$ , the young in the Bismarckian country never support the system - the market is always a better option. As they form a majority, there is no pension system in country  $A$ .

In the Beveridgean country, high-skilled agents also vote for  $\tau = 0$  as income redistribution is harmful to them. Figure 2.1 displays the voting decisions of young low-skilled in the Beveridgean country. The higher the skill premium and the lower the ratio of low- to high-skilled households, the easier for the young low-skilled to

Figure 2.1: Voting of the young low-skilled in the purely Beveridgean country



support the system (the solid black line rotates to the left). This happens because the gains from redistribution also increase. These conditions can be derived using condition (2.8), which yields that young low-skilled in the Beveridgean country vote for  $\tau = 1$  if and only if  $R < (1+n)^{\frac{a+\theta_{t+1}}{1+\theta_{t+1}}}$ , where  $\theta_{t+1}$  is the ratio of low- to high-skilled agents in period  $t+1$ . This condition is necessary and sufficient for the Beveridgean country to offer a pension system as the young high-skilled (who vote against the system) do not outvote the young low-skilled plus the old. For those cases where the gains from income redistribution are not enough to compensate for the higher returns of the market vis-à-vis intergenerational redistribution ( $R > (1+n)^{\frac{a+\theta_{t+1}}{1+\theta_{t+1}}}$ ), the young low-skilled vote together with the young high-skilled against the system, forming a winning majority.<sup>10</sup>

<sup>10</sup>Please note that in the particular case where  $R = (1+n)^{\frac{a+\theta_{t+1}}{1+\theta_{t+1}}}$ , young low-skilled are indifferent between a tax rate of 0 and a tax rate of 1 and thus, assuming an infinitesimal cost of casting a vote, they prefer not to vote. The voting equilibrium is then determined by the relative number of young high-skilled to old voters: if the former is larger, the tax rate is 0; conversely, if the old outvote the young high-skilled, then the tax rate in the country is 1. For simplicity, we abstain from discussing this special case.

### 2.3.2 Mixed pension systems

We now let pension systems be mixed, entailing both a Bismarckian and a Beveridgean component, in line with the pension formulation given by (2.5). We consider that country  $A$  is more Bismarckian than country  $B$  and thus  $\alpha^A > \alpha^B$ . The results are summarized in Proposition 2.3.2.

**Proposition 2.3.2** (Voting equilibria with mixed pension systems). *Consider two small open economies, a more Bismarckian and a more Beveridgean country, with endogenous tax rates and myopic voters. Then, countries only adopt a pension system if they are sufficiently Beveridgean and if the interest rate is sufficiently low, i.e.:*

$$\alpha^j < \frac{\frac{R(1+\theta_{t+1})}{(1+n)} - (a+\theta_{t+1})}{1-a} \text{ and } R < (1+n)\frac{a+\theta_{t+1}}{1+\theta_{t+1}}, \quad j = A, B.$$

In order to get to these results, we derived the first order condition with respect to the tax rate:

$$(1+n)[\alpha^j w^i + (1-\alpha^j)\bar{w}_{t+1}] = w^i R, \quad j = A, B; i = h, l \quad (2.9)$$

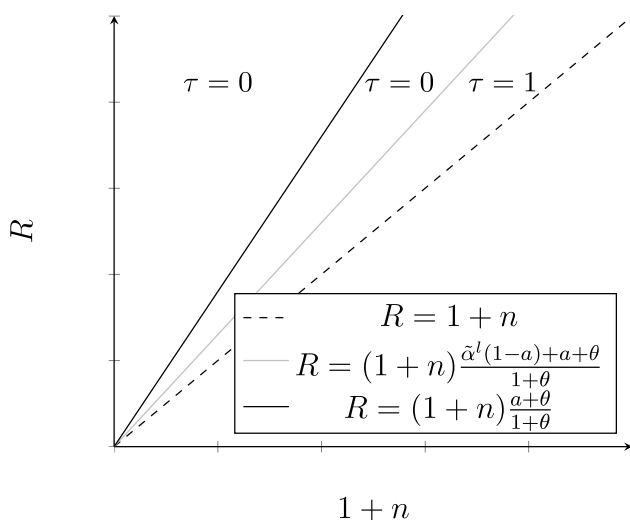
Hence, there is a threshold level of the Bismarckian factor  $\alpha$  above which a low-skilled agent (respectively a high-skilled agent) prefers a zero (respectively unit) tax rate. The  $\alpha$  for which the household is indifferent between  $\tau = 0$  or  $\tau = 1$  is given by the equalization of the returns of the outside option and the pension system:

$$\tilde{\alpha}_{t+1}^i = \frac{w^i \frac{R}{(1+n)} - \bar{w}_{t+1}}{w^i - \bar{w}_{t+1}}, \quad i = h, l \quad (2.10)$$

As  $R > 1+n$ ,  $\tilde{\alpha}_{t+1}^h$  is always larger than one and thus young high-skilled always vote against the system. For the low-skilled, (2.10) may be written as:

$$\tilde{\alpha}_{t+1}^l = \frac{\frac{R(1+\theta_{t+1})}{(1+n)} - (a + \theta_{t+1})}{1-a} \quad (2.11)$$

Figure 2.2: Voting of the young low-skilled in a mixed pension system country



The  $\tilde{\alpha}_{t+1}^l$  for the young low-skilled decreases with the interest rate as higher market returns make it more difficult for the pension system to be attractive. Similarly, the higher the ratio of low- to high-skilled young, the lower the gains from income redistribution and thus the lower  $\tilde{\alpha}_{t+1}^l$ . On the contrary, a higher inverse dependency ratio (higher intergenerational redistribution) or a higher skill premium (higher income redistribution) increases  $\tilde{\alpha}_{t+1}^l$ .

Figure 2.2 summarizes the voting decisions of the young low-skilled. If market returns exceed those of a fully Beveridgean system  $\left(R > (1+n)\frac{a+\theta_{t+1}}{1+\theta_{t+1}}\right)$ , the young low-skilled are always against the system, irrespective of its Bismarckian nature ( $\alpha$ ). This happens because even with the most redistributive pension system, the returns of the market are always higher. For the remaining cases, the voting decision depends on the degree of income redistribution - if it is sufficiently high (low  $\alpha$ ), then the system yields higher returns than the market and they vote for  $\tau = 1$ ; otherwise, they vote for  $\tau = 0$ .<sup>11</sup>

We are now able to put together the individual voting decisions and determine

<sup>11</sup>As seen before, in the particular case where  $\tilde{\alpha}_{t+1}^l = \alpha$ , young low-skilled are indifferent between a tax rate of 0 and a tax rate of 1 and thus, assuming an infinitesimal cost of casting a vote, they prefer not to vote. The voting equilibrium is then determined by the relative number of young high-skilled to old voters. As stated before, for simplicity, we abstain from discussing this special case.

the voting outcome. If the returns of the market are sufficiently high  $\left(R > (1+n)\frac{\alpha+\theta_{t+1}}{1+\theta_{t+1}}\right)$ , there is never a pension system. If this is not the case, countries provide a pension system if they are sufficiently Beveridgean.

The voting equilibria are thus determined by the degree of income redistribution in the two countries. In this setting, and given that the Beveridgean country is more redistributive than the Bismarckian, three final outcomes are possible: no pension system in either country, a pension system only in the Beveridgean or a pension system in both countries:

$$(\tau^A, \tau^B) = (0, 0) \text{ if } \tilde{\alpha}_{t+1}^l < \alpha^B < \alpha^A;$$

$$(\tau^A, \tau^B) = (0, 1) \text{ if } \alpha^B < \tilde{\alpha}_{t+1}^l < \alpha^A;$$

$$(\tau^A, \tau^B) = (1, 1) \text{ if } \alpha^B < \alpha^A < \tilde{\alpha}_{t+1}^l;$$

It is interesting to note that a central planner with the power to determine the degree of income redistribution in the country ( $\alpha$ ) is able to affect the existence of the pension system<sup>12</sup>. By increasing (decreasing) its redistributive nature, i.e. decreasing (increasing)  $\alpha$ , it may ensure majority support for (against) the system. However, if the returns of the market are sufficiently high  $\left(R > (1+n)\frac{\alpha+\theta_{t+1}}{1+\theta_{t+1}}\right)$ , there is always a majority against the system, irrespective of the value of  $\alpha$  set in the country.

## 2.4 Mobility equilibria

We now let mobile workers decide whether they want to migrate, taking as given the tax rate in the two countries. We assume that indifferent agents do not move. Proposition 2.4.1 summarizes the results.

**Proposition 2.4.1** (Mobility equilibria). *Consider two small open economies, a more Bismarckian and a more Beveridgean country, with endogenous tax rates and myopic voters. As long as the more Beveridgean offers pensions, low-skilled migrate to the country. Otherwise, there is no mobility. Corner migration equilibria*

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<sup>12</sup>For a model where  $\alpha$  is endogenous, please refer to the analysis in Cremer and Pestieau (1998) in a static setting.

are only possible if, when only the more Beveridgean offers pensions, the market returns are sufficiently low, i.e.

$R < (1+n) \frac{[\alpha^B + (1-\alpha^B)a] + \bar{\theta}^B}{1+\bar{\theta}^B}$  or if, for the cases where both countries offer pensions, the two countries are sufficiently different in terms of their Bismarckian factors, i.e.  $\alpha^A > \frac{\alpha^B + \bar{\theta}^B}{1+\bar{\theta}^B}$ .

As in the previous sections, let us start with the instructive case where one country is purely Bismarckian ( $\alpha^A = 1$ ) and the other purely Beveridgean ( $\alpha^B = 0$ ).

For the case where no country adopts a pension system, there are no incentives to move. If, alternatively, the Beveridgean adopts a pension system, the young low-skilled of the Bismarckian country have an incentive to move to the other country. If the system is beneficial for the low-skilled in the Bismarckian (that voted for the system), it is also beneficial for them. Mobility ensures that utility in both countries is equalized, unless all young low-skilled move to the Beveridgean. The mobility condition for an interior equilibrium is thus given by:

$$\theta_t^{B,m} = \frac{R - a(1+n)}{1+n-R} \quad (2.12)$$

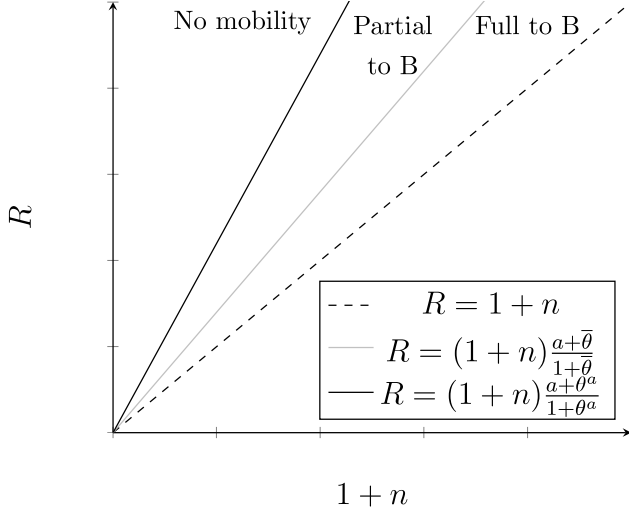
where  $\theta^m$  represents the equilibrium fraction of low- to high- skilled agents. The condition for a corner solution, with all low-skilled workers located in the Beveridgean, is given by:

$$\bar{\theta}_t^B \leq \frac{R - a(1+n)}{1+n-R} \quad (2.13)$$

where  $\bar{\theta}^B = \frac{N^{A+B,l}}{N^{B,h}}$ . These conditions can also be expressed in terms of the market return, as presented in Figure 2.3.

Turning now to the case where  $\alpha^A > \alpha^B$ , we recall the three possible voting outcomes:  $(\tau^A, \tau^B) = (0, 0)$ ,  $(\tau^A, \tau^B) = (0, 1)$  and  $(\tau^A, \tau^B) = (1, 1)$ . No pension system in either country yields no mobility incentives. However, if at least the Beveridgean country adopts a pension system, then low-skilled young migrate to that country. For the case where  $(\tau^A, \tau^B) = (0, 1)$ , income redistribution is

Figure 2.3: Mobility equilibria: direction and size of migration of low-skilled young when  $\alpha^A = 1$  and  $\alpha^B = 0$



sufficiently high for the young low-skilled of the Beveridgean to vote for the system and hence it is also better than no pension system for the young low-skilled of the Bismarckian. An interior mobility equilibrium is such that:

$$\theta_t^{B,m} = \frac{R - (1+n)[\alpha^B + (1 - \alpha^B)a]}{1+n-R} \quad (2.14)$$

where, as before,  $\theta^m$  represents the equilibrium fraction of low- to high- skilled agents. This can also be written in terms of the market return:

$$R = (1+n) \frac{[\alpha^B + (1 - \alpha^B)a] + \theta_t^{B,m}}{1 + \theta_t^{B,m}} \quad (2.15)$$

The condition for a corner solution, with all low-skilled workers located in the Beveridgean is given by:

$$\bar{\theta}_t^B \leq \frac{R - (1+n)[\alpha^B + (1 - \alpha^B)a]}{1+n-R} \quad (2.16)$$

where, again,  $\bar{\theta}^B = \frac{N^{A+B,l}}{N^{B,h}}$ . Expressing this conditions in terms of the market return, we obtain:

$$R < (1+n) \frac{[\alpha^B + (1-\alpha^B)a] + \bar{\theta}^B}{1 + \bar{\theta}^B} \quad (2.17)$$

Conditions (2.14) and (2.16) are generalizations of conditions (2.12) and (2.13), where we assessed pure pension schemes.

Even if the Bismarckian offers a pension system, i.e.  $(\tau^A, \tau^B) = (1, 1)$ , the young low-skilled have an incentive to move to the Beveridgean given that, everything else constant, they prefer higher redistribution ( $\alpha^A > \alpha^B$ ). As before, we may have an interior or a corner mobility equilibrium depending on the potential gains from income redistribution. An interior equilibrium occurs when the higher level of income redistribution in the Beveridgean country is neutralized by lower returns from income redistribution:

$$\alpha^A + (1-\alpha^A) \frac{a + \theta^A}{1 + \theta^A} = \alpha^B + (1-\alpha^B) \frac{a + \theta^B}{1 + \theta^B} \quad (2.18)$$

This condition can be written as:

$$\alpha^A = \alpha^B \frac{1 + \theta^A}{1 + \theta^B} - \frac{\theta^A - \theta^B}{1 + \theta^B} \quad (2.19)$$

A corner solution arises if the degree of redistribution in the Bismarckian country is sufficiently low ( $\alpha^A$  sufficiently high), i.e.:

$$\alpha^A > \frac{\alpha^B + (1-\alpha^B) \frac{a + \bar{\theta}^B}{1 + \bar{\theta}^B} - a}{1 - a} \quad (2.20)$$

This condition can be simplified to:

$$\alpha^A > \frac{\alpha^B + \bar{\theta}^B}{1 + \bar{\theta}^B} \quad (2.21)$$

which means that the higher the maximum fraction of low to high-skilled workers, the more stringent the condition becomes.

To sum-up, when the Beveridgean country adopts a pension system, it attracts low-skilled workers from the Bismarckian country, even if the Bismarckian country also offers a pension system. Full mobility only occurs if the return of the market is sufficiently low or if the countries are sufficiently different in their Bismarckian factors.

## 2.5 Impact of myopic voting on voting and mobility equilibria

By comparing our results with those of Chapter 1, where voters anticipate the impact of mobility, we are able to identify the consequences of myopic voting. To make the results comparable, we focus on the pure pension systems case. Proposition 2.5.1 summarize our findings.

**Proposition 2.5.1** (Impact of myopic voting on voting and mobility equilibria). *Consider two small open economies, a Bismarckian and a Beveridgean country, with endogenous tax rates. Myopic voting ensures that there is never a pension system created in the Bismarckian country due to low-skilled labor mobility. This has no impact on the mobility equilibria, which are the same with and without myopic voters. Also, it ensures that there is never a pension system destroyed in the Beveridgean country due to low-skilled labor mobility. Myopic voting thus creates a flow of migrants, who would prefer not to move if there was no pension system.*

These results are also summarized in Table 2.1.<sup>13</sup> In a nutshell, for the Bismarckian country, myopic voting eliminates the possibility of a pension system to be created, which would benefit the old of the country and harm the young-low skilled. In the Beveridgean country, myopic voting ensures that the system

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<sup>13</sup>The Table also presents the welfare implications of free low-skilled labor mobility. These are a subset of those presented in Chapter 1 for the non-myopic setting (results presented in Table 2.2, for convenience).

is never destroyed with labor mobility (which would eliminate migration flows). This destruction would impact the welfare of the old and the young high-skilled in the Beveridgean, that would be, respectively, worse and better-off under perfect foresight voting.

To obtain these results, we first looked at the Bismarckian country, where myopic voting implies that there is never a pension system. With perfect foresight, it is possible for the country to have a pension system as long as the return of the market is sufficiently low  $\left(R < (1+n)\frac{a+\bar{\theta}}{1+\theta}\right)$  and the old outvote the young high-skilled. In this context, mobility induces the creation of a pension system in the Bismarckian country and is the result of the migration of all the young low-skilled to the Beveridgean country. These voters become indifferent about the tax rate in their home country (and thus have no incentive to cast a vote). Hence, the young high-skilled lose their allies in voting against the system. As, in this setting, the young high-skilled alone are not enough to outvote the old, the new tax rate is the one preferred by the old, i.e. a tax rate equal to 1. Both cases (myopic and non-myopic voters) entail the same mobility equilibrium (i.e. full mobility to the Beveridgean country) but the welfare implications are different. Namely, old agents of the Bismarckian are better-off under the outcome of the non-myopic setting, as they receive pension benefits; conversely, young high-skilled of the Bismarckian are better-off under myopic voting, as in that case they do not have to finance the pension system. For the young low-skilled, the welfare is the same in both cases as they all move to the Beveridgean country which, in both cases, offers a tax rate equal to 1.

In the Beveridgean country, myopic voting ensures that mobility does not undermine the system. Under perfect foresight, mobility induces a change in the tax rate from 1 to 0 when  $(1+n)\frac{a+\bar{\theta}}{1+\theta} < R < (1+n)\frac{a+\theta^a}{1+\theta^a}$  and the young high-skilled outvote the old. The change in the tax rate is related to the change in the voting behavior of the young low-skilled in the Beveridgean; they become indifferent about the tax rate in their home country as they know that, irrespective of the tax rate, their final utility matches that of the other country, where there is no pension system. This change in behavior impacts the voting coalitions, as the young low-skilled have no incentive to cast their vote and, under the conditions

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stated above, the young high-skilled outvote the old.

The mobility equilibrium is thus different in the myopic and non-myopic voters settings. Under perfect foresight, there is no mobility as there is no pension system. With myopic voters, there is support for the system in the Beveridgean and partial migration from the Bismarckian to the Beveridgean country. Old agents in the Beveridgean country are better-off with myopic voters, as it allows the system to be kept, whereas the young high-skilled of the country fare better when voters foresee the impact of mobility, ensuring that the system is not supported by a majority of voters. Again, both equilibria entail the same welfare for the young low-skilled.

Table 2.1: Impact of mobility in the utility levels of the native of the Bismarckian and Beveridgean countries when voters are myopic

Voting (closed $\Rightarrow$ open)	Majorities	Mobility	Bismarckian country				Beveridgean country				Bis. country Majority harmed?	Bev. country Majority harmed?		
			Young $U^t$	Old $U^h$	Young $U^t$	Old $U^h$	Young $U^t$	Old $U^h$	Young $U^t$	Old $U^h$				
$R < (1+n) \frac{a+b}{1+r}$			=	=	=	=	=	=	=	=	=	=	=	
$(1+n) \frac{a+b}{1+r} < R < (1+n) \frac{a+g}{1+r}$		To B (corner)	+	=	=	-	-	+	+	+	+	+	+	YES
$R > (1+n) \frac{a+g}{1+r}$		To B (interior)	=	=	=	-	-	+	+	+	+	+	+	YES
	$(0,0) \Rightarrow (0,0)$	None	=	=	=	=	=	=	=	=	=	=	=	NO

Notes: = means that the utility is the same with or without labor mobility; + means that utility is higher with labor mobility; and - means that utility is lower with labor mobility.

Table 2.2: Impact of mobility in the utility levels of the native of the Bismarckian and Beveridgean countries when voters are not myopic

Voting (closed $\Rightarrow$ open)	Majorities	Mobility	Bismarckian country				Beveridgean country				Bis. country Majority harmed?	Bev. country Majority harmed?		
			Young $U^t$	Old $U^h$	Young $U^t$	Old $U^h$	Young $U^t$	Old $U^h$	Young $U^t$	Old $U^h$				
$R < (1+n) \frac{a+b}{1+r}$			+	+	+	-	-	+	+	+	+	+	+	YES
$(1+n) \frac{a+b}{1+r} < R < (1+n) \frac{a+g}{1+r}$	$h < o$ $h > o$	To B (corner) To B (corner)	+	=	=	-	-	+	+	+	+	+	+	YES
$R > (1+n) \frac{a+g}{1+r}$	$h < o$ $h > o$	To B (interior) None	=	=	=	-	-	+	+	+	+	+	+	YES
	$(0,0) \Rightarrow (0,0)$	None	=	=	=	=	=	=	=	=	=	=	=	NO

Notes: = means that the utility is the same with or without labor mobility; + means that utility is higher with labor mobility; and - means that utility is lower with labor mobility. o - number of old voters; h - number of young high-skilled voters.

## 2.6 Concluding remarks

We study decentralized asymmetric pension systems in a context of partial labor mobility, with one country being more Bismarckian than the other. We consider myopic voters, in the sense that they do not internalize the impact of the tax rate on mobility outcomes. In this setting, countries offer pensions as long as they are sufficiently Beveridgean and the market returns are sufficiently low. This means that we may end up with no pension system in either country, a pension system only in the more Beveridgean country or a pension system in each country.

These results imply that a central planner with the power to determine the degree of income redistribution in a country ( $\alpha$ ) is able to affect the existence of the pension system. In particular, by increasing (decreasing) its redistributive nature, i.e. decreasing (increasing)  $\alpha$ , it may ensure majority support for (against) the system. However, this ability has an important limitation: if the returns of the market are sufficiently high, there is always a majority against the system, irrespective of the value of  $\alpha$  set in the country. An extension of the model could internalize the decision of  $\alpha$ , similarly to what was done by Cremer and Pestieau (1998) but in a static setting.

As long as the more Beveridgean country offers pensions, low-skilled migrate to the country. However, a corner solution does not necessarily occur. When only the more Beveridgean offers pensions, full migration only happens if the market returns are sufficiently low. When both countries offer pensions, full migration only takes place if they are sufficiently asymmetric in terms of their Bismarckian nature.

Considering the case of pure Bismarckian and pure Beveridgean countries, we can make a comparison with the results of Chapter 1, thus assessing the consequences of less sophisticated voters. In the Bismarckian country, myopic voting has no impact of the mobility outcome but eliminates the possibility of a pension system to be created, which would benefit the old of the country and harm the young high-skilled. In the Beveridgean country, myopic voting ensures that the system is never destroyed due to the possibility of mobility. This impacts migration flows, which would be eliminated with perfect foresight, and changes the welfare of the old and the young high-skilled in the Beveridgean, that would be,

respectively, worse and better-off under perfect foresight voting.

In both settings, and when the market return is sufficiently low, the Beveridgean (but not the Bismarckian) has a majority harmed by mobility. Thus, labor mobility can only be politically sustained if appropriate compensatory measures are devised. The welfare analysis for the myopic voting setting provides us also an interesting insight - being a more sophisticated voter (i.e. non-myopic) is not welfare improving for the low-skilled young. However, the young high-skilled and the old can have welfare gains by promoting the literacy or illiteracy of the young low-skilled and, in this way, affect the voting outcome.

As discussed in Chapter 1, some of our assumptions are important to the results achieved. We assume that the intergenerational redistribution is (contrary to the intragenerational redistribution) equal in both countries, since the autarchy dependency ratio is the same. Also, this autarchy dependency ratio is equal for low and high-skilled agents. The introduction of asymmetric natural growth rates across countries and across skill types would lead to more intricate incentives concerning voting and mobility decisions. Another important assumption concerns the production technology. The substitutability between both types of labor, low and high-skilled, has important welfare implications due to the positive relation between the wage levels. The type of mobility is also relevant to the results since, in our setting, only the agents that benefit from intragenerational redistribution are allowed to migrate. We could also explore the possibility of compensations across agents and/or countries.

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## Chapter 3

# Political support for reforms of the pension system: two experiments

### ABSTRACT

We conduct two randomized control trials designed to understand the role of information and priming on the willingness to retrench the pension system. The first entails a survey to a sample of Portuguese voters, who are randomly presented with a text providing factual information about the public pension system. The second surveys a sample of Portuguese university students, randomly presented with an alternative order of questions. We show that more literacy on the pension system has a positive impact on the individual willingness to support reforms. Given that public opinion is usually seen as an important deterrent of effective action by politicians and that the level of voters' literacy can, at least to some extent, be influenced by policy action, this analysis may provide useful insights to policy makers faced with the challenge of reforming existent pension systems. Our analysis also suggests that priming effects should not be ignored, given their impact in individuals in the extremes of the political spectrum.

*JEL Classification:* H55, J26, D8.

*Keywords:* Pension reform, Policy opinions, Information, Priming effects.

### 3.1 Introduction

Europeans are concerned about the future of their retirement benefits and they believe that pensions will be one of the great challenges in their countries in 2030.

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In 2009, only 39% of the Europeans claim to be confident about the future of their pension (Standard Eurobarometer 71). Portuguese are among the least confident in the EU (24%), despite being less aware of the demographic challenges: in 2011 (Special Eurobarometer 378) 77% of the Europeans in the EU15 think that the proportion of people aged 65 or above will increase in the next 20 years, 83% acknowledge the progress in life expectancy in the past 30 years and 67% believe that it will further increase in the coming 30 years; in Portugal, the figures are somewhat lower (67%, 70% and 53%, respectively), hinting at potential information problems.

When asked about possible solutions, only 14% of the Europeans are against any reform and 7% have no opinion. In Portugal, the figures are higher: 23% would not accept any reform, a figure only surpassed by four other countries, and 24% have no opinion, the highest value for the EU. While a majority favors reforms, there is no agreement on the best way to increase the sustainability of the system.

Given that public opinion is usually seen as an important deterrent of effective action by politicians, it is crucial to understand what drives the support for the different reform options aimed at increasing the sustainability of the system. The case of pensions is particularly problematic as those suffering the most with the lack of action are the future generations that do not have a say in the current discussions.

Empirically, there are three major determinants of voters willingness to support policy reforms: self-interest, ideology and information.

The self-interest motive is highlighted by Boeri et al (2001, 2002) who conduct a survey in France, Germany, Italy and Spain and find that the economic situation of the respondent (together with ideology) plays a role in individual views over the welfare state. Heinemann et al (2009) reach similar conclusions for the opinions of Germans on labor market reforms. Chong, Citrin and Conley (2001) use data for the United States to show that the role of self-interest on individual opinions about economic policy issues, like the social security reform, is related to the individual stakes on the particular issue.

Ideology or values also shape voting behavior and preferences for reform. Blinder and Krueger (2004), using data for the US, show that ideology, more than

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self-interest or information, is a key determinant of the public opinion on economic policy, including social security. Lynch and Myrskyl (2009) reach a similar conclusion with survey data for 11 European countries: values are a key determinant of support for the welfare state; those who benefit the most from the system are not more likely to oppose to its reduction.

The role of information is explored by Boeri et al (2001, 2002), who conclude that there is a significant lack of information about pensions among the French, Germans, Italians and Spaniards. Also, those that are more informed about the system are more prone to be in favor of a partial privatization. Walstad et al (2002) use five US surveys to show that economic knowledge has an impact on opinions over economic policy issues. Boeri and Tabellini (2012) find a positive impact of information on support for pension reforms in Italy, but this information is not acquired through the media, hinting at a special role of governments in providing specialized information.

In addition to these factors, opinions are also prone to priming effects that occur when knowledge stored in long-term memory is activated by exposure to a stimulus (for a survey, please refer to Hopkins, 2011). A widely studied example relates to the impact of media coverage on political elections or support for certain policies (see, for instance, Althaus and Kim, 2006). Priming effects are also the root of the relevance of the order of questions in surveys (Bradburn et al, 2004). An application relates to the possible effects of answers to political question on answers to economic questions (Wilcox and Wlezien, 1993 and Palmer and Duch, 2001). It is argued that answering political questions first may impact the way respondents answer subsequent economic questions, by trying to make their replies consistent. Chong, Citrin and Conley (2001) find that prompting the respondents to think about their self-interest, by assessing individual costs and benefits, makes them more prone to be driven by individual economic motivations. Hopkins (2011) shows that the effects of priming found in surveys have external validity in the sense that they are replicated in actual voting situations.

In this paper, we present the results of two randomized control trials designed to understand the role of information and priming on the willingness to retrench the pension system. The first entails a survey to a sample of Portuguese voters,

who are randomly presented with a text providing factual information about the public pension system. The second surveys a sample of Portuguese university students, randomly presented with an alternative order of questions.

The remainder of the paper is organized as follows. Section 3.2 presents the dataset and Sections 3.3 and 3.4 focus on the analysis and main results of the two randomized control trials: one on the role of information and the other on the impact of priming. Section 3.5 presents preliminary results on the effects of ideology and self-interest. Section 3.6 presents some insights on support for the partial privatization of the system. Finally, Section 3.7 concludes.

## 3.2 The data

In order to understand the role of information and priming on the support for reforms of the pension system, we conduct two randomized controlled trials. One targets Portuguese voters (i.e. citizens with 18 years old or more) and the other focuses on university students, from the three major public universities in the Portuguese capital, Lisbon: Universidade Nova de Lisboa, Universidade de Lisboa e Universidade Técnica de Lisboa. In both experiments, we conduct a survey with six blocks of questions, where the first block relates to individual preferences over the pension system, the second assesses knowledge about the Portuguese Social Security (SS), the third ascertains willingness to support different reforms that increase the sustainability of SS, the fourth looks at support for the convergence of the public servants pension system with SS and the fifth and sixth cover, respectively, behavioral and demographic questions.<sup>1</sup>

In the first experiment, and following Boeri and Tabellini (2012), half of the sample is randomly presented with an informative text with factual information about SS (the text is presented in Appendix 3.A). This information is displayed upfront, before the beginning of the questionnaire and with no option to return to the text after starting to fill-in the survey.

In the second experiment, we randomize the order of blocks: some respondents are immediately asked about their willingness to support reforms (blocks 3 and

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<sup>1</sup>The two questionnaires are available here - only in Portuguese for the time being.

4) while others are first asked about preferences (block 1) and pension system features (block 2). After finishing one block, it is not possible to return to it at a later stage.

Both experiments are conducted using an online survey built in *Qualtrics Software* and spread via e-mail and social networks. In the two cases, there is a monetary incentive, namely the possibility to win one out of three 25 euro gift cards from a major supermarket chain upon completion of the questionnaire.

The first experiment (on the effect of information) was conducted in June and July 2013. We collected 429 replies, with an average response time between 25 and 30 minutes. As expected with an online survey, our sample of voters is not representative of the population - the respondents are in general younger and with higher income than the underlying population. This lack of representativeness decreases the external validity but does not hamper the validity of the experiment results, i.e. the internal validity.

The second experiment (on the effect of priming) was conducted in May 2013 and 450 replies were collected. The average response time is somewhat lower (between 20 and 25 minutes) as the questionnaire for students is slightly shorter. Universidade Nova is over-represented in our sample, as are females. Again, as for the previous sample, conclusions from the priming experiment are still valid (internal validity).<sup>2</sup>

Appendix 3.B presents a description of the variables used in this paper, together with the descriptive statistics. In general, there are no significant differences between the treated and the control groups. However, for the first experiment (and excluding the information variables, which will be discussed in the next section), the treated sub-sample presents significantly less retired respondents. Also, the treated sub-sample presents somewhat less older and low income respondents. In

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<sup>2</sup>As pensions are a topic that has been discussed frequently in the media, one may wonder if news published during the months where we collected the data could impact the results. There was, indeed, significant media coverage, in particular in the first weeks of May, with a potential impact in the University students sample, collected during that month. However, we see no significant difference between responses provided during and after this media coverage. One may argue that, in practice, as the media coverage occurred in the beginning of the period, all respondents were similarly affected by it. The situation would have probably been different if the media coverage would have occurred in the last weeks of May, as in that case those that responded earlier would not have been exposed to those news.

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Table 3.1: List of information variables

Variable	Assesses if the respondent knows ...
Info PAYG	... that the system is pay-as-you-go
Info ratio	... the number of active people per retired person
Info ratio30	... the number of active people per retired person in 30 years time
Info sust. factor	... that there is a sustainability factor
Info formula	... that the current pension formulation takes into account all wages received and not only a subset of the most recent ones
Info fund	... that the Social Security Fund still has a positive balance
Info rate	... the contribution rate
Info weight	... the weight of pensions on GDP
Info age	... the statutory retirement age
Info average age	... the average age at which people retire
Info age women	... that the statutory retirement age for women is equal to that for men
Info work65	... that there is no penalty on pension amounts for working after the age of 65 (actually, there is a bonus)
Info complement	... that it is possible to complement the pension of SS by contributing to a voluntary public scheme (funded, not PAYG)
Info ceiling	... about the existence or not of a pension ceiling
<i>Only in the voters sample:</i>	
Info impact austerity	... the impact of austerity measures on pensions spending

the case of the students' sample, the only variable with statistically significant differences is the number of respondents from Universidade de Lisboa, higher in the case of the treated sub-sample.

### 3.3 The role of information

As explained in the previous section, in the first experiment we display a factual text with information about Social Security to a random subset of the respondents (the treated group). The research questions that interest us are as follows: Does exposure to this text impact the respondent's reply? Does the respondent become more willing to support reforms to the system as compared to those not provided with the text? Are information levels affected by this factual text?

Respondents are posed different questions aimed at capturing their pensions literacy. The list of information variables used in the study is presented in Table 3.1.

Table 3.2 presents the mean values of the information variables in the sample, for questions whose answer is provided in the factual text. As there are six ques-

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tions that fall in this category, *Info text* goes from 0 to 6 and represents the number of questions correctly answered. The remaining variables are the components of *Info text* and are equal to 1 if the answer provided is correct and 0 otherwise. The figures for those variables are thus the share of respondents that provided a correct answer. Table 3.3 presents similar information but for questions whose answer is not provided in the factual text (nine questions). The variable *Info out text* thus goes from 0 to 9.

Table 3.2: Correct responses to questions for which the answer is provided in the text (average values)

	Not treated	Treated
<i>N</i>	229	200
<b>info text</b>	<b>2,72</b>	<b>3,2**</b>
Info PAYG	0,91	0,87
Info ratio	0,17	0,35**
Info ratio30	0,15	0,35**
Info sust. factor	0,57	0,57
Info formula	0,62	0,73**
Info fund	0,30	0,34

Notes: \*\* (\*) Statistically different from the average values of the control group at 95% (90%).

Table 3.3: Correct responses to questions for which the answer is not provided in the text (average values)

	Not treated	Treated
<i>N</i>	229	200
<b>info out text</b>	<b>4,49</b>	<b>4,58</b>
Info rate	0,35	0,34
Info weight	0,24	0,24
Info age	0,74	0,71
Info average age	0,32	0,32
Info impact austerity	0,58	0,58
Info age women	0,75	0,76
Info work65	0,73	0,73
Info complement	0,32	0,39
Info ceiling	0,45	0,53

Notes: \*\* (\*) Statistically different from the average values of the control group at 95% (90%).

Two results emerge. First, the factual information is only affecting the replies to the questions that can actually be replied based on the text: in Table 3.3 there

is no difference between the level of information of the treated and control groups, thus supporting the relevance of our treatment. Second, those treated see their information levels increased but not all questions are similarly affected.

As expected, and by assessing the time one spends in the informative text section, it is possible to conclude that not all respondents who have a chance to read the text actually do it (we consider that time spent is a good proxy of having read or not the text). It is thus instructive to look at the results in Table 3.4, which further decomposes the results by time. We distinguish three groups: the least treated (remain in the page for less than 10 seconds) and that amount to 30% of the treated respondents; the most treated (remain in the page for 90 seconds or more) and that constitute 21%; and those in between (49%), the somewhat treated. Table 3.4 shows that spending more time reading the text increases the information level of the respondent. Comparing the most treated to the control group, the treatment significantly increases information levels for all relevant variables. The exception is the question on the social security fund, which is the last piece of information in the text and thus faces a higher probability of being skipped, even for the most treated. The information level on the ratio of old to working age population, which is presented in the beginning of the text, is increased even for the least treated. The information about the PAYG nature of the system is the most widely known fact for all respondents.

With an online survey, one may wonder if those that spend more time replying to information questions score better. If this is so, it can be that people browse the internet looking for information; however, we have several reasons to believe that this is not the case (and it should be noted that not all questions could be answered with a quick internet search). In general, the respondents that spend more time in the information block perform better; however, (i) spending more time reading the questions may simply signal that the respondent is reading them carefully and thinking about the reply; (ii) it can also translate higher availability of time; actually, the ones that spend more time in the information block, also spend more time in the remaining blocks, where the gain of browsing the internet is nil<sup>3</sup>; (iii) finally, in the treated group, the average time spent in the information

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<sup>3</sup>In order to make the data comparable, we exclude the time spent reading the text, for the treated ones.

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block is higher for the ones that spend more time reading the text. All these arguments make us confident that the results are not distorted by the possibility of browsing the internet. Also, if this were the case, our results would provide a lower bound on the impact of information.

Table 3.4: Correct responses to questions for which the answer is provided in the text - by intensity of treatment (average values)

	Not treated	Least treated	Somewhat treated	Most treated
<i>N</i>	229	58	100	41
<b>Info text</b>	<b>2,72</b>	<b>2,83</b>	<b>3,03*</b>	<b>4,12**</b>
Info PAYG	0,91	0,84	0,82**	1**
Info ratio	0,17	0,28*	0,32**	0,54**
Info ratio30	0,15	0,28**	0,29**	0,61**
Info sust. factor	0,57	0,50	0,52	0,78**
Info formula	0,62	0,71	0,71	0,80**
Info fund	0,30	0,22	0,37	0,39

Notes: \*\* (\*) Statistically different from the average values of the control group at 95% (90%); "Least treated" means that the respondent spends less than 10 seconds in the page displaying the text, "somewhat treated" means that the time spent is more than 10 seconds but less than 90 seconds and "most treated" means more than 90 seconds in the page.

The results in this section show that being provided with information has an impact on related pensions literacy, if one takes the time to actually read the text. But what is the implication for the support of reforms of the pension system? In the next section we assess the support for different types of reforms that increase the sustainability of the social security system, namely by increasing the retirement age, decreasing benefits or increasing contributions.

### 3.3.1 Making Social Security less generous

In this section we assess the support for the following qualitative five changes to the Social Security system, namely (i) increase the retirement age, (ii) decrease pensions of the active, (iii) decrease pensions of all (active and retired), (iv) increase the contributions of the active and (v) create or increase the contribution of the retired.

Table 3.5 presents the share of respondents in favor of the different reforms. There are no statistically significant differences between the control group and

the least and somewhat treated. However, for the most treated, the chance of favoring some reforms is significantly higher: almost half of the respondents that actually read the text are willing to increase the retirement age, one out of three would accept a reduction in future pensions of the currently active and 37% would support the decrease of the pensions also affecting the ones already retired. These results indicate that access and willingness to read specific information about the features of the system has an impact in the support for reform. In the remainder of this section, we look further into those reforms that seem to be affected by the information provided in the factual text.

At this point it is important to assess if the most treated were ex-ante more knowledgeable about the pension system than the control group or the less treated. However, the level of information for those questions not addressed in the text (measured by *info out text*) is not statistically different across the four groups (not treated, least treated, somewhat treated, most treated).

How large is the impact of information? Table 3.6 presents the results of three probit models: column 1 for the increase of the statutory retirement age, column 2 for the reduction of future pensions and column 3 for the reduction of present (and future) pensions. The results confirm that the intensity of treatment is crucial, as the treatment per se does not have a significant impact.

We thus present the results distinguishing according to the intensity of treatment (see Table 3.7). The regression analysis confirms that there is no difference between the willingness to reform of the control group and the least and somewhat treated. However, as suggested by the analysis above, for the most treated there is an impact, with an increased support for each reform by around 15 percentage points. Effective treatment increases support from 34% to 51% in the case of increasing the retirement age (and thus ensuring a majority favoring the reform), from 20% to 37% in the case of the decrease of future pensions and from 26% to 43% for the reduction of current (and future) pension payments.

In a nutshell, our analysis shows that having or acquiring a better understanding of the functioning and challenges of the system increases the willingness to undertake reforms that improve its sustainability. It is thus important to understand the differences in the treatment intensity. The results in Table 3.8 provide

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Table 3.5: Share of respondents in favor of the different reforms, by intensity of treatment

	Not treated	Least treated	Somewhat treated	Most treated
<i>N</i>	229	58	100	41
Favor at least one reform	0,70	0,69	0,72	0,85**
Favor reform 1	0,33	0,35	0,38	0,49**
Favor reform 2	0,19	0,19	0,25	0,34**
Favor reform 3	0,25	0,31	0,29	0,37*
Favor reform 4	0,34	0,22	0,29	0,29
Favor reform 5	0,22	0,29	0,23	0,27

Notes: \*\* (\*) Statistically different from the average values of the control group at 95% (90%); "Least treated" means that the respondent spends less than 10 seconds in the page displaying the text, "somewhat treated" means that the time spent is more than 10 seconds but less than 90 seconds and "most treated" means more than 90 seconds in the page.

Table 3.6: Effect of information on the probability of supporting a reform

<i>Dependent variable:</i> <i>1 if favor, 0 otherwise</i>	<b>Retirement age</b>	<b>Pensions active</b>	<b>Pensions all</b>
With text	0,05	0,06	0,04
Info out text	0,03**	0,00	0,02**
<i>Pseudo R-squared</i>	<i>0,16</i>	<i>0,07</i>	<i>0,10</i>
<i>N</i>	<i>424</i>	<i>424</i>	<i>424</i>

Notes: Average marginal effects of a probit model. With text is a dummy variable and thus the marginal effect is the impact in the probability of favoring the reform, in percentage points, of a change from 0 to 1 in the value of the variable. In the case of Info out text the marginal effect represents the impact of a small change in the information level; \*\* Significant at 5%; \* Significant at 10%; Other control variables: Private better, Union, Left, Right, Young 35, Old 55, High income, Low income, Short life expectancy, Personal pension, Covered SS, Unemployed, Student, Retired, Married, Male; Interaction terms between intensity of treatment and age with income are not significant.

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Table 3.7: Effect of information on the probability of supporting a reform, by intensity of treatment

<i>Dependent variable: 1 if favor, 0 otherwise</i>	<b>Retirement age</b>	<b>Pensions active</b>	<b>Pensions all</b>
With text most treated	0,16**	0,15**	0,15**
with text somewhat treated	0,02	0,06	0,01
with text least treated	0,00	-0,01	0,01
info out text	0,03**	-0,01	0,02**
<i>Pseudo R-squared</i>	<i>0,17</i>	<i>0,08</i>	<i>0,11</i>
<i>N</i>	<i>424</i>	<i>424</i>	<i>424</i>

Notes: Average marginal effects of a probit model. Apart from Info out text, variables are dummy variables and thus the marginal effect is the impact in the probability of favoring the reform, in percentage points, of a change from 0 to 1 in the value of the variable. In the case of Info out text the marginal effect represents the impact of a small change in the information level; \*\* Significant at 5%; \* Significant at 10%; Other control variables: Private better, Union, Left, Right, Young 35, Old 55, High income, Low income, Short life expectancy, Personal pension, Covered SS, Unemployed, Student, Retired, Married, Male; Interaction terms between intensity of treatment and age with income are not significant.

Table 3.8: Determinants of treatment intensity

<i>Dependent variable: 1 most treated; 0 other treated</i>			
Info out text	0,03	Unemployed	-0,07
Union	-0,14	Student	-0,02
Left	0,01	Married	-0,12 *
Right	0,01	Male	-0,05
Young 35	-0,07	Media	-0,08
Old 55	0,40 **	Attention	0,06
High income	-0,08	Covered SS	0,01
Low income	0,15 **		
<i>Pseudo R-squared</i>	<i>0,11</i>		
<i>N</i>	<i>198</i>		

Notes: Average marginal effects of a probit model. Apart from Info out text, variables are dummy variables and thus the marginal effect is the impact in the probability of favoring the reform, in percentage points, of a change from 0 to 1 in the value of the variable. In the case of Info out text the marginal effect represents the impact of a small change in the information level; \*\* Significant at 5%; \* Significant at 10%.

some preliminary insights, by comparing the most treated to the other treated respondents. Older respondents and the ones with lower income are more likely to take more time in the text section. In fact, it is natural to think that pensions are a topic of higher concern for older individuals. Also, the ones with lower income rely more heavily on the Social Security system and this may explain why they are keener to take the time to read information presented to them. Conversely, married respondents are less likely to read the text when given the opportunity to do so.<sup>4</sup>

### 3.4 The impact of priming

As discussed in Section 3.2, the second experiment focuses on a sample of University students. We randomize the order of blocks: with a probability of 50%, the respondents are immediately asked about their willingness to support reforms (blocks 3 and 4) and only afterwards prompted to respond questions on their preferences over the pension system (block 1) and their knowledge about its main features (block 2). This is our treated group. With the same probability, they are given the questions in the order presented before (blocks 1 and 2 and only afterwards blocks 3 and 4). These respondents are the control group. In neither case is it possible to return to a block after finalizing it.

The respondents are presented with four reforms of the pension system (similar to reforms 1-4 in the previous experiment), namely (i) to increase the retirement age, (ii) to decrease pensions of the active, (iii) to decrease pensions of both active and retired and (iii) to increase the contributions of the active.

Does the order of the questions have an impact on the willingness to support certain reforms of the pension system? The results indicate that the ones first prompted to think about their preferences and the features of the current system

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<sup>4</sup>The survey also included a block on the convergence of the public servants pension system (CGA) with SS. In our (non-representative) sample, the convergence between the two systems is not controversial. More than 75% of the respondents favor the convergence of CGA with SS. 60% believe that there should be transitory rules to protect those active public servants that have more years of service (the policy approach taken so far). In addition, 33% consider that the pensions of the already retired should be reduced in line with the new rules resulting from the convergence, a measure put forward by the current government.

are less supportive of reforms, in particular reforms that increase the retirement age (reform 1) and reduce the future pension benefits of the currently active (reform 2). This may relate to the effects described in Wilcox and Wlezien (1993) and Palmer and Duch (2001) whereby respondents try to ensure consistency between their support for reform and their previously expressed political opinions. This consistency effect is however not clear in the sample. For instance, those that favor a smaller system or that think that private systems work better than public ones are not more prone to accept the reform when first prompted to think about these preferences.

The mechanism behind our results is different. We obtain a very interesting result whereby ideology mediates priming. In particular, priming effects are different according to the political ideology of the respondent. As shown in Table 3.10, priming is more relevant for the extremes of the political spectrum. Looking at the respondents in the extremes, priming is stronger for the far-right. Finally, the reforms affected by priming effects are different for those in the far-left as compared to those in the far-right. It is interesting to note though that asking directly about willingness to reform (and only afterwards about preferences and knowledge about the main features of the system) increases support both for those in the far-left and those in the far-right.

Table 3.11 presents the results of a regression analysis of the probability to support a reform. Priming effects are relevant for the support of a reduction of pensions of those active (reform 2), irrespective of ideology. However, in the case of an increase of retirement age (reform 1) or a reduction of the pension of the active and the retired (reform 3), priming is only relevant for those on the far-right. Table 3.11 also shows that being on the far-left of the political spectrum consistently reduces support for reform.

### 3.5 Beyond information and priming

In this section we pool the information of both samples to gain some insights on the role of self-interest and ideology. As the samples are not representative, results beyond those presented in the previous sections should be interpreted with caution

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Table 3.9: Share of respondents in favor of the different reforms, by treatment

	<b>Control group</b>	<b>Treatment group</b>
<i>N</i>	<i>234</i>	<i>216</i>
Favor at least one reform	0,66	0,77**
Favor reform 1	0,33	0,44**
Favor reform 2	0,19	0,30**
Favor reform 3	0,20	0,23
Favor reform 4	0,28	0,33

Notes: \*\* (\*) Statistically different from the average values of the control group at 95% (90%).

Table 3.10: Share of respondents in favor of the different reforms, by treatment and ideology

	<b>Left</b>		<b>Center</b>		<b>Right</b>	
	Control group	Treatment group	Control group	Treatment group	Control group	Treatment group
<i>N</i>	<i>47</i>	<i>42</i>	<i>156</i>	<i>134</i>	<i>31</i>	<i>40</i>
Favor at least one reform	0,47	0,71**	0,70	0,75	0,77	0,95**
Favor reform 1	0,21	0,33	0,37	0,43	0,32	0,58**
Favor reform 2	0,13	0,26*	0,18	0,29**	0,32	0,35
Favor reform 3	0,09	0,10	0,24	0,20	0,19	0,48**
Favor reform 4	0,23	0,38*	0,28	0,33	0,32	0,30

Notes: \*\* (\*) Statistically different from the average values of the control group at 95% (90%).

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Table 3.11: Effect of priming on the probability of supporting a reform

	Retirement age	Pensions active	Pensions all	Contributions active
Treatment	0,07	0,1**	-0,02	0,02
Treatment*Left	0,06	0,02	0,00	0,11
Treatment*Right	0,20*	-0,03	0,29**	-0,06
Left	-0,15*	-0,07	-0,16*	-0,07
Right	-0,07	0,07	-0,08	0,08
<i>Pseudo R-squared</i>	<i>0,20</i>	<i>0,10</i>	<i>0,22</i>	<i>0,04</i>
<i>N</i>	<i>436</i>	<i>436</i>	<i>436</i>	<i>436</i>

Notes: Average marginal effects of a probit model. All variables presented in the Table are dummy variables and thus the marginal effect is the impact in the probability of favoring the reform, in percentage points, of a change from 0 to 1 in the value of the variable; \*\* Significant at 5%; \* Significant at 10%; Other control variables: Info, Private better, High income, Low income, Worker, Unemployed, Short life expectancy, Wish retire 65 plus, Youth unemployment, Married, Male, Parent retired, Parent unemployed, Parent university, UL, UTL, Economics management, Doctoral, Master, Grade.

and can only be seen as preliminary. With these constraints in mind, the results in Table 3.12 indicate that, in line with existing literature, ideology plays a role in the support for the different reforms. In particular, and as already mentioned in the previous section, those on the left of the political spectrum are less prone to support the different reforms.

The role of self-interest is asymmetric across reforms, which we would expect given that different reforms have a different impact and are thus subject to different personal considerations. For instance, respondents with higher income are more willing to increase the retirement age. A possible explanation may be related to job satisfaction as, in fact, the proportion of those willing to retire after 65 is higher for higher income respondents as compared to lower income respondents. Also, those that have a self-reported lower life expectancy are less keen to increase the retirement age, as this would have higher costs for them. Another example relates to the reduction of current (and future) pensions, where older respondents are much less keen to favor such reform as compared to younger respondents. Conversely, older workers are more prone to support increases in the contributions of the current active vis-à-vis younger respondents.

There are other elements that also play a role. In particular, male respondents

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are more willing to reform the system, whereas the unemployed are more likely to reject reforms that reduce the generosity of the pension system (possibly because they are beneficiaries of social security and thus value it more).

Finally, our results confirm that, for some reforms, the level of information about the system is indeed relevant to increase support for reform.

Table 3.12: Determinants of the probability of supporting a reform

	Retirement age		Pensions active		Pensions all		Contributions active		Contributions retired	
<b>Information</b>										
Info common	0,04	**	0,00		0,02	**	0,00		0,01	*
<b>Ideology</b>										
Private better	0,01		0,04		0,05	*	0,02		0,05	
Left	-0,09	**	-0,06	*	-0,13	**	0,02		-0,12	**
Right	0,04		0,04		0,07	*	-0,03		0,07	
<b>Self-interest</b>										
Young 35	0,01		-0,04		-0,05		0,00		0,01	
Old 55	0,04		0,01		-0,28	**	0,14	**	-0,12	
Retired	0,01		0,15	*	0,03		0,04		-0,08	
High income	0,07	**	0,01		0,01		-0,06		0,06	
Low income	-0,06		0,02		0,00		-0,02		0,08	
Short life expectancy	-0,17	**	0,02		-0,06		-0,06		0,00	
<b>Other variables</b>										
Male	0,09	**	0,09	**	0,10	**	0,06	*	0,01	
Married	0,04		0,05		0,03		-0,04		-0,04	
Unemployed	-0,16	**	0,02		-0,12	**	0,03		-0,29	**
<i>Pseudo R-squared</i>	0,11		0,05		0,10		0,02		0,07	
<i>N</i>	874		874		874		874		424	

Notes: Average marginal effects of a probit model. Apart from *Info common*, all variables are dummy variables and thus the marginal effect is the impact in the probability of favoring the reform, in percentage points, of a change from 0 to 1 in the value of the variable. In the case of *Info common* the marginal effect represents the impact of a small change in the information level. The reform that would increase the contributions of the retired was only included in the voters' sample.; \*\* Significant at 5%; \* Significant at 10%; Additional control variables: Sample and Treatment.

### 3.6 Insights on the partial privatization of SS

Both surveys include a question to ascertain the willingness of the respondents to partially privatize the SS system, potentially at a cost (based on Schokkaert et al, 2000). A proposal in this direction was put forward by the current Portuguese government, for further discussion (although it gained no political or social traction). The results of this section can provide some initial insights on the way these measures are perceived and the implications of the different implementation features, with the caveat that the samples used are constructed for two specific experiments and are not representative of the population.

The question on privatization may be found in Appendix 3.C. Five privatization options are provided: option A is designed to entail no cost for the respondent, in the sense that the cut in contributions is proportional to the cut in benefits; options B to E entail growing embedded costs, as the cut in benefits is more than proportional to the cut in contributions. In this initial specification, the reduction in the contribution reverts to the respondent, via her monthly salary, and she is free to decide what to do with it.

As the interpretation of the question is not straightforward, in the analysis of this section we focus on those that gave consistent replies, namely by respecting monotonicity. It is interesting to note that, despite the complexity and length of the question, 75% and 82% of the respondents, respectively for the voters and the students samples, give consistent replies. Nevertheless, the fact that the replies are not consistent for 18% to 25% of the respondents hints to the relevance of communicating well the proposed reforms, in order to ensure an inclusive debate and the emergence of informed decisions. As an illustrative example, the inclusion of those that give inconsistent replies would increase the resistance to Option A by around 5 percentage points both for the voters and the students samples.

Table 3.13 presents the aggregate results for each sample. Two main results emerge. First, around one in every four to five respondents does not know if they favor such reforms. This share is much higher than the one found for reforms 1 to 5 in the previous sections, where the percentage was around 5% (except for reform 5, related to the contribution of the retired, where the value was 12%). This may be related to the complexity of the question but can also signal, as mentioned before,

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Table 3.13: Share of respondents in favor of the different options

	Voters sample			Students sample		
	N=317			N=371		
	Yes	No	DK	Yes	No	DK
Option A: 50%	0,39	0,43	0,18	0,48	0,28	0,24
Option B: 45%	0,18	0,63	0,20	0,25	0,50	0,25
Option C: 40%	0,12	0,69	0,18	0,13	0,62	0,25
Option D: 35%	0,08	0,74	0,18	0,07	0,69	0,24
Option E: 30%	0,08	0,74	0,18	0,06	0,70	0,23

Notes: The proposal entailed a reduction in contributions by half, which would be paid directly in the salary. Upon retirement, the pension would be lower, as if the worker had worked for X% of her initial salary.

the need for more information and more discussion of this type of reform. Second, 39% and 48% of the respondents, respectively for the voters and student samples, favor a privatization of 50% of the system (Option A), but this support is cut in half if the privatization would be in somewhat less favorable terms, increasing the sustainability of the social security system (Option B).

When asked what the respondent would do with the extra money, close to 40% of the respondents that would accept the proposal claim they would fully save it for retirement (and an additional 50% state that they would save a large share for retirement).

Finally, the survey included a question with a proposal similar to Option A but, instead of giving the money directly to the person via the monthly salary, it would automatically be put aside in an investment fund that could only be used after retirement. 25% to 30% of the respondents that previously agreed with the measure are not willing to accept this new alternative, where they would be forced to save until retirement via an investment fund. Conversely, 40% to 50% of the respondents that previously refused Option A are now willing to accept it under these new conditions. From those that claimed that they would fully save the money for retirement under the previous formulation, only 60% to 70% would accept the investment fund formulation. This may signal that, although they expect to save the money for retirement, they would like to have flexibility to use it before retirement if they so wished or needed; it may also mean that

they would prefer to save it but not via an investment fund or not via compulsory savings.

The analysis of this section is illustrative of the relevance that the design of such reform has on its political sustainability.

### 3.7 Concluding remarks

Several countries are facing the challenge of ensuring political support for the needed reforms of the pension system. In this paper, we present the results of two randomized control trials that provide useful insights on the determinants of the support for reforms.

We show that, for a sample of Portuguese voters, literacy on pensions has, in line with previous literature, an impact on the agents' willingness to support reforms that increase the sustainability of the pension system. By randomly providing information to half of our respondents, we show that access to (and willingness to acquire) information does have an impact on individual information levels and thereby on support for reforms. However, it is important to note that the intensity of treatment varies across individuals, i.e. not all respondents take the time to actually read the information provided to them: older, lower-income and non-married respondents are more prone to do so. Further research should aim at better understanding the differences between those willing and not willing to acquire information (and on ways to change the behavior of the latter) and, also, at better grasping the effectiveness of information campaigns (i.e. their power to increase information levels) for different individuals.

The second experiment highlights the relevance of priming. For a sample of Portuguese University students, we show that support for certain reforms is impacted by the order of questions. Also, these effects are more relevant for those in the extremes of the political spectrum, in particular for those on the far-right. The drivers of these priming effects should be further investigated.

Our analysis also finds a role for the other two main determinants of voters behavior presented in the literature, namely self-interest and ideology (beyond the priming effects discussed above). In particular, those on the left of the political

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spectrum are less likely to support any reform reducing the generosity of the system. The role of self-interest is, as expected, dependent on the exact reform being discussed, as different measures have different personal implications. However, one should keep in mind that the sample is not representative and any results beyond those directly related to the experiments should be interpreted with caution. A robust insight can only be achieved by using a representative sample of the population.

Finally, we provide some preliminary insights on the relevance of the design of reforms intended to partially privatize Social Security. The exact configuration presented to the respondents has an important impact in their decision to support or not the reform. The robustness of the preliminary results on privatization should be assessed by relying on a sample that is representative of the population.

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# Appendices



## 3.A Informative text

### OLD AGE SOCIAL SECURITY PENSIONS IN PORTUGAL

Social Security old age pensions are organized in a system where active workers contribute to the pensions of those who are retired.

#### **The Portuguese population is ageing**

In the early 1990s there were about 5 people at working age for every person over 65 years old. Currently, there are close to 3 and 30 years from now we will have less than 2 persons of working age for every person over 65 years old.

The average life expectancy (ALE) at age 65 increased by about 3 years in the last 20 years and the same is likely to happen in the next 30 years. In 1990, the ALE of a 65 years old man was 14 years; currently it is 17 years and in 2040 it will be 20 years. For women, the ALE at 65 was 17 years in 1990. Nowadays, it is 20 years and in 2040 it will be 23 years.

#### **Changes to the system**

In recent years several changes were made to the Social Security pension system. For example, the sustainability factor was introduced in 2007, lowering the value of the pension for new retirees in a way that offsets the increase in average life expectancy. Currently, the reduction in the amount of the pension is about 5% and may approach 20% in 30 years. The employee may choose to work for some additional time to ensure a full pension.

The consideration of all wages received during the worker's career (and not just those received in recent years, normally higher) also contributed to lowering the replacement rate, i.e. the ratio between the value of the first pension received after retirement and the last salary received while active.

According to a study by AIR and APFIPP\*, the replacement rate for a salary of 1,000 euros will decrease from about 73% in 2011 to 66% in 30 years. Currently, a person who earns 1000 and retires is expected to receive about 730 euros. 30 years from now, a person who earns 1000 and retires will be receiving 660 euros .

In 2012, additional temporary measures were taken, as the cut (partial or total) of Holiday and Christmas pay and the taxation of pensioners through the so-called Extraordinary Contribution of Solidarity. The Constitutional Court prevented some of these measures to be applied in 2013.

#### **Sustainability**

Studies of AIR and APFIPP as well as of the Ministry of Solidarity and Social Security (MSSS) caution against the negative balance of the system. According to the MSSS\*\*, the Social Security Fund will go bankrupt in 10 years time (or 30 years , if we would continue to apply the measures of 2012).

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\* [http://www.aireforma.pt/1/upload/relata\\_rio\\_apfipp\\_part1\\_final.pdf](http://www.aireforma.pt/1/upload/relata_rio_apfipp_part1_final.pdf) (AIR: Portuguese Association for Research on Savings, Investments and Pensions; APFIPP: Portuguese Association of Investment Funds, Pension Funds and Asset Management); \*\* <http://www.portugal.gov.pt/media/736269/oe2013-rel.pdf> (pp. 261 to 265)

### **3.B List of variables and descriptive statistics**

Below we present the list of variables taken from the voters and students samples and the respective descriptive statistics, broken down by treatment.

Table A.1: Voters sample

Variable	Description	Full sample					Control group					Treated				
		Mean	Std. Dev.	Min	Max		Mean	Std. Dev.	Min	Max		Mean	Std. Dev.	Min	Max	
Private better	1 if the respondent thinks that privately organized pension systems are better than the public organized ones (more money per euro invested)	0,32	0,47	0	1	0,32	0,47	0	1	0,32	0,47	0	1			
Union	1 if the respondent belongs to a trade union	0,13	0,34	0	1	0,15	0,36	0	1	0,12	0,32	0	1			
Left	1 if the respondent classifies himself as 1 or 2 in a scale from 1 (left) to 7 (right) in the political spectrum	0,29	0,46	0	1	0,30	0,46	0	1	0,28	0,45	0	1			
Right	1 if the respondent classifies himself as 6 or 7 in a scale from 1 (left) to 7 (right) in the political spectrum	0,12	0,32	0	1	0,13	0,34	0	1	0,10	0,30	0	1			
Age	Age of the respondent	39,97	13,67	17	83	40,50	14,51	20	83	39,35	12,63	17	78			
Young 35	1 if the respondent is less than 35 years old	0,43	0,50	0	1	0,44	0,50	0	1	0,42	0,49	0	1			
Old 55	1 if the respondent is more than 55 years old	0,16	0,37	0	1	0,19	0,39	0	1	0,13*	0,34	0	1			
Income	Income class - monthly after taxes income per capita; class 1 corresponds to income below 500; then each subsequent class grows in steps of 250; the highest class (12) corresponds to income higher than 3001	4,95	3,20	1	12	4,95	3,26	1	12	4,96	3,13	1	12			
High income	1 if the respondent belongs to income class 6 or higher	0,33	0,47	0	1	0,32	0,47	0	1	0,34	0,48	0	1			
Low income	1 if the respondent belongs to income class 2 or lower	0,24	0,43	0	1	0,28	0,45	0	1	0,20*	0,40	0	1			
Short life expectancy	1 if the respondent expects to live less than 10 years after age 65	0,15	0,35	0	1	0,15	0,36	0	1	0,14	0,35	0	1			
Personal pension	1 if the respondent contributes or expects to contribute to a personal pension fund to complement the pension from the public system in the first years or in the middle of her professional life	0,54	0,50	0	1	0,53	0,50	0	1	0,56	0,50	0	1			
Covered SS	1 if the respondent is covered by social security	0,54	0,50	0	1	0,53	0,50	0	1	0,55	0,50	0	1			
Unemployed	1 if the respondent is unemployed	0,08	0,27	0	1	0,08	0,27	0	1	0,08	0,28	0	1			
Student	1 if the respondent is a student	0,10	0,29	0	1	0,10	0,30	0	1	0,09	0,29	0	1			
Retired	1 if the respondent is retired	0,09	0,29	0	1	0,13	0,33	0	1	0,05**	0,22	0	1			
Married	1 if the respondent is married	0,54	0,50	0	1	0,55	0,50	0	1	0,54	0,50	0	1			
Male	1 if the respondent is male	0,49	0,50	0	1	0,47	0,50	0	1	0,51	0,50	0	1			
Media	1 if the respondent followed media coverage on pensions in the recent months	0,65	0,48	0	1	0,64	0,48	0	1	0,66	0,48	0	1			
Attention	1 if the respondent states that her level of attention to the media coverage is medium or high	0,69	0,46	0	1	0,67	0,47	0	1	0,72	0,45	0	1			

\*\* (\*) Statistically different from the values of the control group at 95% (90%).

Table A.2: Students sample

Variable	Description	Full sample					Control group					Treated				
		Mean	Std.	Dev.	Min	Max	Mean	Std.	Dev.	Min	Max	Mean	Std.	Dev.	Min	Max
Info	Number of correct answers in a set of 13 questions related to the pension system in Portugal	5.80	2.13	0	0	13	5.91	2.07	0	2	12	5.69	2.19	0	13	
Private better	1 if the respondent thinks that privately organized pension systems are better than the public organized ones (more money per euro invested)	0.34	0.48	0	0	1	0.33	0.47	0	1	1	0.36	0.48	0	1	
Left	1 if the respondent classifies himself as 1 or 2 in a scale from 1 (left) to 7 (right) in the political spectrum	0.20	0.40	0	0	1	0.20	0.40	0	1	1	0.19	0.39	0	1	
Right	1 if the respondent classifies himself as 6 or 7 in a scale from 1 (left) to 7 (right) in the political spectrum	0.16	0.37	0	0	1	0.13	0.34	0	1	1	0.19	0.39	0	1	
Income	Income class - monthly after taxes income per capita; class 1 corresponds to income below 500; then each subsequent class grows in steps of 250; the highest class (10) corresponds to income higher than 2500	4.29	2.81	1	1	10	4.48	2.84	1	10	10	4.09	2.77	1	10	
High income	1 if the respondent belongs to income class 6 or higher	0.30	0.46	0	0	1	0.33	0.47	0	1	1	0.28	0.45	0	1	
Low income	1 if the respondent belongs to income class 2 or lower	0.35	0.48	0	0	1	0.31	0.47	0	1	1	0.38	0.49	0	1	
Age	Age of the respondent	27.52	9.73	17	73	73	27.06	9.36	16	71	71	28.02	1.01	20	73	
Worker	1 if the student is employed	0.33	0.47	0	0	1	0.32	0.47	0	1	1	0.34	0.48	0	1	
Unemployed	1 if the student is unemployed	0.16	0.36	0	0	1	0.17	0.38	0	1	1	0.14	0.35	0	1	
Short life expectancy	1 if the respondent expects to live less than 10 years after age 65	0.12	0.32	0	0	1	0.11	0.31	0	1	1	0.13	0.33	0	1	
Wish retire 65 plus	1 if the respondent wished to retire after age 65	0.22	0.41	0	0	1	0.23	0.42	0	1	1	0.21	0.41	0	1	
Youth unemployment	1 if the respondent considers that an increase in the retirement age increases youth unemployment	0.71	0.45	0	0	1	0.72	0.45	0	1	1	0.70	0.46	0	1	
Married	1 if the respondent is married	0.17	0.38	0	0	1	0.17	0.37	0	1	1	0.17	0.38	0	1	
Male	1 if the respondent is male	0.35	0.48	0	0	1	0.38	0.49	0	1	1	0.31	0.46	0	1	
UL	1 if the respondent studies at Lisboa University	0.33	0.47	0	0	1	0.29	0.45	0	1	1	0.36*	0.48	0	1	
UTL	1 if the respondent studies at Technical University of Lisbon	0.08	0.27	0	0	1	0.07	0.26	0	1	1	0.08	0.27	0	1	
Economics management	1 if the respondent studies in Economics or Management School	0.24	0.43	0	0	1	0.27	0.44	0	1	1	0.22	0.41	0	1	
Doctoral	1 if the respondent is a doctoral student	0.16	0.37	0	0	1	0.16	0.36	0	1	1	0.16	0.37	0	1	
Master	1 if the respondent is a masters student	0.25	0.43	0	0	1	0.24	0.43	0	1	1	0.26	0.44	0	1	
Grade	Current grade of the respondent	14.48	1.84	10	20	20	14.54	1.77	11	20	20	14.42	1.92	10	19	
Parent retired	1 if at least one of the parents of the respondent is retired	0.29	0.46	0	0	1	0.28	0.45	0	1	1	0.31	0.46	0	1	
Parent unemployed	1 if at least one of the parents of the respondent is unemployed	0.16	0.36	0	0	1	0.18	0.39	0	1	1	0.13	0.34	0	1	
Parent university	1 if at least one of the parents of the respondent has a college degree	0.51	0.50	0	0	1	0.50	0.50	0	1	1	0.53	0.50	0	1	

\*\*\* (\*) Statistically different from the values of the control group at 95% (90%).

### 3.C Question on partial privatization of SS

#### QUESTION A

Assume that you are employed and you are offered a proposal of "less contributions, less pension" in the following terms:

- The contribution to the pension system is reduced by half
- You receive the other half in your salary
- When you retire, your pension will be lower. It will be calculated as if your salary had been half of its amount or less.

Would you accept this proposal if your pension was calculated as if you had worked for:

- Option A** 50% of your initial salary? ( Yes / No / Do not know )
- Option B** 45% of your initial salary? ( Yes / No / Do not know )
- Option C** 40% of your initial salary? ( Yes / No / Do not know )
- Option D** 35% of your initial salary? ( Yes / No / Do not know )
- Option E** 30% of your initial salary? ( Yes / No / Do not know )

*Example (illustrative values):*

Assume that (i) your net salary is 800 euro per month; (ii) the contribution to Social Security - yours and of your company in your behalf - amounts to 300 euro.

This proposal means that your contribution will be only 150 euros and you'll receive the other half together with your salary. I.e. (i) contribution to Social Security: decreases from 300 euro to 150 euro; (ii) net Salary per month: increases from 800 euro to 950 euros.

This would be effective during your working life. When you retire, your pension would be lower than if you had made the full contribution. The pension would be calculated as if your net monthly salary had been:

- Option A** EUR 400 - 50% of your initial salary? ( Yes / No / Do not know )
- Option B** EUR 360 - 45% of your initial salary? ( Yes / No / Do not know )
- Option C** EUR 320 - 40% of your initial salary? ( Yes / No / Do not know )
- Option D** EUR 280 - 35% of your initial salary? ( Yes / No / Do not know )
- Option E** EUR 240 - 30% of your initial salary? ( Yes / No / Do not know )

#### QUESTION B

Now, imagine a slightly different proposal:

- Instead of receiving half of the initial contribution in your salary, this money would be placed in an investment fund of your choice
- You could only access the money when you retire

Would you accept this proposal? ( Yes / No / Do not know )

