LUISS Guido Carli
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Thesis Committee:
Prof. *Sascha Becker*, University of Warwick
Prof. *Agar Brugiavini*, Università Ca' Foscari, Venezia
Prof. *Mauro Sylos Labini*, Università di Pisa

Abstract

This thesis investigates two different issues in applied microeconomics. Both issues broadly attains to fiscal policy. The first aspect relates to the optimal geographical allocation of public spending; the second issues concerns to the use of fiscal incentives to boost retirement saving, thus alleviating tension on public social security expenditure.

In Chapter 1 (co-authored with Giuseppe Albanese and Pietro Tommasino) we contribute to the literature by exploring how formal rules and informal cultural traits (namely, the degree of civicness) interact in shaping elected officials' behaviour. We use a dataset which includes the expenditure proposals sponsored by each member of the Italian Senate from 1993 to 2012 (as well as other individual and district characteristics) and exploit the 2005 electoral reform. As a first step, we are able to confirm previous empirical findings: in particular, legislators elected in first-past-the post districts show higher propensity to sponsor pork barrel bills and to put effort in legislative activity than those elected with a closed-list proportional system. More importantly, we find that the effects of the change in the electoral rule are muted (and in some cases reversed) in areas characterised by a high degree of civicness. We also propose a simple theoretical probabilistic voting model with altruistic preferences to rationalise these findings.

In Chapter 2 I study the effect of fiscal and behavioural incentives towards private retirement saving, brought about by an Italian reform in 2007, on total wealth accumulation and on the composition of financial portfolio. According to life-cycle model, any permanent shock to life-cycle wealth is likely to affect savings. Any major social security reform, such as the one under investigation, may qualify as permanent shock. I find evidence that workers who subscribe to private pension funds raise their current propensity to save and tilt their financial portfolio towards less risky assets. The possible explanations to rationalize such evidence may be several, ranging from standard life-cycle hypothesis to behavioural economics models.

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The views expressed herein are those of the author and should under no circumstances be interpreted as reflecting those of Banca d'Italia or the Eurosystem.
All errors are and remain my own.

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Chapter 1

Pork barrel, legislators'productivity and electoral rules: a micro test based on the Italian 2005 reform

1.1 Introduction

Few political phenomena appear more widespread across countries and through time than the tendency of elected politicians to indulge in pork barrel expenditure, i.e. to use public money for narrowly-targeted projects, as a means to favour local constituencies. However, while pork barrel is a feature of all modern democracies, several studies suggest that its importance varies systematically as a function of social and political characteristics of each country.

In particular, the fraction of narrowly-targeted as opposed to broad expenditure programs seem to depend on the electoral rule. A positive relationship between majoritarian representation and targeted expenditures is found by Persson and Tabellini (2005) and by Milesi-Ferretti, Perotti and Rostagno (2002) in a panel of countries, and by Gagliarducci, Nannicini and Naticchioni (2011), which use individual-level, within-country data on the behaviour of Italian legislators.

Electoral rules influence also elected representatives' incentives to engage in self-serving or dishonest behaviour. There is evidence that proportional representation increases corruption (Persson, Tabellini and Trebbi 2003; Persson and Tabellini 2005; Kunicova and Rose-Ackerman 2005)[1], as well as other less serious forms of misbehaviour, such as absenteism (Gagliarducci, Nannicini and Naticchioni (2011)).

Of course, the main concern for any empirical analysis of the causal impact of electoral rules is to account for the potential non-random selection of the rules. Persson and Tabellini (2005) address such endogeneity issue by means of an instrumental variable approach.[2] Gagliarducci,

[1] Chang and Golden (2007) offer a more nuanced view, and point out that the details of the electoral regime matter for the results.

[2] They assume that the date of the adoption of the constitution, proxies for European cultural influences and latitude determine the relevant features of the constitution but are uncorrelated with other unobserved determinants of expenditure composition. See Acemoglu (2005) for some concerns about this strategy.

Nannicini and Naticchioni (2011) exploit a peculiarity of the Italian electoral system for the Lower House in place between 1993 and 2005, in which a subset of members were elected in first-past-the-post districts and the remaining were elected through a closed-list proportional system. In this context, the possibility of an endogeneity bias arises because candidates could self-select in one of the two tiers based on some unobservable characteristics. Gagliarducci, Nannicini and Naticchioni (2011) address this issue by resorting to regression discontinuity techniques.

In the present paper, we use an individual-level, within-Italy dataset as in Gagliarducci, Nannicini and Naticchioni (2011), but we follow a different identification strategy, analogous in spirit to Rajan and Zingales (1998).[3] That is, instead of looking at the overall effect of the electoral rule, we focus on the details of one specific theoretical channel.

We will spell-out our theoretical model below, but let us give a quick preview of our argument. According to Persson and Tabellini (1999), electoral competition in majoritarian systems tends to concentrate in districts with a relatively high fraction of swing voters, i.e. voters that can be induced to change their vote even by a small change in one of the policy platforms. The most efficent way to convince a swing voter to switch side is to increase the amount of transfers specifically targeted to his district, because general interest expenditures would also benefit voters in non-swing districts, and would therefore be partially wasted from an electoral point of view. As in majoritarian systems the electoral competition tends to be stiffer, Persson and Tabellini (1999) also show that the marginal cost of a more self-serving electoral platform is higher. Therefore, there is a stronger incentive for candidates to commit to a high level of effort once elected.

While in Persson and Tabellini (1999) voters are self-interested when choosing among competing platforms, we assume that voters (some voters at least) not only care about their own self-interest, but also about the welfare of others. We show that this implies that an *increase* in the degree of voters' civicness *attenuates* the impact of a change in the electoral rule on pork-barrel and on politicians' effort. The intuition is straightforward: with civic voters, the difference in incentives due to the fact that in majoritarian elections competition is concentrated in the swing districts is partly muted by the fact that civic citizens, when voting, partly internalize the preferences of citizens living in other districts. The aim of this paper is to test this empirical prediction.

To do this, we exploit (1) the well-documented (at least since the seminal work by Putnam, Leonardi and Nanetti, 1994[4]) heterogeneity in civicness across Italian regions and (2) the electoral reform which in 2005 changed the system for electing the Italian Parliament form one based on first-past-the post races to one based on large districts, where the competition is among closed party lists. More in detail, our empirical exercise is structured as follows. First, for each electoral district of the Italian upper house (Senate), we collect measures of citizens' civicness. Second, we gather data on the sponsorship of legislative bills by Members

[3] They applied it to an altogether different problem, namely the relationship between financial development and growth. Afterwards, it has been adopted in several other contexts.

[4] See also Guiso, Sapienza and Zingales (2004) and the authoritative and up-to-date survey by Guiso, Sapienza and Zingales (2010).

of the Senate before and after the 2005 reform , distinguishing between general-interest and pork-barrel bills. Finally, we check whether: (1) the propensity to sponsor pork barrel bills and (2) politicians'effort as measured by the overall number of sponsored bills decrease less after the reform in high-civicness districts, which is our theoretical a priori. Just as in Rajan and Zingales (1998) our approach, as it singles out a specific channel through which electoral rules affects outcomes, helps to pin down causality. Indeed, as we have a prediction concerning the *interaction* between civicness and electoral rules we are able to control both for time and for district fixed effect, therefore addressing various concerns arising in standard comparative politics analyses (e.g. reverse causation and omitted variables).

The rest of the paper is organized as follows. After a quick review of previous contributions (Section 2), in Section 3 we outline a simple theoretical model in which electoral rules and civicness jointly determine the equilibrium level of pork-barrel, general-interest spending, and political rents. In Section 4 and 5 we describe the evolution of the Italian institutional set up and our dataset, respectively. In Section 6, we present our econometric analysis. Section 7 concludes and discusses some possible implications of our finding for institutional design.

1.2 A simple model

In this section, we propose an extension of the model by Persson and Tabellini (1999). In particular, we introduce an element of civicness in the preferences of the voters. We will show that the main results of Persson and Tabellini (1999) go through also in this more general setting, namely rents are lower and pork-barrel higher with a majoritarian electoral rule than with a proportional one. Second, and more importantly, we will show that the differences in fiscal policy outcomes between the two regimes (proportional *vs* majoritarian) are attenuated if civicness is high. This result motivates our empirical strategy.

The model has three building blocks: (1) a very simple endowment economy, (2) a government with the ability to rise taxes in order to provide a general-interest public good, district-specific transfers or to pocket political rents; (3) a political system in which two candidates compete for election in order to earn rents from office.

The economy. **-** We consider a country with three regions, each populated by a measure-one continuum of individuals. Each of them is endowed with one unit of a numeraire good. Agents care not only about their own consumption but also about the consumption of the others. In particular, an agent k living in district i maximizes

$$W_k^i = c_k^i + \alpha^i \sum_{j \neq i} c^j$$

Where c^i indicates consumption and α^i is the district-specific degree of civicness. We assume that all the individuals have the same endowment, therefore from now on we will drop subscript k except where it is strictly needed. Equation (1) is a very standard way to capture altruistic preferences (Rabin, 1998; Bergstrom 2006).

Consumption is in turn derived from a private good (the numeraire) and from a non-

excludible, non-rival public good (g). Each agent has an endowment equal to 1 of the numeraire good. Therefore:

$$c^i = 1 - \tau + b^i + h\ln(g)$$

and W^i can be rewritten as:

$$W^i = (1 + 2\alpha^i)(1 - \tau + h\ln(g)) + b^i + \alpha^i \sum_{j \neq i} b^j \tag{1.1}$$

Where $1 - \tau + b^i$ is disposable income after taxes (τ) and district-specific transfers (b^i) and $h\ln(g)$ is the consumption derived from the public good. The strictly positive parameter h captures the usefulness of the public good relative to the private good.

Public Finance. **-** The Government rises from each citizen the same amount of taxes $0 \leq \tau \leq 1$, and uses the revenues to finance the general public good $g \geq 0$, district-specific transfers $(b^1, b^2, b^3) \geq \mathbf{0}$, and rents for itself $r \geq 0$.[5] Its budget constraint is therefore given by:

$$3\tau \geq r + \sum b^i + g \tag{1.2}$$

Political competition. **-** We consider a political system in which two parties (A and B) compete for the government. They simultaneously propose binding policy platforms (q^A, q^B) to the voters:

$$q^A = \left\langle \tau^A, b^{1A}, b^{2A}, b^{3A}, r^A \right\rangle, \; q^B = \left\langle \tau^B, b^{1B}, b^{2B}, b^{3B}, r^B \right\rangle$$

After having observed (q^A, q^B), voters cast their ballots. As it is standard in probabilistic voting models, they do not only consider the impact of the proposed policy platforms on their disposable income, but are also influenced by a aggregate (δ) and an individual (σ_k^i) "popularity shock". The latter are drawn from a region-specific distribution. Therefore, individual k from group i votes for party A if and only if

$$W^i(q^A) > W^i(q^B) + \delta + \sigma_k^i$$

where:

$$\delta \sim U[-\frac{1}{2d}; \frac{1}{2d}]; \sigma_k^i \sim U[\bar{\sigma}^i - \frac{1}{2s^i}; \bar{\sigma}^i + \frac{1}{2s^i}] \text{ for } i = 1, 2, 3. \tag{1.3}$$

The vote share of party A in district i is the following:

$$\pi^{A,i} = S^i\left[W^i(q^A) - W^i(q^B) - \delta - \bar{\sigma}^i\right] + \frac{1}{2} \tag{1.4}$$

where the expression in brackets indicates the swing voters in district i.

Without loss of generality, let $\bar{\sigma}_1 > \bar{\sigma}_2 = 0 > \bar{\sigma}_3$. Moreover, let us follow Persson and Tabellini (1999) and assume that region 2 (the one with the more moderate distribution of "ideologic tastes") is also the region with the more homogeneous ideological distribution. In particular,

[5] It is straightforward to translate the results concerning rent extraction into results concerning effort (which is the variable that we study in the empirical part).

we assume:

Assumption 1

$$s^2 > \max\left[\left(\frac{1-\alpha^1}{1-\alpha^2}\right)s^1; \left(\frac{1-\alpha^3}{1-\alpha^2}\right)s^3\right].$$

Moreover, we require (again following Persson and Tabellini, 1999) the following condition to hold:

Assumption 2: $\bar{\sigma}_1$ and $\bar{\sigma}_3$ are sufficiently far apart. Under the assumption that ideological bias is large enough, party A expects to win with a quite safe margin in district 1 and to equivalently loose in district 3, so that the competition only takes place in the marginal district 2.

The objective function of party A and B is:

$$(R+r)E\left[p^A(q^A, q^B)\right] \tag{1.5}$$

$$(R+r)E\left[1-p^A(q^A, q^B)\right], \tag{1.6}$$

where R are exogenous rents from office and p^A is the probability that party A is elected as a function of the two electoral platforms[6] In particular,

$$p^A = P\left[\frac{1}{3}\sum_i \pi^{A,i} \geq \frac{1}{2}\right] \tag{1.7}$$

$$p^A = P\left[\pi^{A,2} \geq \frac{1}{2}\right] \tag{1.8}$$

The expressions above indicate the probability of election respectively under the proportional and the majoritarian system; in the latter case, by Assumptions 1 and 2, only marginal district matters because it has the highest number of swing voters whose ballot is prone to be swayed by redistributive policies.

How are votes aggregated into a policy outcome? We first consider the case of a single nationwide electoral district, which is meant to capture the mechanics of a typical proportional system. Indeed, in this case winning the elections requires winning at least 50% of the national votes. As a second step, we consider a majoritarian system, in which each region elects a single representative in a first-past-the-post race, and the party which gets at least two regional representative takes the government. This set up implies that a party can win the elections even earning less than 50% of the overall votes, provided it gets at least 50% of the votes in two out of three districts (therefore, in principle, to win it may be enough to convince just 33% of the electorate).

Let us define q^{prop} and q^{maj} as the equilibrium policy outcomes under the two electoral systems:

$$q^{prop} = \left\langle \tau^{prop}, b^{1prop}, b^{2prop}, b^{3prop}, r^{prop} \right\rangle;\ q^{maj} = \left\langle \tau^{maj}, b^{1maj}, b^{2maj}, b^{3maj}, r^{maj} \right\rangle.$$

One can prove the following two results:

[6] the expected value is relative to the aggregate δ. The uncertainty linked to the individual shocks cancels away at the population level.

Proposition 1 $b^{kprop} \leq b^{kmaj}$ for $k = 1, 2, 3$, with the inequality strict for $k = 2$; $r^{prop} > r^{maj}$; $g^{prop} > g^{maj}$.

Proposition 2. - Provided α^2 is sufficiently high, $\frac{\partial\left(g^{prop}/g^{maj}\right)}{\partial\alpha^i} < 0$ for i=1,2,3; $\frac{\partial\left(r^{prop}/r^{maj}\right)}{\partial\alpha^i} \leq 0$ for i=1,2 (with strict inequality for i=1,3); provided $\alpha^1, \alpha^2, \alpha^3$ are sufficiently high, $\frac{\partial\left(b^{maj}/b^{prop}\right)}{\partial\alpha^i} < 0$ for i=1,2,3.

In words, proposition 1 says that in majoritarian regimes there is less provision of general-interest public goods, and less rent extraction, but more provision of geographically-targeted transfers, with respect to proportional regimes. This statement basically extends to our setting with altruistic voters the main result of Persson and Tabellini (1999). Proposition 2, instead, captures the essence of our argument. It says that the *difference* in policy outcomes between the two electoral regimes is *smaller* if the degree of civicness is *higher*. This result concerning the interaction between civicness and electoral rules is key to our empirical strategy.

Discussion. **-** Before moving to the data, we would like to stress that our very stilized model is not meant to capture all the details of the Italian electoral set up. In our model the difference between a majoritarian and a proportional system boils down to an increase in district magnitude, whereas it is well-known that the two systems differ in other respects as well (see e.g. the discussion in Sartori, 1997).[7] However, it is certainly plausible that the very significant increase in average district magnitude induced by the reform (from about 1,3 to about 15 seats per district) had an impact on the behaviour of political players, and therefore the mechanism described by the model is at play in the context of the 2005 Italian reform.

A second caveat concerns our assumption that national parties are the relevant players in the election game, with no role for individual candidates. While this is obviously a simplification, this assumption is relatively realistic in the Italian setting. Indeed, the available literature suggests that in parliamentary (as opposed to presidential) democracies, and in contexts in which parties have an important role in selecting candidates, the autonomy of individual politicians is very limited. Not surprisingly, in those countries legislators tend to vote along party lines (Carey and Shugart, 1995). For Italy, the average RICE index, which measures the fraction of legislators of a given party which vote in the same way in a given vote, is above 95 per cent (Depauw and Martin, 2009). Therefore, it is plausible that the mechanisms highlighted in the model go at least some way in explaining the observed behaviour of the Italian legislators.

1.3 Electoral rules for the Italian Parliament, before and after the 2005 reform

The Italian Parliament is composed by two houses, with substantially equal prerogatives, which jointly exercise the legislative power (to become law, a text must be voted by both Houses).

[7] The Italian reform also changed the ballot structure, moving from a vote over candidates to a vote over party lists. The reform (as we will discuss below), also changed the way in which votes are translated into seats, from a system mostly based on plurality to a system mostly based on proportionality.

The Lower House (Chamber of Deputies) is composed by 630 members; the Upper House (Senate of the Republic) by 315 members, plus a small number of life members appointed by the President of the Republic.

Starting from the XII legislature (1994-1996) and until the XIV (2001-2006), Members of the Parliament were elected with a two-tier system: 75% of them in single-member plurality districts, the remaining 25% with a closed-list proportional rule (for a detailed description, see Katz, n.d.).

The electoral system was somewhat different in the two branches of Parliament. For the Chamber of Deputies, voters received two ballots: one to cast a vote for the preferred candidate in the majoritarian first-past-the-post district, and one to cast a vote for a party list in a single national-level proportional district. Candidates could choose in which tier to run. They could even run for both tiers, but if successful in both, the election in the majoritarian tier dominated on the one in the proportional tier. For the Senate, voters received a single ballot for the majoritarian race; however, the number of districts (232) was lower than the number of seats. The remaining seats (83 out of 315) were assigned to the best losers according to a party-based proportional formula at the regional level.

It is important to remark that, while in the competition for the Lower House voters effectively perceived a difference between the majoritarian and the proportional electoral competition, this was not true for the Senate, essentially due to the single ballot. This is why we believe that - concerning the XIV legislature and the previous ones - it is not possible to interpret the differences in behaviour of the senators elected in different tiers as reflecting differences in incentives. For the same reason, for these legislatures, pooling data from the Senate with those from the Chamber of Deputies appears problematic.

After a reform legislated in december 2005 and applied in the XV legislature (2006-2008) and in the XVI (2008-2013), MPs are elected with a closed-list proportional system with a majority bonus.[8] Voters receive only one ballot, and they can choose one party list, but not the individual candidate. In the new system, the main difference between the two branches of Parliament lies in the size of the electoral districts, with the Senate districts corresponding to the Regional territory, while for the House of representatives the major regions includes more than one district.[9]

1.4 The data

Our data set covers all members of the Senate, from the XII to the XVI legislature (spanning the period 1994-2012), for a total of 1020 individuals. Senators display a high dispersion in the survival rate: 670 of them (42% of observations) were in charge only for one term during the period under observation; only 6 of them (2% of the sample) were veteran politicians, in office

[8] The bonus is awarded to the most voted party, and consists in a number of seats sufficient to obtain a 55% majority of seats of the district for the Senate, at the national scale for the Lower House.

[9] As in most proportional systems, seats are assigned only to those parties which pass a minimum threshold of votes. Another difference between the Chamber of Deputies and the Senate is that thresholds are applied at the national level in the former, and at the regional level in the latter.

continuatively during the five legislatures; 137 of them (33% of the sample) survived the electoral reform, i.e. they succeeded to be elected at least once under both electoral systems.About one quarter of senators are members of a party steering committee at the national level or are experienced local government officials.

The reason why we restricted the sample to the members of the Senate essentially boils down to the differences in the electoral system among the two houses. For the Senate, as we argued in the previous section, in the pre-reform period the two tiers were not perceived as distinct playing fields by voters, as they were confronted with straightforward winner-takes-all races among individual candidates. Furthermore, differently from what happened in the lower house, candidates could not choose for which tier to run and they did not diversify electoral strategy accordingly. Both during the electoral campaign and once in office, they all faced identical incentives. For the Senate only, therefore, mimics a shift from a pure majoritarian to a closed-list proportional system.

Our dataset contains information concerning the institutional activity and the personal characteristics of the Senators. Data for senators in office from 1994 to 2006 are obtained from the dataset assembled by Nannicini et al. (2013), which we extended with data for the XV and the XVI legislature.

As in Gagliarducci, Nannicini and Naticchioni (2011), we measure pork-barrel expenditure with the share of bills targeted to the district of election. Two elements are crucial for the definition of this measure: first, as for the source, we relied on the official classification (TESEO) of the legislative acts to identify the "targeted" nature of the proposed bill. In TESEO (which includes a list of 9602 geographical entities), each bill is classified according to the administrative level/geographical entities that it affects. For our purposes, a bill represents pork barrel if at least one geographical entity affected by the bill overlaps with the district of election. Second, as for the geographical reference of targeting, we choose the regional dimension, both to minimise measurement errors and to ensure comparability across electoral systems as under the proportional system (and the proportional tier in the mixed system) electoral districts overalp with the Italian regions. Pork barrel represents the empirical counterpart of the particularistic transfer b^i of the theoretical model and it captures the aptitude of the senators confronted with the tradeoff between broad spending programmes (e.g. social security) and narrowly-targetd transfers responding to opportunistic targets. Operationally we constructed our measure as the fraction of targeted bills over the total proposed by each senator as main sponsor during the legislature.The yearly number of bills proposed as main sponsor by each senator is the second outcome we use to test the findings of the model: it is a proxy of the individual effort put to the electoral mandate and it represents the opposite of the rent r.

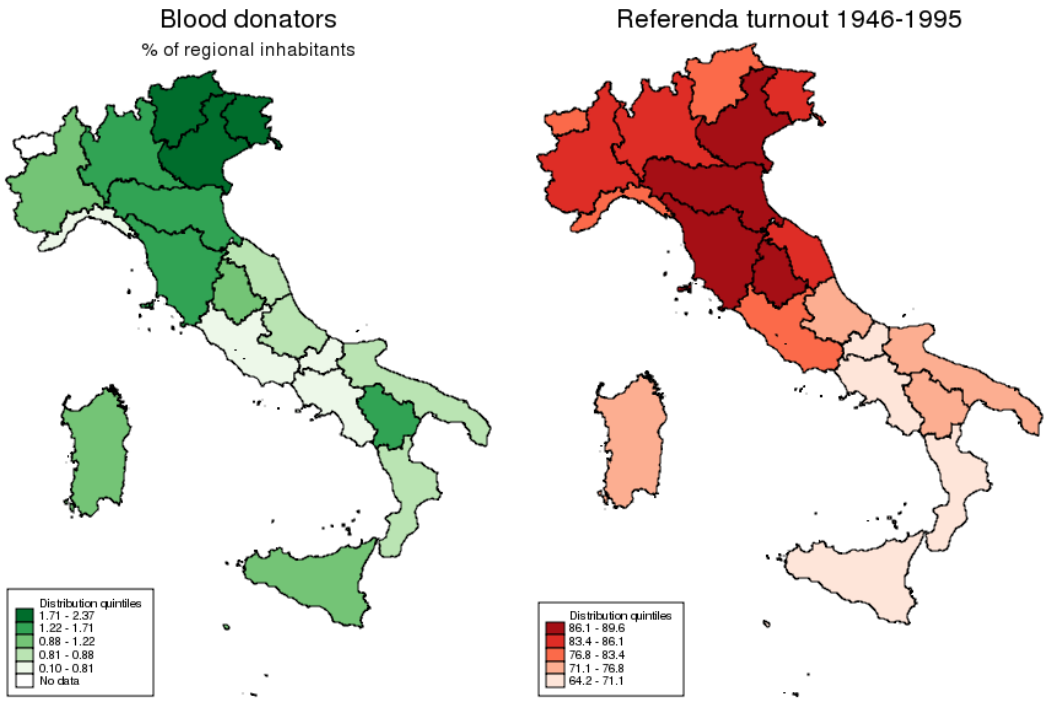
The individual characteristics of Senators (see table 1.1) are drawn from the *La Navicella* (the Annals of the Parliament) and include demographic characteristics (age, gender, number of kids), education, professional activity, and information on the Senator's political/parliamentary experience: nation-wide relevance (whether the senator is member of the steering committee of a political party at the national level), previous experience at the local level (as region's governor), or in the national Parliament.

Table 1.1: Summary statistics

	Mean	S.d.	Min	Max	Obs.
Individual characteristics					
Pork barrel	9.39	18.52	0.00	100.00	1597
Number of bills proposed per year	2.32	3.30	0.00	41.50	1597
Male (% of men)	0.89	0.32	0.00	1.00	1597
Age	55.11	8.48	38.00	88.00	1597
Married	0.85	0.36	0.00	1.00	1379
Number of kids	1.78	1.19	0.00	9.00	1379
Years of schooling	16.76	2.35	5.00	18.00	1470
Mover	0.16	0.37	0.00	1.00	1597
Member of a localistic party	0.10	0.30	0.00	1.00	1597
Previous experience in local government	0.30	0.46	0.00	1.00	1597
Nation-wide relevance	0.27	0.44	0.00	1.00	1568
Parlamentary experience (n. of years)	4.10	5.57	0.00	41.00	1597
Regional covariates					
Referenda turnout	79.77	7.71	64.23	89.55	1584
Blood Donators	1.14	0.52	0.10	2.37	1581
Non-sport newspaper diffusion	7.96	3.28	2.60	14.56	1584
Per capita GDP (thousands of euro)	23.44	6.16	13.05	32.31	1584

Data on civicness are time-invariant and measured at the regional level, as to guarantee the comparability with institutional data. Civic capital is the empirical analogue of the altruistic preference α of the model. In our econometric strategy, we use two alternative measures of civicness: the average referenda turnout in the period 1946-1995 (drawn fro the Ministry of Domestic Affairs), and the number of blood donators per 100 inhabitants in 2002 (provided by ISTAT). Both the indicators are well-established in the literature on civicness (Guiso, Sapienza and Zingales 2010) and quite correlated. Figure 1.1 depicts the regional distribution of such indicators. Concerning referendum turnout, one should notice that voters in these kinds of consultation are willing to bear the cost of voting even if no personal economic payoff is at stake. Most referendum during this period were linked to ideological issues, such as the form of government (republic or monarchy), the regulation of divorce, abortion. In any case, no referendum was on local public finance issues. Following the literature, we do not consider referenda held after 1995, because since then it became customary, among voters which were against the aim of the referendum, to abstain in order to make the referendum fail (in Italy, a turnout of at least 50% is needed for a referendum to be effective). Also blood donation is an often-used proxy for civcness: since neither legal obligation nor financial incentive exist to blood donation, it remains a pure altruistic gesture, driven by individual values and internalized social norms. Some recent works have unveiled that blood donation does not respond to uniquely altruistic preference since, for example, employees are entitled to a one/two-day leave from the work; such characteristics creates confounding factors among employees/self-employed workers. Also, the number of blood donators varies across time, albeit slightly. For those reasons, referenda turnout is our preferred indicator of social capital. Finally, the dataset also includes, as regional controls, per-capita income (from ISTAT) and non-sport newspaper diffusion (from Cartocci 2007), as a

Figure 1.1: Civic capital, by region



proxy of the share of informed voters in the district. This might be relevant as more informed voters should exercise a higher degree of monitoring of representatives' behaviour, and via this channel they could affect their behaviour.

1.5 Econometric analysis

1.5.1 Preliminary evidence

Figure 1.2 shows difference in the variables of interest (pork barrel and effort) under the two different electoral rules, as a function of the degree of civicness. As it emerges from the graph, this difference diminishes as civicness increases, exactly as predicted by Proposition 2.

In the rest of the section we will assess whether this evidence withstands out to a more formal econometric analysis, and whether it can be causally interpreted.

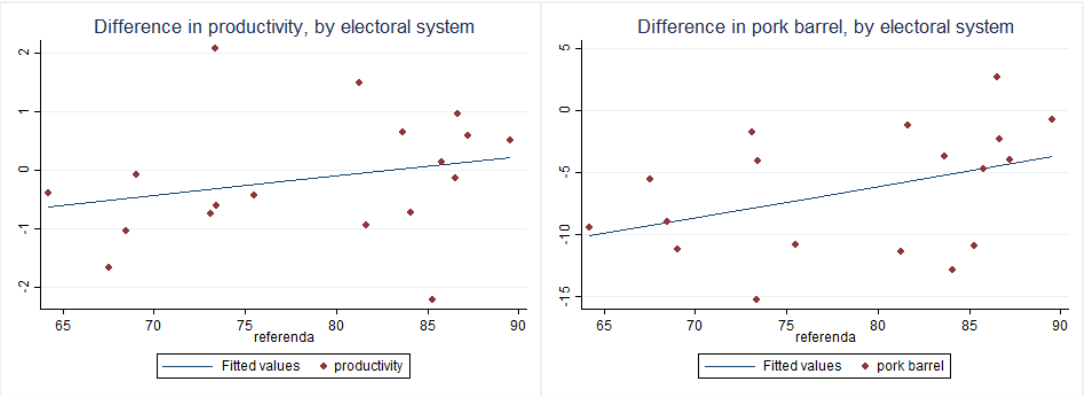
1.5.2 Econometric specification

As a first step, we exploit the time variation provided by the electoral reform and the cross-section variation in civicness to estimate the following specifications.

$$Y_{ijt} = \beta_0 + \beta_1 post_t * civic_j + \beta_2 post_t + \beta_3 civic_j + \boldsymbol{X'_{it}\alpha} + \boldsymbol{Z'_{jt}\theta} + \epsilon_{ijt} \tag{1.9}$$

As a further step, we add to the baseline specification a full vector of district dummies, which allows us to control not just for the level of civicness, but for all the unobserved time-invariant

Figure 1.2: Difference in outomes, by electoral rule



characteristics of the districts (as a consequence, civicness is dropped from the regression).

$$Y_{ijt} = \beta_0 + \beta_1 post_t * civic_j + \beta_2 post_t + \boldsymbol{X'_{it}\alpha} + \boldsymbol{Z'_{jt}\theta} + \mu_j + \epsilon_{ijt} \tag{1.10}$$

Finally, we add, together with the district fixed effects, a full set of legislature dummies to capture possible common macroeconomic shocks:

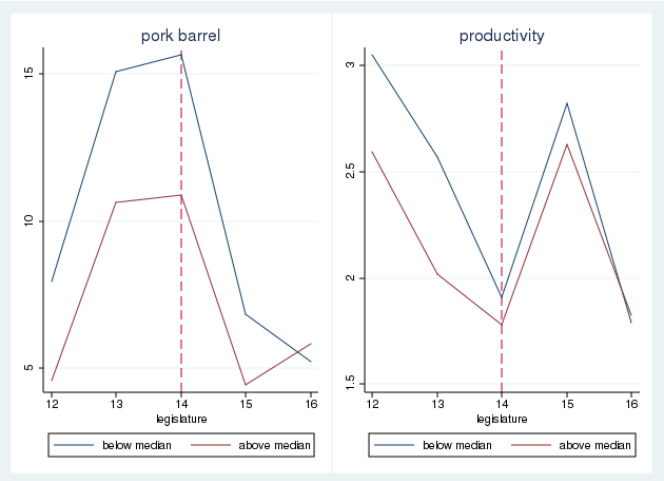
$$Y_{ijt} = \beta_0 + \beta_1 post_t * civic_j + \boldsymbol{X'_{it}\alpha} + \boldsymbol{Z'_{jt}\theta} + \mu_j + \delta_t + \epsilon_{ijt} \tag{1.11}$$

In the above specifications the dependent variable (y_{ijt}) is alternatively the share of locally-targeted bills or the average number of bills sponsored by senator i over the years of the legislature, elected in district j, in legislature t. $post_t$ is a dummy indicating the effect of shifting from a mainly majoritarian to a closed-list proportional electoral system; $civic_j$ is a proxy for the level of civicness in the district j.[10] β_1 is our coefficient of interest as indicates how the incentives provided by different electoral rules to incumbents differ according to the level of civicness of the electorate (it captures how the impact of the electoral rule is heterogenous across different levels of civicness), therefore accounting for possible complementarity/substitutability between institutions and culture.

We allow for selection on observables by controlling for a vector of individual-specific ($\mathbf{X}_{it}$) and district-specific ($\mathbf{Z}_{jt}$) characteristics, respectively. In particular, in all our regressions $\mathbf{X}_{it}$ includes: age, gender, number of children, years of education, nation-wide relevance (whether the senator is member of the steering committee of a political party at the national level), two dummies summarizing previous experience at the local level (as region's governor or as member of the regional executive, and as provincial governor or as member of the provincial executive, respectively), the length of the parliamentary experience (which is allowed to enter both linearly and squared, to account for possible non linearity in seniority effects) and a dummy which is equal to 1 if the representative belongs to a localistic party (the most prominent of

[10] Following the above-mentioned literature on civicness, we consider it time-invariant. Indeed, the conjecture first put forward by Putnam, Leonardi and Nanetti (1994) that civicness is mostly determined by political vicissitudes of the distant past has been confirmed by several other studies.

Figure 1.3: Common trend assumption



which is the *Lega Nord*). In the political science literature, these individual-level controls are supposed to have an impact on the propensity of legislators to act on the basis of personal motivations/ambitions, instead of following party directives (see e.g. Carey and Shugart 1995).

The $\mathbf{Z}_{jt}$ vector includes per-capita income (from ISTAT) and non-sport newspaper diffusion[11]), and a dummy equal to 1 if the region is a Special Statute Region (Italian Constitution awards this special status to 5 regions; traditionally, those regions benefit from more generous transfers from the central government and are granted a significant degree of authonomy from the Center).

This last specification parallels the one in Rajan and Zingales (1998). Owing to the inclusion of the set of legislature dummies, the coefficient on $post_t$ turns to be meaningless, due to multicollinearity. Legislature dummies, in fact, capture the marginal effect of each legislature on the outcome of interest and prevent the estimation of the overall effect of the electoral system. On the other hand, it reduces substantially the risk of omitted variables and reverse causation that would bias our estimates.

What matters for the unbiasedness of the β_1 coefficient in equation (11) is that the change in political outcomes with respect to the pre-reform period, once controlling for all the observable characteristics, is not influenced by differences in civicness. Although this identyfing assumption cannot be formally tested, figure 1.3 provides informal evidence in favour of its plausibility: in the legislatures before the reform, the amounts of legislative effort in high (above the median) civicness and low (below the median) civicness districts moved in a roughly parallel fashion (panel B); the same is true for the fraction of pork barrel bills (panel A).

[11] Newspaper readership is a commonly-used indicator of the attention that the local population pays to political matters. We take the figures from Cartocci 2007.

Table 1.2: Estimation results - pork barrel

	(1)	(2)	(3)	(4)	(5)	(6)
Shift to proportional	-36.194 (7.635)*** [12.553]***	-42.492 (8.115)*** [14.736]***		-8.637 (2.192)*** [2.996]***	-11.861 (2.718)*** [4.114]***	
Civicness	-0.467 (0.152)*** [0.162]***			0.359 (2.575) [1.304]		
Shift*civicness	0.397 (0.101)*** [0.149]***	0.453 (0.100)*** [0.000]***	0.354 (0.102)*** [0.000]***	3.831 (1.860)* [1.936]*	4.929 (2.047)** [2.241]**	3.605 (1.746)* [1.788]**
Civicness indicator:	Referenda	Referenda	Referenda	Blood	Blood	Blood
Regional dummies:	NO	YES	YES	NO	YES	YES
Legislature dummies:	NO	NO	YES	NO	NO	YES

All regressions include individual and regional covariates
SE clustered at regional level in parenthesis; wild-bootstrapped SE in brackets
Significance level at 1% (***), 5% (**), 10% (*).

1.5.3 Estimation results

Baseline results.- The results of our baseline estimation are summarised in Tables 1.2 and 1.3.

In table 1.2 we first investigate the effect on pork barrel taking referenda turnout as a proxy for civicness. As predicted by theory, the switch to proportional representation tends to reduce pork barrel (Column 1); analogously, there is some evidence that the higher the level of civicness, the lower the attitude to divert public resources to meet particular territorial needs. More importantly, we want to analyse how the impact of the electoral system switch may differ according to the civicness endowment of the electoral districts: the coefficient on the interaction terms is positive and significant.
This is in line with our model, which predicts that the effects of a change in the electoral rules on targeting is attenuated where civicness is high.
The result remains true even when we add district as well as legislature dummies (Column 2 and Column 3)[12]. Moreover, the size of the coefficients is quite stable as we go from the more parsimonious to the richer specification.
Similar evidence is found when using blood donators as an alternative proxy for civic capital (Column 4 to 6).

In table 1.3 the effect on the yearly productivity of Senators is analyzed. Also in this case, the results are in line with our theoretical predictions, as the effect of the change in the rules is smaller in high-civicness districts (said differently, the coefficient of the interaction term between civicness and the electoral-system dummy turns out significantly negative). This is true

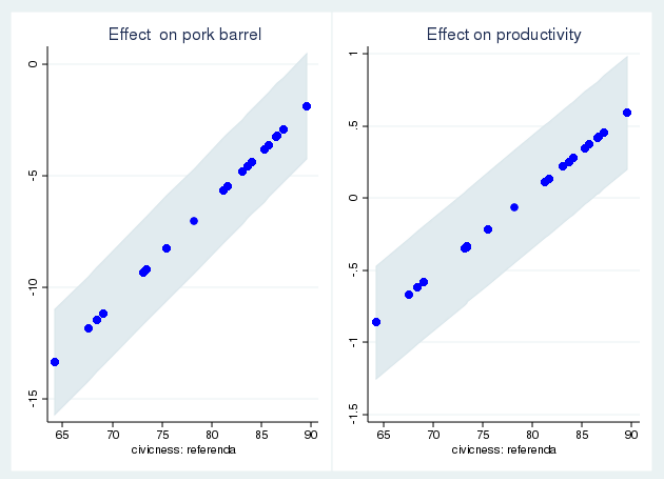
[12]In column 2 the civicness variable is not identified because time-invariant; in column 3 also the reform dummy is not identified because of multi-collinearity with the legislature dummies

Table 1.3: Estimation results - senators' productivity

	(1)	(2)	(3)	(4)	(5)	(6)
Shift to proportional	-5.001 (1.988)** [2.433]**	-4.546 (1.866)** [2.337]*		-1.470 (0.427)*** [0.510]***	-1.091 (0.419)** [0.520]**	
Civicness	0.035 (0.032) [0.033]			-0.408 (0.292) [0.368]		
Shift*civicness	0.062 (0.024)** [0.026]**	0.057 (0.022)** [0.027]**	0.063 (0.025)** [0.032]*	1.195 (0.348)*** [0.000]***	0.996 (0.353)** [0.428]**	1.065 (0.392)** [0.547]*
Civicness indicator:	Referenda	Referenda	Referenda	Blood	Blood	Blood
Regional dummies:	NO	YES	YES	NO	YES	YES
Legislature dummies:	NO	NO	YES	NO	NO	YES

All regressions include individual and regional covariates
SE clustered at regional level in parenthesis; wild-bootstrapped SE in brackets
Significance level at 1% (***), 5% (**), 10% (*).

Figure 1.4: Marginal effect of the reform



across all the specifications and irrespective of the proxy for civicness that we use.[13]

The marginal effect of the electoral reform, $\beta_1 * civic_j + \beta_2$ is shown in figure 1.4. The figure confirms the intuition of figure 1.2: shifting from a mainly majoritarian to a closed-list proportional system decreases both pork barrel and productivity; such difference gradually attenuates in magnitude along with civicness and in the case of productivity even changes sign

[13]Standard errors (in parenthesis) are clustered at the regional level (which overlap with the electoral district), as to account in a flexible manner for within-region dependence of errors. Inference with cluster-robust standard errors would require that the number of cluster goes to infinity (with few clusters standard asymptotic tests tend to over-reject the null hypothesis). In order to overcome such issue, in presence of a relatively small number of clusters, we use a bootstrap-t procedure described in Cameron, Gelbach and Miller (2008)(bootstrapped standard errors are reported in brackets). Bootstrapped standard errors show no evidence of a downward bias of the standard errors, thus confirming the validity of the inference.

at high levels of civic capital. In a nutshell, civicness tends to smooth differences in incentives across electoral systems, so that the effect of the reform is more evident at low levels of civic capital, where pork barrel was high and the level of officials' activism low.

1.5.4 Endogenous selection

The effect found in our estimates can be interpreted along the lines proposed by our model (i.e. the existence of different incentives for legislators under the two electoral regimes) but may be also driven by systematic differences in the characteristics of elected politicians under the two systems. That is, politicians which are more likely to succeed in a proportional race are characterized by a different propensity to indulge in pork-barrel and/or to exert effort with respect to those which were more fit for the majoritarian system.

In this case, the estimated effect would capture the joint impact of the change in post-electoral behaviour for given individual characteristics and of the change in the (unobservable) characteristics which influence both the behaviour once in office and the probability of electoral success.

As a matter of fact, as shown in table 1.4, Senators elected with the majoritarian system and Senators elected with the proportional system display different observed characteristics. In the proportional legislatures, Senators tend to be older and slightly more educated; the share of women is higher, as well as the share of those with previous parliamentary experience, while that of senators with previous local experience as regional governor almost halved. Also, the share of movers, i.e. those elected in a district different from that of residence, is more than double under proportional rule.The differences in observables shown in table 1.4 may be a sign of the existence of systematic heterogeneity in unobservable factors which might be driving in turn both the probability of being elected and the behaviour once elected. For example, some candidates might be intrinsically more dedicated to their geographical constituency, and these individuals may have more chances to succeed, *ceteris paribus*, under the plurality rule; on the contrary, people naturally less inclined to particularistic policies may be more prone to self-select and to be chosen under the proportional rule.

In order to test for this possibility, we perform several variable-addition tests.
First, following Wooldridge (1995) and Vella (1998), we augment our baseline specifications with a dummy for selectivity s_i, equal to 1 if the individual senator survived the electoral reform (i.e. if he was in office at least during one legislative term before and one after the reform). We then test the coefficient on s_i, supposed not to enter the model significantly under the hypothesis of no selectivity bias, by means of a standard t-test.

$$Y_{ijt} = \beta_0 + \beta_1 post_t * civic_j + \beta_2 post_t + \beta_3 civic_j + \boldsymbol{X'_{it}\alpha} + \boldsymbol{Z'_{jt}\theta} + \gamma s_{ijt} + \epsilon_{ijt} \tag{1.12}$$

As shown in Table 1.5, we fail to reject the null hypothesis of no selectivity bias for all our specifications.

Table 1.4: Individual characteristics of senators by electoral system

	majoritarian	proportional	difference
Pork barrel	11.17	6.70	4.46***
Number of bill proposed per year	2.37	2.23	0.14
(% of men)	0.92	0.84	0.08***
Married	0.82	0.90	-0.08***
Number of kids	1.77	1.82	-0.06
Age	54.11	56.62	-2.50***
Years of schooling	16.67	16.93	-0.26*
Mover	0.11	0.24	-0.13 ***
Member of a localistic party	0.12	0.07	0.05**
Previous experience in local government	0.31	0.30	0.02
Nation-wide relevance	0.27	0.26	0.01
Parlamentary experience (n. of years)	3.10	5.61	-2.51***

Significance level at 1% (***), 5% (**), 10% (*).

While being computational simple, this test does not allow for a flexible selection model. To overcome such inconvenience, we explicitly model the selection mechanism as follows:

$$s_{ijt} = 1[\boldsymbol{\Psi_{ijt}\delta} + u_{ijt} > 0] \tag{1.13}$$

In this model a selection effect arises if there exists a correlation between unobservable factors driving the selection process u_{ijt} and those shaping the outcome ϵ_{ijt}, i.e. if $E[\epsilon_{ijt}|u_{ijt}]$ is non nul (see the seminal papers by Heckman, 1979 and Hausman and Wise, 1979). To take into account sample selection we use a Heckit estimator and we proceed as follows: first, we estimate equation (1.13) by a probit. We then augment our baseline specifications with the inverse Mills ratio $\lambda(\Psi_{ijt}\hat{\delta})$ as follows.

$$Y_{ijt} = \beta_0 + \beta_1 post_t * civic_j + \beta_2 post_t + \beta_3 civic_j + \boldsymbol{X'_{it}\alpha} + \boldsymbol{Z'_{jt}\theta} + \rho\lambda(\Psi_{ijt}\hat{\delta}) + \epsilon_{ijt} \tag{1.14}$$

The we test whether the coefficient which accounts for correlation of errors is different from zero

$$H_0 : \rho = \sigma_{\epsilon,u} = 0$$

Importantly, the heckman model may be close to unidentified if identification only relies on the non-linearity of selection mechanism. We therefore include among regressors of the selection equation a variable assumed to affect the probability of getting a seat but not the behaviour of successful candidates (thus satisfying the exclusion restriction), as follows:

$$\Psi_{ijt} = \{X_{it}, Z_{jt}, w_{it}\}$$

where w_{it} is the product of the inverse of the ranking position in the party list, weighted by the percentage of votes got by the list and the number of seat attributed in the district. This is

Table 1.5: Selectivity bias test (Nijman and Verbeek, 1992)

Dependent variable:	Pork barrel			Senators' productivity		
	(1)	(2)	(3)	(4)	(5)	(6)
Civicness indicator:	Referenda turnout					
$H_0 : \gamma = 0$						
p-value	0.870	0.850	0.469	0.710	0.489	0.680
Civicness indicator:	Blood donators					
$H_0 : \gamma = 0$						
p-value	0.873	0.999	0.470	0.749	0.485	0.717
Regional dummies:	NO	YES	YES	NO	YES	YES
Legislature dummies:	NO	NO	YES	NO	NO	YES

Table 1.6: Selectivity bias test (on inverse Mills ratio)

Dependent variable:	Pork barrel			Senators' productivity		
	(1)	(2)	(3)	(4)	(5)	(6)
Civicness indicator:	Referenda turnout					
$H_0 : \rho = 0$						
p-value	0.390	0.463	0.464	0.715	0.724	0.862
Civicness indicator: Blood donators						
$H_0 : \rho = 0$						
p-value	0.427	0.462	0.463	0.856	0.999	0.983
Regional dummies:	NO	YES	YES	NO	YES	YES
Legislature dummies:	NO	NO	YES	NO	NO	YES

meant to be a proxy of the likelihood of being elected under the proportional rule, as it increases with the electoral strength of the party and with the relative strength of the candidate within the party.

This test again fails to reject the nul of no selectivity bias, as shown in Table 1.6.

1.5.5 Extensions

Our estimates do not allow to disentangle the two components of civicness, already evoked by Guiso, Sapienza and Zingales (2004) as *inherited* and *environmental* civic capital. In our set up we prefer to think of these two components, respectively, as the individual endowment of civic capital of the senator, which auto-disciplinates its behaviour according to a set of strongly interiorized social/moral norms, and the endowment of civicness of the electorate, which punishes/rewards the senator's performance with re-election, according to a set of social norms endorsed by individuals sharing the same social, economic and environmental conditions.

Table 1.7: Robustness with Movers

Dependent variable:	Pork barrel towards:					
	District of election				District of residence	
	(1)	(2)	(3)	(4)	(5)	(6)
Shift to proportional	−42.49 (8.12) ∗ ∗∗	−41.65 (8.41) ∗ ∗∗	−45.91 (9.11) ∗ ∗∗	−4.30 (35.00)	4.55 (25.91)	1.21 (27.78)
Civicness (election)					−0.20 (0.24)	
Civicness (residence)					−0.06 (0.16)	
Shift*civicness (election)	0.45 (0.10) ∗ ∗∗	0.45 (0.10) ∗ ∗∗	0.50 (0.11) ∗ ∗∗	0.10 (0.28)	−0.28 (0.26)	−0.13 (0.27)
Shift*civicness (residence)				−0.09 (0.18)	0.15 (0.19)	0.05 (0.25)
Mover		−4.75 (1.32) ∗ ∗∗				
Regional dummies	YES	YES	YES	YES	NO	YES
Sample:	Full	Full	Non-Movers	Movers	Movers	Movers

Civicness indicator: Referenda turnoutAll regressions include individual and regional covariates
Standard errors clustered at regional level in parenthesis.
Significance level at 1% (***), 5% (**), 10% (*).

Inherited and environmental civicness

Table 1.7 shows the result of some further analysis we carried to sort out this issue. Column (1) and (2) report the results of specification 1.10, augmented with a dummy for being a mover as defined above. Results in column (2) are in the same ballpark of column (1); furthermore, being a mover decreases the likelihood of engaging in particularistic transfers. In the same vein, in columns (3) and (4) we perform a split-sample exercise: we estimate equation 1.10 within the subsample respectively of movers and not movers. It turns out that the effect of the shift of electoral system on pork barrel is driven by senators elected in the district of residence; moreover, the magnitude of the impact of such shift does not vary with the level of the civicness of the district of residence. Finally in columns (5) and (6) we find no evidence of an aptitude of movers to use public resources for particularistic transfers towards their region of residence.[14] Such evidence reinforces the findings of the empirical model that the civicness of the voters not of the elected is the driver of the effect.

[14]In the table we showed replications of equation 1.10; similar results are obtained by replicating equations 1.9 and 1.11.

This results are the opposite of those of Carozzi and Repetto (2016). They find - somewhat unintuitively - that movers benefit their residence district but not their electoral district. However, Carozzi and Repetto only consider the majoritarian legislatures. Furthermore, they do not consider the role of social capital. Finally, they don't look at legislative poposals, but at actual laws, irrispective of those who proposed them.

Table 1.8: Electoral cycle

Dependent variable:	Pork barrel		Senators' productivity	
	(1)	(2)	(3)	(4)
Shift to proportional	−31.42	−21.29	−4.80	−1.92
	(14.07)*	(7.74)**	(4.91)	(0.99)*
Shift*civicness	0.34	0.23	0.05	0.02
	(0.18)*	(0.10)**	(0.06)	(0.01)**
Regional dummies:	YES	YES	YES	YES
Year of legislature:	First	Others	First	Others
Test of equality of coefficients p-value:		0.48		0.12

Civicness indicator: Referenda turnoutAll regressions include individual and regional covariates
Standard errors clustered at regional level in parenthesis.
Significance level at 1% (***), 5% (**), 10% (*).

Electoral cycles

Finally we investigate whether are results are mainly or partly influenced by the electoral cycle. To do this, we compute our outcome variables separately for the first year of the legislature and for the rest of the legislature. As shown in Table 1.8 we found no evidence that the difference in the estimated coefficients $\beta_1 + \beta_2$ is statistically significant. This suggests that senators tend to behave in a pretty uniform way throughout the whole duration of their mandate.

1.6 Concluding remarks

In the present paper, we provide evidence on the link between electoral rules and public finance outcomes using a new dataset on the legislative choices of the members of the Italian Senate. We find that Senators elected before 2006 with a predominantly majoritarian system have a higher propensity to sponsor pork barrel bills and to exert effort (as measured by the overall number of proposed bills) than those elected since 2006, with a proportional system. While the research question is not new, we propose a new empirical strategy, based on the assumption that the relationship between rules and policies depends on the degree of civicness. To motivate this identifying assumption, we spell-out a theoretical model. In the model, the change in policy outcomes due to a switch from a majoritarian to a proportional system (a switch analogous to the one which took place in Italy in 2005) is smaller the higher the degree of civicness.

Before concluding, we would like to point to some institutional-design implications of our analysis. Suppose we want to choose an electoral rule which minimizes a social loss function which depends (positively) on the amount of pork barrel and on the amount of shirking by the legislators. Our analysis shows that majoritarian and proportional system imply a different mix of the two. While this confirms previous findings, we also document that this trade-off is influenced by the cultural characteristics of a country. Using the terminology of Djankov et al.

(2003), civicness influences not only the intercept but also the slope of the society's "institutional possibility frontier". As a consequence, given our social loss function, the best electoral system in a low-civicness country may be different from the one for a high-civicness country.

Chapter 2

Incentives to retirement saving and their impact on non-retirement wealth accumulation

2.1 Introduction

In most industrialised countries, the long-standing demographic ageing and the recent tight fiscal conditions brought about by the financial crisis resulted in growing macroeconomic imbalances and challenged the sustainability of the social security systems, relatively generous up to the eighties.

Italian social security was not an exception in this framework, with high replacement rates, defined-benefit system, indexation of pensions to the cost of living and early retirement provisions. During the last twentyfive years it underwent a serie of major reforms with the aim of achieving a closer relation between contributions paid during the working life and payouts received at retirement. To realize this target a shift from earning-based benefits to a notionally defined contribution system was realized, public pensions overall decreased, seniority pensions was gradualy abolished and the retirement eligibility requirements progressively sharpened. The impact of public pension reforms has been largely analyzed by using Italian and other European countries' data (by, among the others, Attanasio and Brugiavini, 2003; Bottazzi, Jappelli and Padula, 2006 for Italy and by Attanasio and Rohwedder, 2003 for the UK). Such analysis can be framed within a wider debate on the optimal degree of paternalism by social planner in constraining pension decisions, which encompasses not only the compulsory revisions for the public pillar of the pension systems, but also policies affecting the voluntary decisions on private retirement wealth accumulation. The effect of reforms aimed to condition this latter aspect has been widely investigated in the U.S. (by, among the others,Madrian and Shea, 2001; Carroll et al., 2009; Chetty et al., 2014), where the private pension fund industry has been steadily growing for the last forty years; the phenomenon has been scarcely analysed in other developed countries.

This paper contributes in this respect, by focussing on a social security reform which took place

in Italy in 2007. The reform was designed to boost private retirement wealth accumulation. In particular, tax favor and behavioural incentives were granted to workers to promote investments in the retirement saving instruments already existing and to enlarge the choice set of such vehicles to the severance pay. Behavioural incentives took the form of the reversal of the default option for the destination of the severance pay (*Trattamento di Fine Rapporto*, TFR hereafter): for private-sector payroll employees the TFR is automatically transferred to a private pension fund unless they explicitly opt out.

2.1.1 Some theoretical benchmark

In this framework, it is paramount for policy implications to predict how individuals modify their expectations and shape their reaction functions to changes in retirement system. We will focus on the impact of the private retirement saving decisions on the non-retirement wealth accumulation. In investigating the effect of fiscal and beavioural incentives of the reform, it is useful to ground the analysis to some benchmark theoretical model. The lifecycle model is the natural candidate. The model predicts, in its early frictionless version (Friedman, 1957; Feldstein, 1974; Modigliani and Brumberg, 1954), that any permanent change to lifecycle wealth is likely to be fully offset by present consumption and saving choices. Decisions undertaken under the impulse of such incentives may qualify as permanent shock to lifecycle wealth insofar as they modify retirement benefits.

Fiscal incentives increase the after-tax return on private pension investments, thus raising the cost-opportunity of consuming today (the price of future consumption relative to current consumption falls). The expected sign of the substition effect on the total wealth accumulation is far from being clear cut. One the one hand the increased financial convenience of the private pension investments might simply imply a reshuffling of resources across different saving accounts, with total wealth remaining virtually unchanged; as an example, Attanasio and DeLeire (2002) document that workers finance their tax-favored retirement saving mainly trough diverting resources from other taxable accounts, so that less than 10% of increased retirement saving represents a true net addition to national savings. On the other hand, individuals might keep their non-retirement saving fixed and substitute away from consumption. This hypothesis is supported by empirical evidence in Gelber (2011) and Paiella and Tiseno (2014). They find that voluntary private saving is not financed with resources from other saving accounts but rather by a drop in durables (cars) consumption in the U.S. (the former) or by an increase in households liabilities in Italy (the latter). The raise in the return on the private pension fund investment also implies an income effect: individual expects a positive shock to lifetime wealth and may decide to save less because with a higher interest rate, a given target level of future consumption is achieved with less saving; this would lead to a decrease in total wealth. Of course, whether substition dominates income effect or the reverse depends on individual parameters such as intertemporal preferences or risk aversion. If the reactivity to changes in relative prices of consumption across time is high, substitution effect tends to dominates income effect (Attanasio and Weber, 2010).

Predicting the impact of behavioural incentives requires borrowing from the predictions of the behavioural departures from the standard lifecycle model that rationalize time inconsistency (Laibson, 1997; Angeletos et al., 2001); this is the second strand of economic literature this paper is closely related to. The reversal of the default option for the destination of the TFR might determine a "default-option bias", widely documented in literature on the 401(k) retirement plans in the U.S. Among the others Madrian and Shea (2001) and Carroll et al. (2009) find that in decisions regarding the participation and the size of the constribution to 401(k) plans, individuals tend to choose out of the choice set the option they are assigned to by default, although they might opt out with a marginal cost. Different explanations may be proposed to rationalize such findings, from inertia to tendency to procrastination and 'present bias'. The degree of inertia is likely to be the main determinant of the effect of the reversal of the TFR default destination on the total wealth; according to Madrian and Shea (2001) only in case of high inertia individuals do not offset the increase in retirement wealth by reducing discretionary non-retirement saving. In addition, in a more recent paper, Chetty et al. (2014) find that policies aimed to boost retirement saving increase wealth accumulaton only if they relie on passive instruments that do not require an active choice by individuals. In fact most individuals (around 85% of the sample) are unresponsive to policies such as fiscal subsidies requiring them to voluntary shift resources across accounts.

On the whole, predicting the effect of this reform on total wealth accumulation is even more difficult than so, as taking the incentives to join private pension funds imply modifying different margins with respect to the standard lifecycle model. First, those who opt for private pension funds are endowed with two financial portfolios: a discretionary non-retirement one and a retirement portfolio managed by the pension fund.

In addition, the TFR is yearly transferred by the employer to a private pension fund and capitalized in an investment account up to retirement; the final amount is then converted into annuities and paid out on top of public pension. Individual pension will then turn from deterministic to stochastic as the annuities deriving from pension funds' payouts depend on the sthocastic financial return of the investment. Therefore not only the first moment of the distribution of the expected retirement wealth is affected, as it happened with the reforms of the public pillar of the pension system, [1] but above all its second moment varies.

Also, the TFR is transformed from deferred (one-off) compensation to a retirement saving vehicle; therefore the scope for consumptin smoothing, especially for those with discontinous labor careers, is drastically reduced. While the TFR is normally cashed in at the end of each employment contract to support income during the unemployment spells, opting for private pension implies that the severance pay is locked until retirement. Related to this, also the temporal profile of saving may be affected, given the age-related profile of background risks, more rilevant

[1] The impact on non-retirement saving of drop in expected retirement wealth induced by reforms of the public pension pillar of the Italian pension systems has been documented by Attanasio and Brugiavini (2003); Bottazzi, Jappelli and Padula (2006); Jappelli and Padula (2015); they find a sizeable displacement effect between pension and discretionary wealth, but by far less than one (ranging from one to two-third). The crowd-out is incomple with respect to the prediction of a frictionless model; reasons are several and they range from liquidity constraint and bequest motives to background risk, present bias and incomplete markets.

for the young, who can count on lower financial wealth to aborb negative shocks (Guiso, Jappelli and Pistaferri, 2012).
Beside predicting the effect of the reform on the level of wealth accumulation, it is equally interesting to investigate the impact on the composition of the non-retirement financial portfolio. According to the early frictionless version of the lifecycle model (Samuelson, 1969; Merton, 1969), under the assumption that a isoelastic utility function, the optimal financial assets mix should only depend on risk aversion and on the differences in return across assets. In a more recent paper Cocco, Gomes and Maenhout (2005) use a calibrated lifecycle structural model enriched with non-tradable labor income and borrowing constraints and find that portfolio allocation vary with age and total wealth (both financial and human); allocation rule does not vary substantially when a transitory retirement income shock occurs (the share of risky assets slightly decrease just before retirement for precautionary reasons). Bottazzi, Jappelli and Padula (2011) find that, as a reaction to a reforn reducing public pensions, agents modify their wealth allocation, reducing the weight of financial wealth relative to real-estate equity. The effect is more pronounced for riskier financial assets.
Estimating the impact of incentives to private retirement saving on wealth accumulation is paramount under the perspective of a broad welfare analysis. The reform implies an intertemporal tradeoff, from the perspective of the public finance, between a drop in current tax revenues (owing to fiscal incentives) and an expected reduction in future social public expenditure.
In the aftermath of the financial crisis concerns for the long-term sustainbility of social public spending have been rising and fiscal space for national governments has been growing tighter and tighter in most cases. Against this background it is crucial that the use of scarce public resources to boost long-term retirement saving succeed in raising the aggregate saving of the economy: if such incentives only determined a reshuffling among saving accounts and benefitted individuals with a 'a priori' higher saving propensity, they would trigger an implicit fiscal transfers from the universe of taxpayers to the subpopulation of savers, with plausible non-negligible distributional implications (those in the highest quantiles of the distribution of income and wealth generally display higher propensity to save).
The remainder of the paper is organized as follows. The institutional setup and the reform are depicted in section 2.2; section 2.3 provides data and summary statistics. In sections 2.4 and 2.5 the empirical strategy and the results are described. Finally, section 2.6 concludes.

2.2 Institutional background

2.2.1 Private retirement saving before the reform

The Italian social security system has traditionally displayed relatively generous features: a high incidence of early retirement and of social pensions (if compared to other European countries), favorable replacement rates, earnings-based benefits. Since the late eighties, nevertheless, it became progressively clear that the system suffered from growing imbalances. Ageing gradually challenged the sustainability of a defined-benefit system and, more generally, of the overall public spending (of which social security represents the main component, with 30% of allocation of

resources); an increasing public debt has been severely constraining the available fiscal space from then until present.

In order to balance out the social security system, several reforms have taken place since the nineties to bring about an actuarially fair pension system, resulting in generalized reduction of public pension (although the effect has been heterogeneous across cohorts and sector of employment). Jointly, the severe underdevelopment of the private pension fund industry called for an intervention in this domain, with the aim to guarantee an adequate level of retirement income, thus compensating the decrease in the replacement ratio of public pension, and to boost the diversification of the retirement wealth source (the public pillar being exposed to possible cuts due to binding public budget constraint). [2]

The reform of private retirement saving took place in 2007,[3] with the aim of enlarging to the severance pay the choice set of available retirement saving vehicles.

The severance pay (TFR hereafter) is a form of deferred compensation by the employer to the worker. Before the reform TFR was normally accrued in a notional saving account yearly contributed by the employer in a fixed proportion (6.91 per cent) of the employee labor income, capitalized at a rate partially indexed to inflation and paid as a one-off at termination of the labor contract (irrespective of the cause). Further to the reform, in the first semester of 2007, payroll employees had to choose whether to keep the TFR as a deferred compensation or to contribute with their TFR to a private pension fund, thus transforming it into a private retirement saving vehicle.

Even before the reforem this latter was a viable option, but this choice was more than rare. And even before the reform subscription to private pension fund was financially convenient for several reasons: i) tax favor was granted both to capital gains of the investment of the fund and to the contribution to the fund (irrespective of whether it derived by the TFR or by other discretionary resources);ii) the private funds' capital gain were on average more than double than the TFR capitalization rate in the period 2003-2006, as shown in table 2.1 (variance increased due to the stochastic nature of the distribution of pension fund investment return); iii) also, the most convenient category of private pension funds, the 'subsidized funds', provides for a contribution of the employer to match the discretionary contribution by the employee transferred to the fund on top of the TFR.[4]

[2]From a broader perspective the development of private pension funds positively correlates with long-term credit to firms and investiments, given that private pension funds tend to invest in long-term financial and also illiquid assets. More generally, a diversified (rather than bank-centric) financial system improves investors' portfolio choices and risk management techniques and broaden the set of financing tools available to borrowers, thus finally boosting economic growth prospects (see Rajan and Zingales 1998).

[3]It was legislated at the end of 2005 (legislative decree 252/2005) and implemented at the beginning of 2007, one year in advance with respect to what planned.

[4]The private pension fund system includes two main categories: i) occupational or subsidized funds (*Fondi Negoziali*), whose group membership is reserved to workers belonging to a particular sector of activitiy (or company or whose labor contract is regulated by a national collective agreement) and whose conditions are collectively bargained; ii) unsubsidized funds, whose membership is generally individual. The contribution by the employer, provided by the collective agreements underlying subscription to subsidized fund, normally matches in magnitude the contribution rate by the employee (that, on average, is bounded at 1.5% of the gross labor income) and represents for the worker, at least in the short term, a free lunch due to the nominal downward rigidities in collective wage bargaining.

Table 2.1: TFR capitalization rate*vs.* private pension funds return

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	mean (2003-06)	st. dev. (2003-06)
Pension funds	5.0	4.6	7.5	3.8	2.1	-6.3	8.5	3.0	0.1	8.2	5.2	1.3
TFR	2.8	2.5	2.6	2.4	3.1	2.7	2.0	2.6	3.5	2.9	2.6	0.1

Source: COVIP Annual Report 2015. All figures are before tax (tax rate is the same for fund investment capital gains and TFR capitalization rate). The first row refers to subsidized pension funds (*Fondi Pensione Negoziali*), the only category of funds the TFR could be transferred to before the reform.

Although the financial convenince, only around 7% of payroll employees joined a private pension funds. This puzzling evidence can be explained by low financial and pension literacy, high information costs and lack of trust toward private pension fund management.

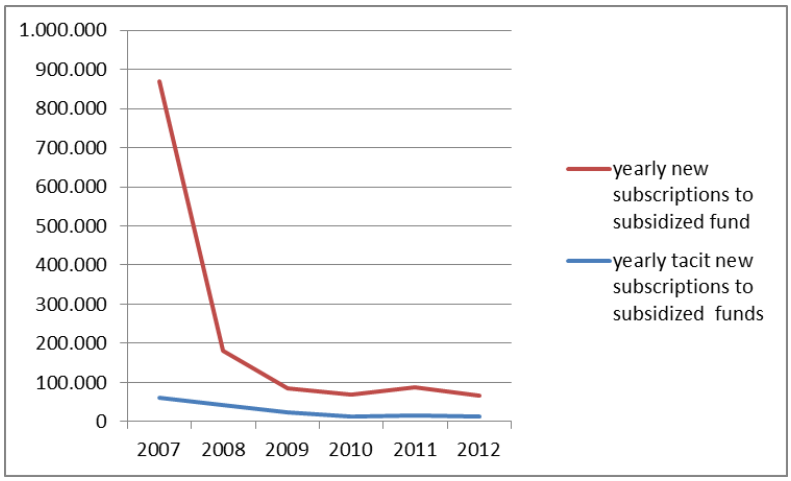
2.2.2 The severance pay reform

The reform introduced major fiscal and behavioural incentives to transfer the severance pay to private pension funds, with the aim of boosting private retirement wealth accumulation. As for fiscal incentives, the threshold for tax deductability of the discretionary contribution by the employee and by the employer to the fund has been made less stringent; however, this measure only applies to private-sector employees. In addition, from an accurate analysis of administrative data it emerges that this threshold was not binding. As a matter of fact, the average contribution of employees amounted to 1400 euro in 2007; even if matched by the employeer with the same amount, total contribution is by far lower than the thresold of around 5164 euro. As for the fiscal aspect, favorable tax rate for the capital gain was confirmed and a favorable tax regime was introduced for the payouts (both under the form of annuities and of one-off); nevertheless this latter is likely to be by far less salient than contribution deduction because its effects have an impact on very future income.

The reform also reversed the status quo for the destination of the TFR, but only for private-sector workers: unless they make an explicit choice on this respect, the TFR is transferred to a private pension fund, invested on the financial market and paid as an annuity on top of public pension once the retirement eligibility requirements are met.[5] The reversal of status quo, designed to capture the most inertial workers, did not have a widespread impact, as only around 7% of new subscriptions in 2007 were 'tacit', as shown in figure 2.1. Also the other measures, aimed to ease portability of contribution across funds and the anticipation of benefits indeed introduced marginal changes. Finally, even before the reform, almost all private-sector workers had a 'reference' subsidized fund for to enroll in; after the reform, the coverage for private sector slightly improved and a new subsidized fund was created and targeted to public school workers, who represent about one-third of pubblic-sector employees. Regardless of the incentives she enjoy, who transfer her TFR to a private funds ends up with two financial portfolios: a non-retirement portfolio that she can directly manage and a retirement one, with less degrees of

[5]This choice is irreversible; workers can opt out with a very marginal cost. If workers opt out, the TFR of employees of firms wit more than 50 workers is transferred by the employer to a saving account managed by a central independent authority. For smaller firms, the TFR is accrued in a notional account; in practice, it is used by the employer as a source of funding alternative to the more expansive standard channels.

Figure 2.1: Tacit *versus* explicit subscriptions to subsidized pension funds(administrative data)



Administrative data. Source: COVIP

freedom in terms of risk profile and asset allocation. Also, since the amount of the TFR capitalized in the private fund is paid out as annuities on top of public pension, retirement income turns from deterministic to stochastic. Finally, she is deprived of an instrument for consumption smoothing because TFR is no longer paid out at the end of each labor contract.

2.2.3 Effectiveness of the reform

As pointed out in section 2.2.2, incentives to subscribe to private pension funds can be considered quite marginal. Nevertheless, the reform has proved to be effective in boosting enrollment. As shown by the left panel figure 2.2, total subscriptions of private pension funds increased by around one-third in 2007. This boost was mainly driven by subscriptions to subsidized funds and in particular by subscriptions of private-sector workers, who peaked by almost 70% with respect to the previous year.

The reform spurred a large debate on the profitability of pension funds; it therefore drastically cut information barriers and constrained individual to take a decision in a specific array of time, thus limiting the scope for procrastination.

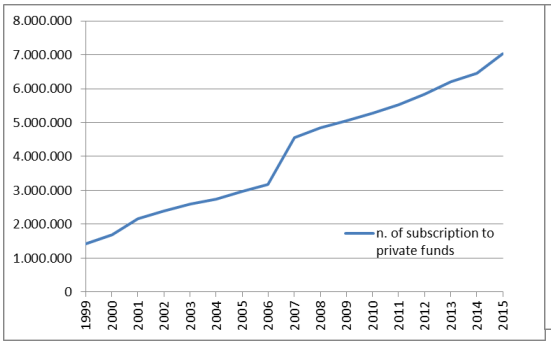
2.3 Descriptive evidence

2.3.1 The dataset

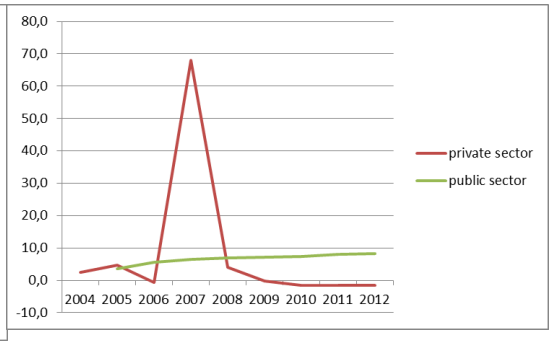
Data is drawn from the waves 2002-2012 of the SHIW (Survey on Household Income and Wealth), a survey including a large representative sample of the Italian population drawn by the Bank of Italy every 2 years. The survey contains detailed information on household income, consumption, and wealth, as well as a number of demographic and socio-economic variables measured either at the household and at the individual level. Recently, SHIW has been widely used in behavioural studies or for research on retirement and saving choices, thanks to the in-

Figure 2.2: Enrolment in private funds

(a) Total n. of subscriptions to private pension funds



(b) Growth rate of enrolment in subsidized private funds, by sector of employemnt



Administrative data. Source: COVIP

troduction of questions aimed to elicit the degree of financial and pension literacy, risk aversion, discount rate, etc. For the purpose of the paper I restrict the analysis to individuals actively taking part in the labor force as payroll employees. Self-employed and unemployed individuals are discarded because they are not entitled to receive TFR; the employment history of the individual is taken into account by recovering information on unemployment/employment spells from all the waves of the survey prior to 2002.

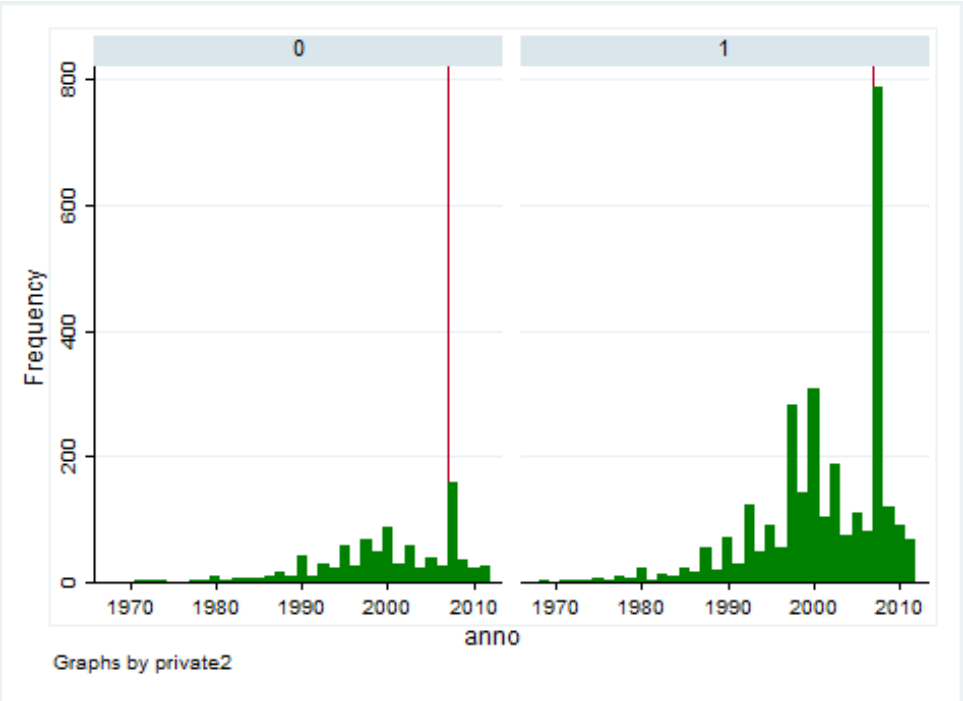
As a result, the dataset covers almost 35,000 observations[6], roughly equally distributed across the six years. A panel component is present: around 9% of individuals is surveyed every year while around 45% appears only once. Given the relatively small size of the longitudinal component, I will mostly exploit the cross-section dimension of the dataset for the identification of the effect of interest.

As a first check, I want to investigate whether the sample is truly representative of the population for the purpose of our analysis i.e. whether survey data corroborates administrative data on the enrolment in private pension funds. Figure 2.3 shows a peak in the flow of new subscriptions of private funds in 2007, mainly driven by private-sector employees; the graph mirrors the dynamics displayed in the right panel of figure 2.2. For our purpose the observational unit is the individual because the variable of interest, the indicator for having transferred the TFR to a private pension fund, is reported at the individual level.[7] Most of the relevant socio-economic characteristics and labor-market information are reported at the individual level as well. Besides age and gender, the dataset includes information on the labor market participation of each individual: dimension of the firm, sector of the employment, type of labor contract. The dataset also include a proxy for the intertemporal preferences and for risk aversion; they are two individual parameters of the implicit intertemporal utility maximization problem underlying the

[6]The sample includes almost 22 thousand individuals and 15 thousand households.

[7]The question about the transferral of the TFR, *"Was your severance pay transferred to a supplementary pension scheme (pension fund or individual pension plan)?"* has been introduced in the Survey starting from 2008, by making explicit reference to the 2007 reform; for the previous years it is only known whteher individuals joined a private pension funds, but no mention is made to the severance pay.

Figure 2.3: Enrolment rate in private pension funds, by sector of employment (survey data)



decision about both the optimal saving rate and the optimal financial portfolio allocation rule (Merton, 1969; Salanié and Treich, 2006). Also the expected retirement age and substitution rate (between pension income and labor income) are elicited. Exploiting this information, I estimate the expected discounted retirement wealth; as anticipated in section 2.1, in a lifecycle model the retirement wealth is a major determinant of the lifetime wealth and therefore may drive the saving decisions of individuals. Details on the procedure and the assumptions underlying the estimation of the retirement wealth are reviewed in the appendix.

Other covariates like the composition of the households and a proxy for liquidity constraints are reported at the household level. The level of non-retirement saving[8] and the several components of real and financial wealth, our outcomes of interest, are reported for the household as a whole. All financial variables are transformed in real rather than nominal terms, to allow comparison across years.

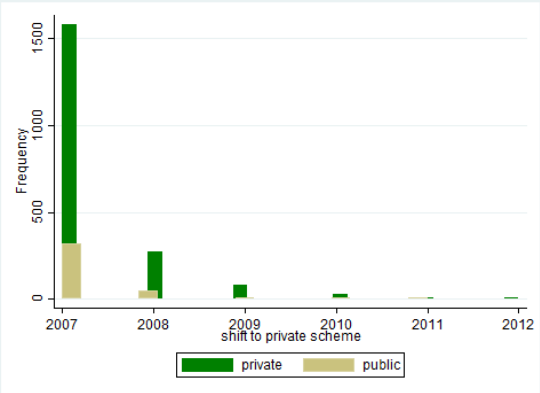
So far I have only aknowledged that the reform was effective in increasing subscriptions to private pension funds, but the source of the resources transferred to the fund is still not known. Figure 2.4 shows specifically the new subscriptions involving the transferral of the TFR. In 2007 almost 15% of private-sector workers and around 6% of public-sector employees decided to transfer their TFR to a pension fund, in line with what results from administrative data and from the Report from the devoted Authority (COVIP).[9] All in all, the SHIW sample confirms the anectodal evidence that the reform has been effective in inducing private-sector employees

[8] Saving is measured in a residual manner, as the difference between disposable income, consumption and the flow of resources transferred to a private pension fund

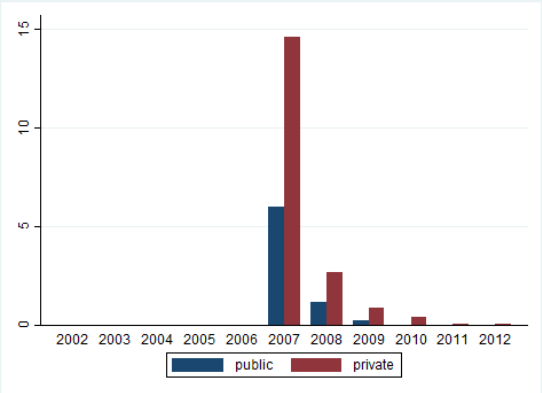
[9] According to COVIP, around half of the subscriptions in 2007 (26% of the eligible private-sector and 12% of the public-sector workers) involves the transferral of the TFR.

Figure 2.4: Workers shifting their TFR to private fund

(a) number of workers



(b) % of active workers



to transfer their TFR.

2.3.2 Descriptive statistics

SHIW data has been largely used by previous papers, with the aim of investigating the effect of Italian social security reforms on saving decisions (Attanasio and Brugiavini, 2003; Bottazzi, Jappelli and Padula, 2006; Paiella and Tiseno, 2014). They mostly take household as observational unit, picking up the covariates of the household head when reported at the individual level. Both this approach (that drops all observations but the household head) and mine (that all household members) may lead to a violation of the so called 'SUTVA' (Stable Unit Treatment Value Assumption); this assumption requires that in a policy evaluation exercise the decision ('treatment') of one individual does not affect the decision or the outcome of the other. It would be unreasonable to rule out any degree of spillover within a household.
Both approaches, in principle, may assume either a 'unitary model' à la Becker (1981) with common preferences and a unitary objective function for all the household members, or a bargaining model for intrahousehold allocation(developed, among the others, by Chiappori, 1992; Lundberg and Pollak, 2007). It is then not possible to draw a ranking between the two strategies. Nevertheless, in our setting wealth allocation choice is modelled as the reaction function of the characteristics and choices of all the household members instead of the head only; I expect in this way to minimize the omitted variable bias (whose sign would be ambiguous). Also, in the empirical strategy, I flexibly account for any possible form of correlation of unobservable confounders within household.
Tables 1.4 and 2.3 show descriptive statistics of the sample by comparing, respectively, characteristics and outcomes between those who decided to transfer their TFR and those who remained with the 'old regime'.

As depicted by table 1.4, the choice of joining private pension funds by transferring the TFR is more widespread among men, living in the North-west or in the center of Italy; among workers of the private-sector, in particular if employed in industry, in financial services and in

Table 2.2: Descriptive statistics, by severance pay destination choice

	'Old regime'	Private pension fund	Difference
Private sector	0.74	0.83	0.09***
Age	41.71	43.28	1.57***
Gender	0.57	0.60	0.03**
High education	0.00	0.01	0.01*
Retirement wealth (expected)	241608.03	291283.72	49675.69***
Net wealth (h)	202520.05	257655.28	55135.23***
Disposable income	16565.72	23696.70	7130.98***
Disposable income (h)	34537.78	40710.44	6172.66***
New hire	0.12	0.02	-0.11***
Unemployment record	4.63	2.29	-2.34***
Open labor contract	0.86	0.96	0.10***
Defined-benefit pension syst.	0.74	0.85	0.11***
Replacement rate (expected)	68.31	66.64	-1.67***
Firm dimension (> 50 employees)	0.23	0.53	0.30***
Proxy for:			
Liquidity constraint (h)	3.22	3.51	0.29***
Discount rate	9.19	8.47	-0.72***
Risk aversion	3.35	3.28	-0.07***
Sector of employment:			
Agricolture	0.04	0.01	-0.03***
Industry	0.24	0.36	0.11***
Commerce	0.07	0.03	-0.04***
Transport	0.05	0.07	0.02***
Financial services	0.03	0.12	0.09***
Area:			
North west	0.25	0.20	-0.05***
North east	0.23	0.42	0.19***
Center	0.21	0.25	0.05***
South	0.20	0.10	-0.11***
Islands	0.11	0.03	-0.08***
Observations	32540	2039	

Significant at the 1%(***), 5%(**) and at the 10%(*) level.
(*h*) Measured at the household level.

Table 2.3: Descriptive statistics of outcomes, by severance pay destination choice

	'Old regime'	Private pension fund	Difference
Panel A: **Pre-reform**			
Saving (% of disposable income)	23.29	21.23	-2.06**
Net wealth (% of disposable income)	482.96	549.79	66.83**
Real estate wealth (% of disposable income)	538.85	745.64	206.80***
Financial wealth (% of disposable income)	52.91	50.96	-1.95
Liabilities (% of disposable income)	30.04	46.80	16.76*
Risky assets (% of financial portfolio)	14.09	24.19	10.10***
Observations	17148	548	
Panel B: **Post-reform**			
Saving (% of disposable income)	20.28	20.35	0.07
Net wealth (% of disposable income)	524.79	606.05	81.26***
Real estate wealth (% of disposable income)	588.01	793.89	205.88***
Financial wealth (% of disposable income)	48.07	65.84	17.77***
Liabilities (% of disposable income)	38.91	64.91	26.01***
Risky assets (% of financial portfolio)	11.27	21.32	10.05***
Observations	15528	1355	
Significant at the 1%(***), 5%(**) and at the 10%(*) level			

the transportation sector. Those workers are on average more educated, somewhat older and therefore subject to the more generous defined-benefit retirement system, with less discontinuous employment track record. Those individuals are on average placed in the highest quantiles of the wealth and income distribution; in addition they are less liquidity constrained, more prone to risk and more foreward-looking in terms of intertemporal preferences. The differences in covariates between the two subsample raise the concernes that the latter are not fully comparable and that, in turn, the former may partially drive the results. In the empirical strategy I try to overcome this issues by recurring to several strategies that account for both selection on observables (multivariate specifications, propensity score matching) and on some specific type of selection on unobservables (difference-in-difference).

Panel A of table 2.3 displays that, prior to the reform, individuals who decide to shift their TFR to private funds have on average lower propensity to save; their net wealth is higher, driven by the difference in real-estate property and despite the higher level of debt; the composition of the financial portfolio is more tilted towards risky assets (corporate bonds, mutual funds, shares, etc.). Panel B broadly confirms the existence of difference further to the reform.

These summary statistics are far from detecting causal effects of taking the fiscal and behavioural incentives provided by the reform: they capture the joint impact of causal relation, selection on observables, and unobservable self-selection. In what follows I will attempt to disentangle the three components and single out the causal effect.

2.4 Empirical strategy

2.4.1 Econometric model

The empirical strategy aims to detect the causal effect of changes in expected tax-favored retirement wealth on taxable non-retirement savings. For this purpose I exploit the exogenous shock represented by the fiscal and behavioural incentives to invest in a private pension fund, introduced by the reform. This strategy helps horthogonalize decisions on retirement saving from taxable wealth accumulation choices.
I use a difference-in-difference design where those who decided to stick to the 'old regime' are used as controls to elict the counterfactual outcome of the 'treated', i.e. workers who transferred their TFR to a private pension.[10]
Specifically I estimate the following model :

$$Y_{it} = \alpha + \delta D_i + \beta D_{it} + \gamma private_i + \boldsymbol{X_{it}'\Psi} + \eta_t + \epsilon_{it} \tag{2.1}$$

where the dependent variable Y_{it} indicates the level of the taxable saving account normalized by the disposable income for individual i in year t.[11] D_i is t indicator for the treatment. i.e. the choice of contributing to private pension funds with the individual severance pay, and it captures all the time-invariant characteristics that may differ across the two groups and that could otherwise qualify as a source of omitted variable bias. D_{it} is the time-varying indicator for treatment, switched on only after 2007 and, of course, β_3 is the coefficient of interest. X_{it}' provides a very rich set of covariates summarized in table 1.4 and designed to control for selection on observable. Finally, the year fixed-effect η_t controls for common macroeconomic shocks.

2.4.2 Identification issues

The identification of the causal effect β rests on the identifying assumption:

$$Y(0)_{i,t'} - Y(0)_{i,t} \perp D_i | X_{i,t} \tag{2.2}$$

In absence of the reform, non-retirement saving would have evolved similarly over time across the two groups of treated and control individuals. The common trend assumption in equation 2.2 allows for selection on time-invariant unobservable, which is consistent with a fixed-effect error $\epsilon_{it} = v_i + u_{it}$. More specifically, this quasi-experimental design admits time-invariant unobservables v_i that affect selection into program, while the influence of idyosincratic transitory shock is ruled out (Abadie, 2005):

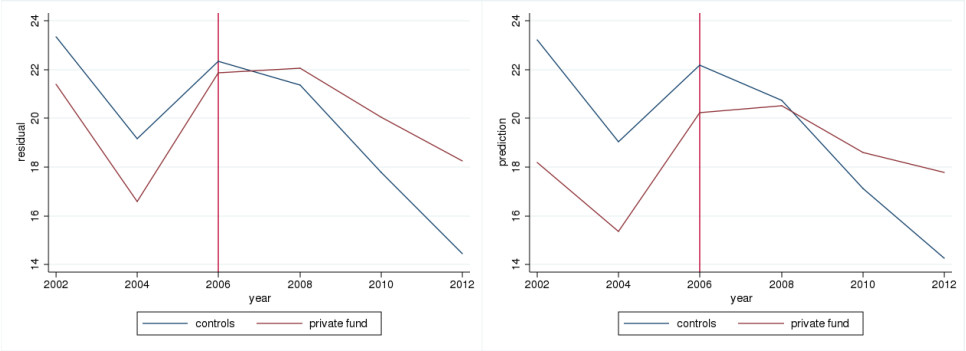
$$E(D_i = 1 | u_{i,t}] = E[D_i = 1] \tag{2.3}$$

[10] The outcome in the counterfactual state of the world had the latter not decided to shift the destination of their TFR.

[11] In the survey saving is reported for the household as a whole; however, since disposable income is available at the individual level as well, in principle one could interpret the saving rate as measured at the individual level under the assumption that propensity to save is equal for all household members.

Figure 2.5: Common Trend in:

(a) level of saving rate (raw data) (b) fitted values of saving rate



Although common trend assumption in 2.2 is untestable, figure 2.5 display a visual inspection of whether the two subsamples of treated and control share the same dynamics in the outcome of interest in the pre-reform years. The assumption seems to be *prima facie* visually corroborated by using both the raw data on the saving rate and the fitted value obtained from specification 2.1.

The identification assumption of the difference-in-difference design is satisfied. However, several elements make the policy evaluation exercise challenging. First, the assignment into treatment is not compulsory: government provides fiscal and behavioural incentives but it rest in *ultima ratio* in the decision of each individual worker whetheter to take the incentives and join private pension funds or not. Self-selection may be driven by unobservable confounders.[12] The two main candidates are saving preferences and anticipated gain from treatment. As for the former, of course heterogeneity in saving attitude may affect both retirement and non-retirement wealth accumulation. If unobservable thrift is positively correlated with both types of saving, estimates would be overestimated. On the contrary, as shown in table 2.3, those who self-select into treatment have lower propensity to save in the pre-reform period. This would imply, if any, a downward bias of the estimated regressor of interest.

In addition, as described in details in section 2.2.2, the anticipated gains from treatement are higher for employees in the private sector rather than for those in the public sector because the tax favor and the coverage of the subsidized funds are broader. Nevertheless, two arguments corroborates the validity of my identification strategy in this respect. First, equation 2.3 allows for differences in expected gain as long as those differences are fixed; in this framework where there was no other change in incentives but the reform, it seems plausible to assume time invariance of these differences:

$$E[U_{i,t}|D_i = 1, private_i = 1] - E[U_{it}|D_i = 1, private_i = 0] = K \quad \forall t \tag{2.4}$$

The other argument attains to monotonicity: being employed in private sector affects the decision of joining a private pension fund in a monotone way. Although this assumption cannot

[12] In the baseline specification I already control for many observable drivers of self-selection

be tested (see Imbens and Angrist, 1994), the fact that in every wave of the survey the composition of the treatment group is roughly equally tilted towards private-sector employes (around 80% each year) stands as an anecdotal evidence that the assumption is verified and then it corroborates the above argument in equation 2.4.[13] Another challenge to identification is that the difference in composition between treated and controls over time may not be orthogonal to the reform. This may happen in case of endogenous sorting of individuals into private sector just before the reform in order to benefit from higher incentives As shown in table 2.4, the percentage of those who enter the private sector in a given year from public sector is very low and the difference of this phenomenon between before and after the reform is not statistically significant.

Finally the global financial crisis bursted in 2008 may represents a major time-varying confounder as it may affect relative prices of financial assets and increase labor income risk and affect the, thus paving the way for precautionary saving. In this sense I claim that the crisis has had an impact differentiated by age and by sector of employment; this is in line with the predictions and the evidence of the literature in this regards. The seminal paper by Caballero (1991) predicts that an increased variance in the income shock stimulates saving (although the expecation of the income level does not change) and that the scope for precautionary saving narrows with age; this prediction is supported by the findings of a large portion of the empirical works on this subject, such those by Lusardi (1997), Cocco, Gomes and Maenhout (2005) and Carroll and Samwick (1998). Also, the magnitude of precautionary saving depends on the degree of income uncertainty and may be reduced by unemployment insurance, as documented by Engen and Gruber (2001). It is therefore plausible to assume that the impact of the crisis varies by sector, since the growth rate of unemployment rate after the crisis was heterogeneous and the unemployment insurance system did not assure a full homogeneous coverage for all sectors and type of labor contract. In my empirical analysis I take care of this issue with a non-parametric time trend differentiated by age and sector, as to capture all crisis-induced time-varying unobservables.[14]

[13] Differently from the quasi-experimental framework used from the seminal paper by Imbens and Angrist, 1994, being employed in private sector cannot be used as an instrument for assignment to treatment to estimate local average treatment effect on the subpopulation of compliers. In fact although monotonicity holds and therefore a correlation between the two variables exists, people tend to self-select into private *versus* public sector of employment in a not exogenous manner.

[14] Differently from Paiella and Tiseno (2014), in my setting the sector of employment cannot be used to instrument the choice of joining a pension fund because the exclusion restriction that the instrument does not have an autonomous causal effect on the saving rate is unlikely to hold. First, because the crisis affected branches of activity in an heterogenous manner, thus the scope for precautionary saving differ by branch; second, each sector has its own subsidized sectoral fund that attracts most of retirement saving. The financial performance (in terms of net return on investment) has a direct impact on retirement wealth and therefore affects saving propensity.

Table 2.4: Transition matrices from public to private sector

	2004	2006	2008	2010	2012
$P\left(private_t = 1 \mid private_{t-1} = 0\right)$	0.22	0.17	0.19	0.19	0.18
Test of equality pre-post reform (p-value): 0.16					

2.5 Empirical evidence

2.5.1 Baseline results

Table 2.5 reports the estimated effect of shifting the severance pay to a private pension fund on non-retirement taxable saving base on equation 2.1. In all specifications the dependent variable is the ratio between non-retirement savings and disposable income (hereafter saving rate). The set of controls is also common to all specificationa. The choice of covariate among those available in the survey has been model-driven: I restricted the selection to proxies for lifetime earnings (income, education, gender, a polynomial of second order for age), for intertemporal (discount rate) and risk attitude, for liquidity constraints, for labor income risk (unemployment track record, sector of employment, type of labor contract), and for expected pension wealth (expected replacement rate and retirement age).

What changes across specifications is that I gradually relax the assumption that the impact of macroeconomic shock η_t is constant across the sample and I allow it to vary in a more and more flexible manner between private and public-sector workers, across sector of employment (manifacturing, services, transport, etc.) and by sector and age. For this purpose I use a non-parametric time trend obtained by the interaction of the year dummies with other relevant, case by case, dicothomous variables.[15]

Results confirm the descriptive evidence that those who shift their TFR to pension fund tend to have a lower propensity to save (the coefficient on D_i is negative); after the reform, once they opt for a retirement saving account, they jointly increase their discretionary non-retirement saving. This result has two main implication: first, in line with what found in Paiella and Tiseno (2014) and Gelber (2011), there is no crowd-out between retirement and non-retirement wealth accumulation. Going back to the terminology used in section 2.1.1, substition effect seems to dominate income effect. Even more, a certain degree of crowd-in emerges, probably due to fact that the large debate about the financial convenience of pension funds spurred at the time of the reform reduced the information cost with respect to the understanding the variety of assets traded on the financial market and their relative convenience and therefore in general boosted financial investments. Also, the treated in most of the cases more than offset the initial gap with respect to the control individuals in terms of taxable savings (the magnitude of the coefficient on D_{it} is larger than that on D_i).

The magnitude of estimated coefficient is quite stable across specifications and ranges between one fourth and one-third of the mean of saving rate (equal to almost 20 percentage points). This results supports the claim that estimates are robust to conditioning on a large set of

[15] In column 5, the most flexible specification, this strategy induces a combinatorics of 330 dummies.

Table 2.5: Baseline specifications

	Saving-to-disposable-income ratio			
	(1)	(2)	(3)	(4)
D_{it}	7.90	9.25	8.11	5.15
	(3.41)**	(4.33)**	(3.47)**	(2.46)**
D_i	-5.90	-6.64	-6.37	-5.60
	(2.77)**	(3.30)**	(3.04)**	(2.76)**
Time trend	year dummies	year* private/public	yar* sector of employment	year* sector *age
R^2	0.06	0.05	0.06	0.10
Obs.	21349	19785	21349	21349

Standard error clustered at household level in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

All regressions include: share of kids and of income recipients, wealth, liquidity constraint of the household level; polynomial of second order of age, education, risk aversion, discount rate, expected retirement wealth; employment track record, sector of employment at the individual level; area dummies.

unobserved heterogeneity proxies. In all specifications retirement wealth and self-selection into private/public sector does not display a statistically significant causal effect (they are note therefore reported).

2.5.2 Robustness analysis

Table 2.6 reports a variety of specifications that show that the estimated effect is robust to different identification strategies, selected subsamples and functional form.

In the first column I combine selection on fixed unobservables (or common trend, the identification assumption underlying the difference-in-difference design), with selection on observable. Although figure 1.3 shows a visual inspection of the common trend, this assumption is analytically untestable and may be implausible if observable compositional differences between treated and control correlate with the outcome dynamic. Specification in column 1 of table 2.6 addresses this issue with a two-step strategy, in the vein of Heckman, Ichimura and Todd (1998) and Blundell et al. (2004). In a first step treated and control units are matched on the propensity score (estimated parametrically, according to a normal distribution) and weights are determined non-parametrically using local linear regression; in a second step specification 2.1 is estimated by using weights obtained in the first step. In this way, treated and controls are 'made more similar' in terms of observables. Applying propensity score weighting slightly reduce the magnitude of estimates, that maintain their statistical significance.

6 In the second column all the lags and leads of the treatment dummy are used to test for granger causality; this strategy is aimed to rule out the non-retirement saving decisions are affected by some confounders happening before the reform. At the bottom of this column the null hypothesis that the joint effect of the leads is different from zero is rejected, thus ruling out any anticipation effect that would invalidate the estimate. Column (3) showa that estimates are

Table 2.6: Robustness analysis

	Saving-to-disposable-income ratio						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
D_{it}	6.14		5.55**	4.81	-3.68	0.24	-0.96
	(2.89)**		(2.91)	(4.62)	(3.05)	(0.09)***	(5.21)
D_i	-6.95	-11.34	-6.39***	-8.59	-0.50	-0.20	4.68
	(2.40)***	(6.16)	(3.36)	(6.04)	(2.34)	(0.09)**	(5.31)
$D_{it} * private_i$							12.13
							(6.90)*
$D_i * private_i$							-13.20
							(6.22)**
$Private_i * post_t$							-10.52
							(2.45)***
D_{it} of partner					2.39		
					(2.64)		
Leads							
$D_i * 2004$		3.57					
		(5.27)					
$D_i * 2006$		8.95					
		(6.72)					
Lags							
$D_i * 2008$		10.67					
		(5.93)					
$D_i * 2010$		11.50					
		(6.87)					
$D_i * 2012$		10.17					
		(4.99)*					
p-value of leads:		0.34					
	Propensity score weighting	Lags and leads	Only open-endend contracts	Only first income earner of household	Only self-declared household head	Log of saving	Differentiatial effect
R^2	0.24	0.10	0.11	0.15	0.19	0.28	0.06
Obs.	2549	19785	17567	10562	5058	15932	19786

SE clustered at household level; SE in parentheses. *** p<0.01, ** p<0.05, * p<0.1

All regressions include: share of kids and of income recipients, wealth, liquidity constraint of the household level; polynomial of second order of age, education, risk aversion, discount rate, expected retirement wealth; employment track record, sector of employment at the individual level; area dummies

robust (in terms of magnitude and significance) to restricting the sample to the payroll employees with an open-ended contract, among which subscription to pension fund is more widespread. In columns (4) and (5) the sample is restrict to, respectively, the head of household in terms of income earned, and the self-decleared household head. In this latter specification also the subscription to private fund of the household head's partner is controlled for, thus accounting for any intra-household barganing or peer effect. In both columns the magnitude of the effect is downscaled and the estimated effect is not-statistically significant, although the sign of the regressor of interest is the same as in the baseline regression; plausibly, part of the difference may be explained by the drastic drop in the number of observations.
In column (6) the outcome of interest, non-retirement saving, is taken in log rather than normalized by income, due to its lognormal distribution, thus downsizing the weight of the outliers. According to this log-linear specification, those who transfer their TFR to a private pension funds further to the reform increase their non-retirement saving by approximately one quarter; in nominal terms this is equivalent to an increase by approximately 2000 euro. Finally, in column (7), I account for differences between public and private-sector workers in terms of incentives provided by the reform and of pre-reform preferences that help explain self-selection into sector of employment. For this purpose I estimate the following diff-in-diff-in-diff model, where unobserved time-invariant heterogeneity across sectors is further differenced out:

$$Y_{it} = \alpha + \beta_0 D_i + \beta_1 priv_i + \beta_2 D_i * post_t + \beta_3 priv_i * post_t + \beta_4 D_i * priv_i + \beta_5 D_i * post_t * priv_i + X'_{it}\gamma + \eta_t + u_{it} \tag{2.5}$$

where the triple interaction $D_i * post_t * priv_i$ ($D_{it} * priv_i$ according to the notation in the table) is the new regressor of interest. Once I allow the effect to differ across sector of employment, evidence is shown that the impact on non-retirement saving is driven by private-sector workers.

2.5.3 Extension

In table 2.7 I investigate how treated workers allocate their increased flow of saving across wealth components. In the first three columns the outcome variables are expressed as ratio to disposable income. Looking at the first row of the table, the crowd-in effect found in table 2.5 is confirmed: those who opt for transferring their severance pay (and plausibly additional resources) to a private pension funds increase their financial wealth (columns 1) by around 15 points, one-third of the pre-reform mean. The effect on the net worth (column 3) is positive but not significant; the effect on real-estate is negative but not statistically significant. The sign of the estimate in the column (2) is in line with the theoretical prediction: retirement wealth and real-estate wealth are both highly illiquid assets and therefore if the first increases, substition effect implies that the second decreases. The last two columns look at the composition of the non-retirement financial portfolio: the share of government bonds rise by around 3 points, thus doubling the average pre-reform share; risky assets (shares, bonds and all financial assets other then deposits and sovereign securities) decrease by 4 points, almost one-third of the pre-reform average. This findings is also in line with the theoretical predictions: if retirement wealth becomes more uncertain agents rebalance their non-retirement financial portfolio towards less

Table 2.7: Wealth allocation

	Financial wealth (% of disposable income)	Real estate wealth (% of disposable income)	Net wealth (% of disposable income)	Sovereign bonds (% of financial portfolio)	Share of risky assets (% of financial portfolio)
	(1)	(2)	(3)	(4)	(5)
D_{it}	16.16	-26.34	25.56	2.95	-3.91
	(5.54)***	(53.52)	(24.93)	(1.12)***	(2.43)
D_i	-9.52	103.70	41.30	-1.84	6.03
	(4.72)**	(53.14)**	(21.68)*	(0.99)*	(2.33)***
R^2	0.13	0.11	0.71	0.06	0.20
Obs.	19785	19785	19785	17394	17394

Standard error clustered at household level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

All regressions include: share of kids and of income recipients, wealth, liquidity constraint of the household level; polynomial of second order of age, education, risk aversion, discount rate, expected retirement wealth; employment track record, sector of employment at the individual level; area dummies

risky financial securities.

2.6 Conclusion

I found that fiscal and behavioural incentives and the other measures brought about by the reform succeeded in making the new system a dominant strategy for around 6% of private-sector payroll employees and 4% of public-sector workers decided to take incentive. In line with what found in Chetty et al. (2014),[16] those individuals are the 'active savers' who responded to subsidies: they increase their retirement saving primarily by diverting resources from other savings account (the severance pay) and plausibily by transferring additional resources.[17]
Different theoretical models are useful to rationalize those findings.
First, agents rationally respond to incentives, in particular to tax subsidies, and increase retirement wealth. In terms of lifecycle model, substitution effect dominates income effect; the underlying assumption, as already mentioned, is that the reactivity to changes in intertemporal relative prices is quite high. Also, since in the months prior to the reform individuals have been exposed to a massive advertising campaign on the financial convenience of private pension funds, this might have drastically cut the information cost and thus favored access to the pension funds market.
Another explanation hinges upon the behavioural economics literature. People with present-biased preferences discount the near and the distant future at different rate; they tend to procrastinate choices that involves a cost in the present *versus* an increase in utility in future; also, they often deviate from their chosen optimal intertemporal plan. In particular, time-inconsistent individuals tend to undersave with respect to a time-consistent fully rational plan

[16] Percentages are lower than what found in Chetty et al. (2014), in line with a generalized undereporting about private pensions.
[17] This phenomenon is well documented by administrative data but it cannot be tested by using this sample.

(Laibson, 1997; Angeletos et al., 2001; Diamond and Köszegi, 2003) Joining a private pension plan acts as a 'commitment device', as well documented in Ashraf, Karlan and Yin (2006); it is an instrument for agents to tie the hand to their 'future selves' and force them to same more for their retirement. In this context those who seem to have joined pension funds by inertia are very few; therefore the 'default bias' widely documented in the behavioural literature does not appear entirely convincing.

The paper by Carroll et al. (2009) builds on that and shows that even requiring individuals to make an active choice has a relevant effect on retirement saving. This because agents are forced to think of the problem anyway and therefore, once they bear the transaction cost whether they save or not, they can display their true preference for retirement saving, thus circumventing time inconsistency. This is a weaker for of paternalism than default option because induce individual to analyze an issue rather than procrastinating without fixing a default choice. Active decision has been showed to be the optimal setup when individuals tend to postpone decisions and have heterogeneous preference for retirement and non-retirement savings.

Once individuals have chosen to transfer their TFR to a private pension funds, whether rationally or inertially, they do not reshuffle savings among different accounts; they jointly increase non-retirement discretionary saving, with a positive impact on total wealth accumulation. In line with what found by Gelber (2011) using U.S. data, I found evidence of a 'crowd-in' rather than a 'crowd-out' hypothesis, with a sort of 'multiplier' effect of fiscal incentives on total wealth. The increase in non-retirement saving my serve two purpose; first, it can be used for income and consumption smoothing in discontinuous labor career because workers lost severance pay that served as additional unemployment insurance. Also, since the retirement income becomes stochastic, saving increases in order to compensate for the increased uncertainty. This behaviour can be rationalized with the precautionary rationale (Lusardi, 1997Salanié and Treich, 2006).

The effect on discretionary savings is driven by private-sector workers and it is line with assumption of full rationality, as some incentives targeted private-sector workers only. In terms of composition of net worth, those individual increased financial wealth and rebalanced their financial portfolio toward less risky assets; they substitute away from home equity, although this latter effect is not statistically significant.

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Appendix A

Appendix to Chapter 1

Proof of Proposition 1

As outlined in the text, Party's A maximises the following equation (taking the opponent's platform as given):

$$(R+r)E\left[p^A(q^A,q^B)\right] \tag{A.1}$$

From equations (1.3) (1.4) and (1.7), it is easy to show that:

$$p^A(q^A,q^B)=\frac{1}{2}+\frac{d}{3s}\sum s^i(W^i(q^A)-W^i(q^B))$$

where s$\equiv \frac{\sum_i s^i}{3}$.
By equation (1.1):

$$\begin{aligned}\sum s^iW^i(q^A) &= (1-\tau+h\ln(g))\sum s^i(1+2\alpha^i)+\\ &+ b^1(s^1+\alpha^2s^2+\alpha^3s^3)+b^2(\alpha^1s^1+s^2+\alpha^3s^3)+b^3(\alpha^1s^1+\alpha^2s^2+s^3)\end{aligned}$$

Due to Assumptions 1 and 2, it is always optimal for the party to set $b^1 = b^3$=0, as the marginal benefit of increasing b^2 is always higher.
Notice also that it is optimal to set $\tau = 1$, as the benefit of increasing $b^2(\alpha^1s^1+s^2+\alpha^3s^3)$ is higher than the cost of increasing taxes ($\frac{\sum s^i(1+2\alpha^i)}{3}$). Therefore, maximizing (A.1) is tatamount to maximize:

$$(R+r)\left[\frac{1}{2}+\frac{d}{3s}\left(h\ln(g)\sum s^i(1+2\alpha^i)+b^2(\alpha^1s^1+s^2+\alpha^3s^3)\right)\right]$$

subject to:

$$g+b^2+r\leq 3.$$

which implies (assuming an internal optimum[1]):

[1]The condition for an internal optimum is:

$$\frac{h\sum s^i(1+2\alpha^i)}{\alpha^1s^1+s^2+\alpha^3s^3}-3<R-\frac{3s/2d}{\alpha^1s^1+s^2+\alpha^3s^3}<0$$

which is verified for suitable values of h and R.

$$\begin{aligned} g^{prop} &= \frac{h\sum s^i(1+2\alpha^i)}{\alpha^1 s^1 + s^2 + \alpha^3 s^3} \\ r^{prop} &= \frac{3s}{2d(\alpha^1 s^1 + s^2 + \alpha^3 s^3)} - R \\ b^{2,prop} &= 3 + R - \frac{3s/2d + \sum s^i(1+2\alpha^i)}{(\alpha^1 s^1 + s^2 + \alpha^3 s^3)} \end{aligned} \tag{A.2}$$

Consider now party A's problem in a majoritarian system. Given Assumption 2 and equations (1.3) (1.4) and (1.8), the probability of winning is given by:

$$p^A(q^A, q^B) = \frac{1}{2} + d(W^2(q^A) - W^2(q^B))$$

where:

$$W^2(q^A) = (1+2\alpha^2)(1-\tau + h\ln(g)) + b^2 + \alpha^2 b^1 + \alpha^2 b^3.$$

Obviously, also in this case $b^1 = b^3 = 0$. Moreover, also in this case it is optimal to set $\tau = 1$ (as $1 > \frac{1+2\alpha^2}{3}$). Therefore party A's problem is to maximize:

$$(R+r)\Big[\frac{1}{2} + d\Big((1+2\alpha^2)h\ln(g) + b^2\Big)\Big]$$

Subject to:

$$g + b^2 + r \leq 3.$$

which implies (assuming an internal optimum):

$$\begin{aligned} g^{maj} &= h(1+2\alpha^2) \\ r^{maj} &= \frac{1}{2d} - R \\ b^{2,maj} &= 3 - h(1+2\alpha^2) - \frac{1}{2d} + R \end{aligned} \tag{A.3}$$

Now we are in a position to compare the equilibrium outcomes under the two electoral regimes. Looking at the public good:

$$\frac{g^{prop}}{g^{maj}} = \frac{s^1\frac{1+2\alpha^1}{1+2\alpha^2} + s^2 + s^3\frac{1+2\alpha^3}{1+2\alpha^2}}{\alpha^1 s^1 + s^2 + \alpha^3 s^3} \tag{A.4}$$

but $\frac{1+2\alpha^1}{1+2\alpha^2} > \alpha^1$ and $\frac{1+2\alpha^3}{1+2\alpha^2} > \alpha^3$, therefore $g^{prop} > g^{maj}$. As for the rent:

$$\Delta r = r^{prop} - r^{maj} = \frac{3s}{2d(\alpha^1 s^1 + s^2 + \alpha^3 s^3)} - \frac{1}{2d} > 0$$

because $\sum_i s^i > \alpha^1 s^1 + s^2 + \alpha^3 s^3$. Finally, as

$$3 = g^{maj} + r^{maj} + b^{2maj} = g^{prop} + r^{prop} + b^{2,prop}$$

it follows that $b^{2maj} > b^{2prop}$.

Proof of Proposition 2

Looking at equation (7), it is apparent that g^{prop}/g^{maj} decreases with α^2. Now look at what happens with α^1 (the results concerning α^1 can be straightforwardly extended to α^3). From equation (7), one has that $\frac{\partial(g^{prop}/g^{maj})}{\partial\alpha^1} < 0$ if and only if:

$$\alpha^2 > \frac{s^2 - s^1 - s^3}{2s^2}. \tag{A.5}$$

r^{maj} does not depend on altruism, and r^{prop} is clearly decreasing in α^1 and α^2. Finally,

$$\frac{b^{2prop}}{b^{2maj}} = \frac{3 + R - \frac{3s/2d + h\sum s^i(1+2\alpha^i)}{(\alpha^1 s^1 + s^2 + \alpha^3 s^3)}}{3 + R - \frac{1}{2d} - h(1 + 2\alpha^2)}$$

Therefore a *sufficient* condition for $\frac{\partial(b^{2prop}/b^{2maj})}{\partial\alpha^1} > 0$ is that $\partial\frac{\sum s^i(1+2\alpha^i)}{(\alpha^1 s^1 + s^2 + \alpha^3 s^3)}/\partial\alpha^1$ is negative, which happens as long as condition (9) is satisfied. In turn, $\frac{\partial(b^{2prop}/b^{2maj})}{\partial\alpha^2} > 0$ is positive if and only if

$$\sum_{i=1,3} s^i \left[-\frac{1}{2d} + \alpha^i(3 + R) - h(1 + 2\alpha^i) \right] > 0,$$

which is true provided

$$\alpha^i > \frac{h + 1/2d}{3 + R - 2h} \text{ for i=1,3}$$

Appendix B

Appendix to Chapter 2

Pension wealth is a relevant component of lifecycle wealth and therefore, according to lifecycle theory, any major shock to pension wealth is likely to affect consumption and saving choices. Following Attanasio and Brugiavini (2003) and Bottazzi, Jappelli and Padula (2006), I estimate the expected value of pension wealth, discounted at present, as follows:

$$PW_{it} = \left[P(N_t|t) \left(\frac{1+g_s}{1+r} \right)^{N_t - t} \theta_t \right] \sum_{t=N_t}^{P} (\alpha|N_t) \left(\frac{1}{1+r} \right)^{T-N_t}$$

where $P(N_t|t)$ is the conditional probability of surviving at the expected retirement age N_t and $P(\alpha|N_t)$ is the conditional probability of surviving at age α, after retirement. Survival probabilities are drawn from the official Italian life tables, by age and gender. I use the expected after-tax replacement rate θ_t and the expected retirement age N_t as elicited in the survey rather than the statutory ones, as in Attanasio and Brugiavini (2003), because individuals make choices on the basis of their expectations, right or wrong may they be. The expected value of θ_t is almost 70%, in line with official estimates.

g_s is the real earning growth rate for group s. I use 32 groups, obtained by partitioning my sample by gender, four cohorts (so as to span the entire sample) and four education levels. In order to get g_s I estimate a regression of log earnings using all available waves of the survey, starting from 1987. The estimated real growth rate spans from a nul dynamics to almost 4 percent. In simulating the labor income at retirement I assume no spells of unemployment from present onwards because it is well known that unemployment is larger among young; using observed spells of unemployment to forecast future employment track would therefore lead to overestimate future unemployment. Estimated pension wealth is on average 250 thousands euro (of 2012) and it amounts to around 15 times the individual labor income.

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