Supplementary private pensions and saving: evidence from Spain*

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Abstract

This paper analyzes the effect of private supplementary pensions (and the tax reliefs that aim to stimulate such plans) on national saving in Spain. It tries to test the alleged positive effects of private pension plans on savings. Using a longitudinal dataset and fixed-effects methods, we find that tax-favored contributions to a pension fund are not associated with a lower consumption level, which implies that this policy does not increase national saving. The empirical results on the impact of contributions on private household wealth are less clear.

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1 Introduction

Tax relief on supplementary pensions represents one of the pillars of the so-called *voluntary welfare* (Barr, 1992). The presence of tax incentives for encouraging private pension schemes is quite common in Organisation for Economic Development and Co-operation (OECD) economies, not only as a means of raising national saving but also as a way of attenuating future fiscal pressures on the public sector associated with public pensions, making compatible moderate increases in pension expenditure for the public sector with adequate pensions for the old-age population. In fact, voluntary pension plans are a piece of the World Bank and OECD's core recommendations for reforming pensions in Western countries; in particular, it is argued that these tax-favored plans should complement non-contributory pensions and mandatory contributory benefits.

Economic analysis of this policy has centered on its effect on national saving, as a positive by-product of the existence of private pension plans that further increase their attractiveness. If private pensions plans increase savings it can be argued that such a system of old-age provision will contribute to higher investment and future growth, making it easier to combine in the future higher pensions for pensioners and growing income for workers.[1] The evidence on the issue is still inconclusive, with most of the studies focusing on the USA and not reaching a consensus on its effectiveness. The present paper, which studies the effect of tax incentives for promoting supplementary pensions on saving in Spain, aims to enlarge the body of literature related to this topic. In particular, the research presented here is one of the few available for a country other than the USA and it profits from the use of a longitudinal survey that allows controlling for the effect of time-constant unobservable households heterogeneity using fixed-effects techniques. The results suggest that contributions to pension funds are not linked to higher national saving since they are not accompanied by falls in consumption. However, there is no clear evidence that pension funds contributions come from reshuffling other household assets or saving that would have been done anyway. Therefore, at most, it seems that this tax relief would increase private household saving but not national saving, as the additional saving would come from the higher disposable income allowed by the existence of the tax relief.

The rest of the paper unfolds as follows. The second section, which comes after this introduction, outlines the systems of tax incentives for encouraging retirement saving in Spain and summarizes the main findings of previous literature. The third and fourth sections describe the database and the methodology used in the study, respectively, while the fifth section is devoted to presenting and discussing the main results of the empirical analysis. The final section summarizes the paper's main conclusions.

2 Background and literature review

2.1 Supplementary pensions in Spain

Spanish authorities started to foster supplementary pension provision in 1988, when the first parametric reform of the public pay-as-you-go system was carried out. Regarding complementary pensions, for the first time, the government introduced some incentives for promoting private pension coverage on a voluntary basis. In particular, voluntary contributions to private pension funds became exempt from income tax (a progressive tax with several brackets) up to a certain limit, the returns to such investment were made tax-free and, finally, withdrawals were taxed (usually at a lower marginal tax rate because of declining incomes associated with old age).[2] These first tax reliefs were followed by exemptions from payroll taxes from 1995 and several tax

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[1] Apart from this aim, some authors allege the superiority of funded plans over pay-as-you-go systems for coping with demographic aging, but there is some controversy on this issue. See Barr and Diamond (2006) for a discussion.

[2] Therefore, voluntary contributions are subtracted from taxable income, so the exemption is given at the marginal tax rate.
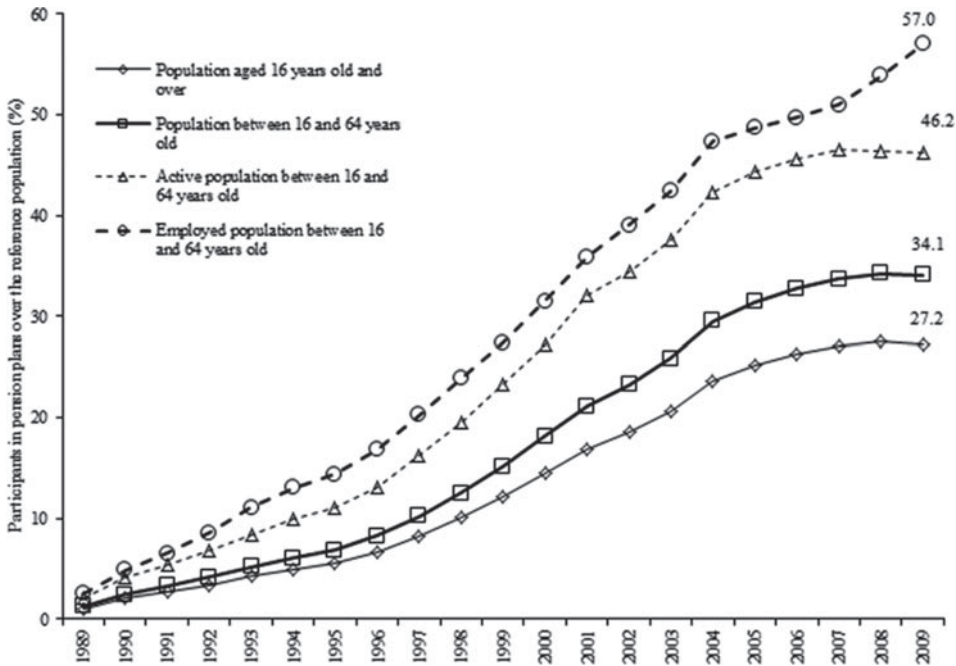
Figure 1. Evolution of participation in supplementary pension schemes in Spain (1989–2009).
Source: Authors' analysis from Spanish Association of Investment and Pension Funds data and Spanish Labour Force Survey (4th quarter of each year).

incentives in corporate tax from 2001.[3] Nevertheless, the most beneficial tax treatment was in effect from 1999 to 2007, with not only higher general and specific contribution limits, but also a tax-exemption of 40% on lump-sum withdrawal payments. This special treatment on lump-sum payments was removed in 2007.[4]

As might be expected from such tax policies, the number of contributors to pension funds grew exponentially from 1989 to 2009 (see Figure 1), reaching more than 10 million at the end of 2009. It is also relevant to point out that, according to the data from the Spanish Association of Investment and Pension Funds, about 81% of such pension plans were personal (<20% were occupational schemes or similar plans) and, according to the Spanish Directorate General for Insurance and Pension Funds (Directorio General de Seguros y Fondos de Pensiones, 2009), roughly 82.1% of total pension funds corresponded to defined contribution schemes, 0.7%, to defined benefit plans and the rest, to mixed systems. These figures are quite in line with international trends in pension systems design, which privilege personal defined contribution pensions.

The growth in the number of contributors also translated into a rapid accumulation of funds: in barely two decades, the supplementary pension system has accumulated funds that accounted for more than 8% of Spanish GDP in 2009 (see Figure 2).

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[3] In addition, private pension assets were always exempted from the wealth tax, which was abolished in 2008.
[4] A more detailed description of tax relief on private pensions in Spain can be found in Antón (2007) and Domínguez-Barrero and López-Laborda (2007).

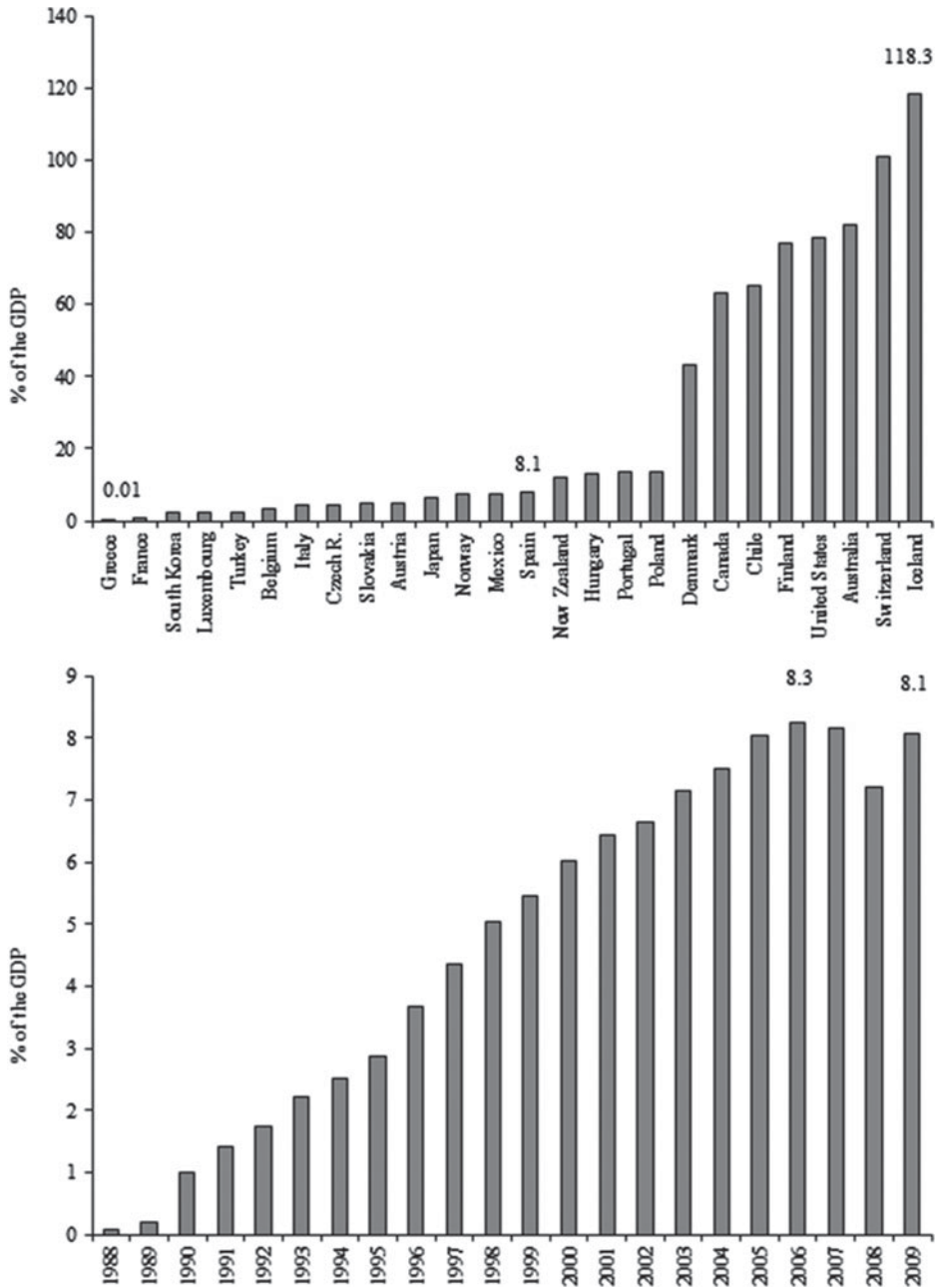Figure 2. Pension fund assets in Spain. Upper panel: pension fund assets in OECD countries as a percentage of GDP (around 2009). Lower panel: pension fund assets in Spain as a percentage of GDP (1989–2009). Data from Belgium, France, Greece, Slovakia and Switzerland correspond to 2008; Japanese data are from 2005.

Source: Authors' analysis from OECD and Spanish Association of Investment and Pension Funds data.

Although these data put Spain in a position that is far from countries where either occupational or personal private pensions have a longer tradition, such as Canada, the USA or Chile, the relevance of these schemes is more pronounced than in Italy, Greece or France and very similar to other countries such as Poland or Hungary that have recently moved to mandatory personal accounts.

Unfortunately, information on the cost of the tax incentives for encouraging these benefits is remarkably limited. The data available are limited to information on income tax relief, which would account for approximately 0.2% of Spanish GDP in 2002 (Yoo and De Serres, 2004; Antón, 2007).

2.2 Supplementary pensions, tax incentives and saving

The effect of pension tax relief on saving is a highly controversial issue. From a theoretical point of view, assuming perfect capital markets and consumers with perfect foresight, the net effect of such a policy on private saving is ambiguous, as it results from the balance of a substitution effect associated with a higher rate of return on saving and an income effect linked to larger possibilities of consumption because of the tax break (Atkinson and Stiglitz, 1980; López, 2000; Attanasio and DeLeire, 2002; Bernheim, 2002; Attanasio *et al.*, 2004).[5] Under less restrictive scenarios, using Behavioral Economics models contemplating problems of self-control or some type of bounded rationality, results are not straightforward either (Bernheim, 2002). Bernheim points out that, in this theoretical framework, other simpler policies – such as an increase in consumption taxes – might be much more effective in raising household saving than tax-favoring voluntary pensions.

According to Attanasio and DeLeire (2002), the money put in pension funds can come from three different sources: first, money that otherwise would have been devoted to consumption; second, savings emanating from reshuffling assets or that would have been done anyway (in the absence of tax incentives); and third, savings associated with higher disposable income resulting from the tax break. Only in the first case do pension fund assets represent a net addition to national saving, whereas in the second case the effect on private saving is null and in the last case the higher private household saving is compensated by a lower public saving, resulting also in a null effect on national saving.[6]

Most of the empirical evidence on this issue is taken from studies of the USA, particularly on individual retirement accounts (IRAs) and 401(k) plans, and is highly

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[5] More sophisticated models, incorporating other features such as contribution limits or public pension wealth are proposed by Venti and Wise (1986, 1990), Gale and Scholz (1994) and Gale (1998).

[6] Note that this paper is exclusively focused on the effects of voluntary private pensions on saving. A very different issue is the impact of mandatory pensions on saving and, particularly, how replacing a mandatory pay-as-you-go pensions system by a private fully-funded pension scheme based on individual accounts can affect national saving. On the theoretical impact of mandatory pensions on saving see, among many others, Feldstein (1974, 1988), Kotlikoff (1979), Diamond and Hausman (1984) and Auerbach and Kotlikoff (1987). On the transition from a pay-as-you-go system to a fully funded scheme and its impact on saving see, for instance, Arrau and Schmidt-Hebbel (1993), Kotlikoff (1996), Corsetti and Schmidt-Hebbel (1997), Valdés-Prieto (1997) and Kotlikoff *et al.* (1999). On the effect of this type of pension reform on saving see the survey of Mesa-Lago (2004) for Latin America and the Caribbean and the wider review of the Independent Evaluation Group (2006), a report prepared for the World Bank.

controversial. Surveys of this vast literature reveal very inconclusive and contradictory findings, from negative or null effects on national saving to very positive or even crowding-in effects (i.e., private saving would increase more than one monetary unity by each monetary unit contributed) (Engen *et al.*, 1994; Bernheim, 2002; Attanasio *et al.*, 2004; Börsch-Supan, 2004; Bosworth and Burtless, 2004; OECD, 2009; Attanasio and Wakefield, 2010; Attanasio and Weber, 2010).[7] Studies based on the British case do not reach a consensus either (Guariglia and Markose, 2000; Attanasio *et al.*, 2004; Rossi, 2009). Finally, two recent studies of Germany suggest that the introduction of tax-favored supplementary pensions (the so-called Riester reform) would not have contributed to increase saving (Börsch-Supan *et al.*, 2007; Corneo *et al.*, 2010).

There is only one study of the Spanish case (Ayuso *et al.*, 2007), which explores the effects of the introduction of the tax breaks of the late eighties on consumption. They combine information from tax data and a household budget survey using a two-sample two-stage least-squares approach. They do not find any overall effect on saving, although positive and negative effects on particular age and income groups are reported.

This paper aims to contribute to the literature on this issue outside the USA. In order to do so, we profit from the use of fixed-effects techniques applied to a longitudinal household finance survey that includes information on wealth, pension funds and consumption. Because of reasons of availability, the use of panel databases has been very limited in previous work on this topic. Particularly, such type of literature is limited to the research work of Engen *et al.* (1994) and Joines and Manegold (1995), using the *Internal Revenue Service-Michigan Tax Panel*, and López-Murphy and Musalem (2004), who exploit a panel of countries. These three studies find that the contribution of voluntary pension funds to saving is very small.

3 Data

The database used in this analysis is the *Spanish Survey of Household Finances* (SSHF) of 2002 and 2005, the waves of the survey available at the moment of writing this paper, carried out by the Bank of Spain jointly with the National Statistics Institute (INE). The design of the survey was inspired by the American *Survey of Consumer Finances* and the Italian *Survey of Household and Income Wealth* and includes a multi-stage and stratified sampling, over-representing high-income households (Bover, 2004, 2008*a*). The survey contains detailed information on financial and non-financial wealth, income and durables and non-durables consumption of Spanish households. Furthermore, the two available waves of the SSHF allow the

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[7] The complete list of papers dealing with this topic in the USA comprises more than twenty references. Although the interested reader is encouraged to review the above mentioned literature surveys, it is worth mentioning that leading contributions come from, on the one side, Venti and Wise (1986, 1990) and Poterba *et al.* (1995), who report large positive effects on saving and, on the other side, Engen *et al.* (1994), Gale and Scholz (1994) and Gale (1998), whose findings point out a negligible impact of tax relief for private pensions.

construction of a panel of 2,580 households (Bover, 2008*b*), among which one third made contributions to supplementary pensions in 2002 or 2005.[8]

One of the key issues in the survey was the treatment of missing values, whose presence is non-negligible in many variables related to income and, especially, wealth. After many efforts to minimize non-response, this issue was addressed by the designers of the SSHF using multiple imputation techniques, which were considered the most appropriate way of dealing with this problem (Barceló, 2006). Therefore, the Bank of Spain provided the researchers not only with original data but also with five sets of imputations to deal with the issue of missing values.

Both the descriptive and the multivariate analysis of the database were carried out using the five imputations included with the survey. All these calculations were performed using the software Stata 12.

4 Methodology

In order to explore the effects of pension contributions on national saving we follow the proposal of Attanasio and DeLeire (2002), who explore the impact of IRA tax deductions on saving in the USA. Following these authors, contributions to pension plans represent new national savings only when they result from lower levels of consumption. If participation in private pension schemes is not associated with lower consumption, then national savings does not increase, while, if the new saving exclusively comes from a higher level of disposable income because of tax relief, although private household saving is higher, the net effect on national saving is null because the increase in household saving is counteracted by a decrease in public saving linked to the lower tax revenue.

Our analysis entails a slight modification of the test proposed by Attanasio and DeLeire (2002). These authors do not use longitudinal econometric techniques but regress the change in consumption or saving in a short period of time on a set of household characteristics using a sample that contains households that contribute in some time to pension funds, assuming that this method allows for controlling for unobserved heterogeneity as long as contributing households should have similar preferences for saving and consumption. In the present paper, as our sample is smaller, we include both contributing and non-contributing households and estimate the regressions in levels but using fixed-effects techniques, which allow controlling for unobserved heterogeneity of all households.

In order to assess the impact of participation in pension plans on saving these authors suggest two kinds of tests. The first type of test is based on consumption and its main objective is to determine if enrolment in a pension plan leads to a lower level of household consumption, which, as mentioned earlier, is the only way by which these plans can boost national saving. In this strategy, we estimate the following expression:

$$C_{it} = \alpha + \beta X'_{it} + \gamma P_{it} + u_i + \varepsilon_{it} \tag{1}$$

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[8] These data are freely available on the website of the Bank of Spain, jointly with the codebooks and questionnaires translated into English.

where C_{it} denotes the consumption level of household i in time t, X_{it} is a vector of household observable characteristics (detailed below), P_{it} is the variable associated with participation in private pensions (either enrolment in a pension plan or yearly pension contributions depending on the specification), u_i is a household-specific disturbance and ε_{it} is a time-varying individual specific disturbance. The null hypothesis is that participation in pension plans does not affect consumption and, thus, it does not lead to increased national saving. This expression is estimated both in levels and logs.

The second test is based on household non-pension assets and consists in determining if pension plan contributions are made at the expense of existing assets or saving that would have been done anyway. The equation to be estimated unfolds as follows:

$$NPW_{it} = \alpha + \beta X'_{it} + \gamma P_{it} + u_i + \varepsilon_{it} \qquad (2)$$

where NPW_{it} represents the non-pension wealth. The null hypothesis is now that pension saving does not negatively affect other types of saving, that is, that pension saving is not substituting other types of saving. We must have in mind that even if non-pension wealth is unaffected by pension saving, it does not mean that national saving increases as it requires a lower consumption level to be true. Furthermore, we investigate whether participation in pension plans affects the level of total household assets, that is, we estimate the equation

$$W_{it} = \alpha + \beta X'_{it} + \gamma P_{it} + u_i + \varepsilon_{it} \qquad (3)$$

where W_{it} denotes the total household wealth.

In contrast to most previous empirical studies, we benefit from the use of panel data, which allows the removal of time-constant household unobserved heterogeneity using fixed-effects estimation (such unobserved heterogeneity is likely to play an important role in determining household saving decisions, as it has to reflect unobserved tastes for saving, attitudes to toward risk, ability, etc.). Therefore, the identification of the causal effect of pension contributions is achieved provided that the endogeneity of this variable is associated with time-varying observable characteristics and time-constant unobservable factors. One should bear in mind that, although we control for a wide range of observable characteristics, unobserved time-varying variables that are not independent of the dependent variable and contributions could lead to inconsistent estimators. In other words, our identification strategy assumes that there is no time-varying unobservable factor simultaneously affecting contributions and consumption or saving. In this respect, as mentioned above, using longitudinal data, this study goes a step further than most previous research.[9]

As Attanasio and DeLeire ([2002]) suggest, the effects on national saving are more likely to appear when a household starts to contribute to a pension plan.

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[9] We could not find a good instrument for having a pension plan or the total amount of contributions, that is, one that is strongly correlated to such variables and, at the same time, might be considered as reasonably exogenous to saving and consumption. Nevertheless, one should keep in mind that a bad instrument can do more harm than good (Bound *et al.*, [1995]; Staiger and Stock, [1997]; Angrist and Pischke, [2009]; McKenzie *et al.*, [2010]). For instance, if instruments are weak (weakly correlated with the potentially endogenous variables), the precision of estimates can dramatically diminish.

Nevertheless, the effect should be observable in a longer period of time if there are not perfect capital markets or there are (tax deductible) contribution limits (as in the Spanish case). Therefore, we estimate the equations presented above using both a binary indicator of participation in pension plans and the annual level of contributions as key variables for determining the effect of the enrolment in pension plans on saving.

In Table 1, we list the variables included in the analysis, along with their definition. They comprise the outcome variables of the equations outlined above (consumption, total wealth and non-pension wealth), the policy variables of interest (being a contributor to a pension plan and total amount of contributions to pension plans) and the vector of observable characteristics used as control covariates: household head sex, age, education, marital status and employment status, household size, number of children <5 years old and between 5 and 15 years old, number of household members aged 65 years old and over, number of employed household members, number of household members with high educational attainment, household income and its squared and a time aggregate effect (a binary variable for the year 2005).

As is customary in policy evaluation and applied micro-econometrics (Angrist and Krueger, 1999; Duflo *et al.*, 2008; Angrist and Pischke, 2009; Khandker *et al.*, 2010), we focus on fixed-effects estimates irrespective of the correlation of time-constant unobserved heterogeneity with covariates. Random effects require much stronger assumptions for consistency, which, in practice, are difficult to fulfill. Particularly, consistency of random-effects estimates require that unobserved individual effects constant across time are not correlated with any of the observable covariates. In our particular case, this is not likely to be reasonable, as unobserved heterogeneity might be related to saving, attitudes to toward risk, ability, etc. and other factors that are constant over time and that are likely to be correlated with education, income, etc. Nevertheless, in the results section we return to this issue.

5 Results

The main descriptive statistics of the sample used in the analysis are presented in Table 2. The most relevant feature to be highlighted is the existence of significant differences in observable characteristics between contributing and non-contributing households: for instance, consumption, wealth, income or pension contributions are remarkably higher among contributing households.

The results of the econometric analysis are displayed in Table 3.[10] First of all, they show that the null hypothesis asserting that contribution to voluntary pensions does not reduce consumption cannot be rejected in any of the proposed specifications, either using a binary variable for contributors or a continuous variable for contributed amounts. In other words, our results suggest that the contribution to private pensions does not reduce consumption, which would imply that, by definition, they

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[10] Detailed results from the estimation for the whole sample are showed in the annex. Detailed results from the estimation for the sample including only households headed by people aged < 65 years old are omitted for reasons of space but are available from the authors upon request.

Table 1. *Variables considered in the analysis*

Variable	Definition
Consumption (2005 constant €)	Expenditure on durable (annual expenditure) and non-durable goods (monthly annualized expenditure)
Non-durables consumption (2005 constant €)	Annual expenditure excluding vehicles and other durable goods in the year of interest (annualized monthly expenditure)
Wealth (2005 constant €)	Net value of real and financial assets
Non-pension wealth (2005 constant €)	Net value of real and financial asset excluding wealth in private pensions
Female household head	Dummy indicating whether the household head is a woman
Household head aged <35	Dummy indicating whether the household head is aged <35
Household head aged 35–44	Dummy indicating whether the household head is aged between 35 and 44
Household head aged 45–54	Dummy indicating whether the household head is aged between 45 and 54
Household head aged 55–64	Dummy indicating whether the household head is aged between 55 and 64 (omitted in some specifications as this group is the reference category)
Household head aged 65–74	Dummy indicating whether the household head is aged between 65 and 74 (omitted in some specifications as this group is the reference category)
Household head aged 75 and over	Dummy indicating whether the household head is aged 75 and over
Household head with Elementary education	Dummy indicating whether the household head has Primary education or less (omitted in all specifications as this group is the reference category)
Household head with Basic education	Dummy indicating whether the household head has only Lower Secondary education
Household head with Medium education	Dummy indicating whether the household head has only Upper Secondary education
Household head with Higher education	Dummy indicating whether the household head has University education or above
Household head married	Dummy indicating whether the household head is married
Household head employed	Dummy indicating whether the household head is employed
Household size	Number of household members
No. of employed people	Number of household members who are employed
No. of children aged <5	Number of household membersaged <5 years old
No. of children aged 5–15	Number of household members aged between 5 and 15
No. of people aged 65 and over	Number of household members aged 65 and over
No. of people with Higher education	Number of household members with University education or above
Household income	Net annual income received by the household in the year before the interview
Household contributor to a pension plan	Dummy indicating whether any household member has a pension plan
Yearly contributions to pension plans (2005 constant €)	Amount of annual contributions made to private pension plans
Year 2005	Dummy capturing time aggregate effects

Source: Authors' analysis from SSHF.

Table 2. *Main descriptive statistics of the sample*

	Total		Non-contributors		Contributors	
	Mean	Standard deviation	Means	Standard deviation	Mean	Standard deviation
Consumption (2005 constant €)	15,508	12,749	13,579	11,033	20,526	15,296
Non-durables consumption (2005 constant €)	12,143	8,188	10,879	7,147	15,431	9,681
Wealth (2005 constant €)	245,675	837,817	192,841	924,855	383,152	526,707
Non-pension wealth (2005 constant €)	241,491	835,591	192,841	924,855	368,078	517,565
Female household head	0.370	0.483	0.386	0.487	0.328	0.470
Household head aged <35	0.141	0.348	0.151	0.358	0.116	0.320
Household head aged 35–44	0.228	0.420	0.194	0.396	0.315	0.465
Household head aged 45–54	0.204	0.403	0.164	0.370	0.309	0.462
Household head aged 55–64	0.165	0.371	0.147	0.355	0.211	0.408
Household head aged 65–74	0.178	0.383	0.230	0.421	0.044	0.205
Household head aged 75 and over	0.083	0.276	0.114	0.317	0.004	0.067
Household head with Elementary education	0.408	0.492	0.484	0.500	0.211	0.408
Household head with Basic education	0.165	0.371	0.168	0.374	0.157	0.364
Household head with Medium education	0.261	0.439	0.230	0.421	0.341	0.474
Household head with Higher education	0.166	0.372	0.117	0.322	0.292	0.455
Household head married	0.701	0.458	0.662	0.473	0.801	0.399
Household head employed	0.520	0.500	0.431	0.495	0.752	0.432
Household size	3.172	1.403	3.040	1.464	3.516	1.164
No. of employed people	1.227	0.970	1.064	0.978	1.650	0.807
No. of children aged <5	0.192	0.462	0.185	0.465	0.211	0.455
No. of children aged 5–15	0.374	0.693	0.325	0.663	0.503	0.753
No. of people aged 65 and over	0.468	0.725	0.592	0.778	0.146	0.419
No. of people with Higher education	0.439	0.818	0.320	0.703	0.749	0.995
Household income	33,863	36,316	27,558	25,150	50,269	52,327
Household contributor to a pension plan	0.278	0.448	–	–	1.000	0.000
Yearly contributions to pension plans (2005 constant €)	780	2,486	–	–	2,810	4,064
Year 2005	0.500	0.500	0.480	0.500	0.553	0.497
Observations	5,160		3,564		1,596	

Note: Standard deviations have been computed using the first imputed dataset.
Source: Authors' analysis from SSHF.

Table 3. *Fixed-effects estimates of the impact of contributing to private pension plans on consumption and non-pension saving*

	Sample used in the estimation			
	Total sample		Households headed by people aged <65 years old	
	Policy variable of interest		Policy variable of interest	
Outcome variable	Being a contributor to a pension plan	Contributions to a pension plan	Being a contributor to a pension plan	Contributions to a pension plan
Equation (1)				
Total consumption	2,613** (1,121)	0.887*** (0.057)	3,302** (1,656)	1.074*** (0.095)
Total consumption (in logs)	0.086** (0.036)	0.000*** (0.000)	0.103** (0.045)	0.000*** (0.000)
Non-durables consumption	1,279** (626)	0.276*** (0.034)	1,596** (754)	0.321*** (0.035)
Non-durables consumption (in logs)	0.052 (0.031)	0.000*** (0.000)	0.077** (0.039)	0.000*** (0.000)
Equation (2)				
Non-pension wealth	−622,306** (312,484)	−109 (76)	−959,344** (509,429)	−138 (92)
Equation (3)				
Wealth	−604,152** (312,141)	−108 (76)	−945,674* (508,887)	−137 (92)
Observations	5,160	5,160	3,103	3,103
Households	2,580	2,580	1,685	1,685

Notes: Standard errors in parentheses.
***significant at 1%; **significant at 5%; *significant at 10%.
Control variables: an intercept, household head sex, household head, household head educational level, household head marital status, household head employment status, household size, no. of employed people in the household, no. of children aged <5 in the household, no. of children aged between 5 and 15 in the household, no. of people aged 65 and over in the household, no. of people with higher education in the household, household income, squared household income and a dummy for the year 2005.
Source: Authors' analysis from SSHF.

cannot increase national savings. Both being a contributor and the amount of contribution seem to exert a positive rather than negative effect on consumption. When expressing consumption in logs, the impact of the binary variable remains positive but the effect of the continuous one vanishes. In order to check the robustness of the results, we repeated the analysis excluding durable goods from our consumption variable and the results hold. In addition, we performed the analysis restricting our sample to those households headed by individuals aged <65 years and, again, the results were basically the same as in the first set of estimates. As commented upon in the second section, one should keep in mind that both a null and a positive effect of tax incentives on consumption are perfectly coherent with standard Economic Theory. Apart from a substitution effect associated with a lower present consumption, other things being equal the tax break allow taxpayers to enjoy a higher disposable income – that is, it generates an income effect – inducing higher consumption. Which effect prevails is an empirical issue.

In the second place, we test if being a contributor to a pension plan or the amount contributed is associated with lower non-pension wealth. In this case, the null hypothesis is that contributing to voluntary pensions is not compensated by lower non-pension assets, that is, there is no substitutability between both types of saving or pension saving would not have been generated otherwise. On the basis of the results obtained in this second test, we can reject the hypothesis of null substitutability when using the binary indicator of being part of a pension plan, whereas none of the estimated coefficients is statistically different from zero in the case of contributions. The results, therefore, are ambiguous and non-conclusive in this second case: private pensions would seem to substitute for other savings when using the binary indicator, but they would seem not to substitute when examining the actual amount contributed. The same results are found when we compute the impact of participation in complementary pensions on total household assets. Nevertheless, it should be highlighted that the standard error of the estimates is very large. It is worth mentioning that, according to the theoretical analysis of Attanasio and DeLeire ([2002](#)), in the absence of contribution limits to tax-favored contributions and capital-market imperfections, the eventual saving increase should be observed when contributions started rather than later. It is evident that liquidity constraints, capital market imperfections and contribution limits exist but this argument illustrates why the bulk of the eventual increase in household saving should be observed when a household start a pension scheme. This reasoning might help to make our results clearer, since the results for the effect of the binary variable (having a pension plan) are more robust than those obtained with the continuous one (amount of contributions).

In sum, these results suggest a null effect of contributions on national saving and an unclear effect on household private saving (the levels of significance are lower and the precision of estimates are larger). In the best of cases, the analysis depicts a situation where new household saving would be financed by the lower taxes paid by pension contributors. However, two cautionary notes should be kept in mind. Firstly, the estimated effect of contributions on household non-pension savings is extremely imprecise, probably because such an effect is too small to be clearly identified with

a relatively small sample. In fact, pension wealth represents <4% of the total wealth of households. Secondly, missing values play a substantial role in the survey (an issue that, as mentioned in Section 3, is addressed using multiple imputation), especially regarding saving: while about 45% of the households surveyed had some imputed component of household saving in 2005, this proportion was <5% in the case of consumption. In principle, on the basis of this second feature, results based on consumption are less likely to be subject to measurement error.

Finally, it is worth recalling why we focus on fixed-effects estimates. As commented above, the use of random effects in the context of policy evaluation in applied microeconometrics is rare, since consistency requires very strong assumptions and the efficiency gains associated with them if such assumptions hold tend to be small (Angrist and Pischke, 2009). There is a range of Hausman-type tests described in the literature aimed at testing whether the absence of correlation between unobserved individual effects and covariates is reasonable. Basically, the idea behind these tests is to see if the difference between fixed-effects estimated coefficients and random-effect coefficients is statistically different from zero. However, as with any statistical test, there is the possibility of incurring a type II error, which consists in not rejecting the null when it is false (a false positive). Type II is related to the power of the test, which is lower the larger the variance of the coefficient to be estimated (in this case, related to the estimated variance of the fixed- and random-effect coefficients) and the smaller the sample size. In this case, a false negative might have very serious consequences: we would be leaving aside a consistent estimator (the fixed-effects estimator) and using an estimator with a smaller variance but that is inconsistent. In this paper, unfortunately, we are undoubtedly in a situation where the power of the test is small because we have a relatively small sample size and we have large standard errors not only because of the sample size but also because of the multiple imputed dataset. Therefore, irrespective of the results of any Hausman-type test one might carry out, there is a strong case for focusing on fixed-effects estimates. This particularly applies to the results obtained when the analysis is limited to households headed by people aged <65 years old, since the sample is somewhat smaller. This is a conservative position, since we are sacrificing efficiency for consistency.

Nevertheless, we implement a regression-based test proposed by Wooldridge (2010), which is compatible with multiple imputed datasets like ours, which consists in, first, adding to the model the within-person means of time-varying variables (excluding aggregate time effects); second, estimating such augmented model using random-effects and, finally, testing whether the estimated coefficients for such within-person means are jointly statistically different from zero. Implementing this approach, we find that the null hypothesis (that coefficients for within-person means are zero, which has to do with the irrelevance of correlation between unobserved heterogeneity and covariates) is rejected at least at 5% confidence level in all cases but two: first, the model that explores the effect of having a private pension plan on total wealth in the sample that only includes household heads aged <65 and, second, when we study the effect of having a private pension plan on non-pension wealth in the same sample as the former. In the first case, the random-effects estimated coefficient for the dummy variable for having a private pension plan is negative but not

statistically different from zero (−357,288.1, with a standard error of 445,741.8). In the second case, the random-effects estimated coefficient is negative and statistically significant at 10% level (−379,053.9, with a standard error of 226,412.4). Therefore, the results reported in the main text for these two cases are basically unchanged, suggesting no positive effect of voluntary private pensions on national saving.

6 Conclusions

Tax relief on supplementary private pensions, which have proliferated in recent years in OECD economies, has the promotion of saving as one of its primary objectives. The aim of this paper has been to assess to what extent this objective has been accomplished in the Spanish case. Using a longitudinal household finance survey and fixed-effect techniques, we have found that participation in this type of pension plan is not associated with a decrease in consumption. Therefore, a positive effect on national saving can be ruled out. This result is consistent with some macroeconomic evidence that suggests the lack of relevant effects of voluntary pension funds on national saving (López-Murphy and Musalem, 2000). On the other hand, our empirical analysis has not provided conclusive evidence on the impact on household private saving. One should keep in mind the small size of the sample and the large standard errors associated with it and the multiple imputation procedure for missing variables. Therefore, although our research contributes to knowledge concerning the effects of voluntary private pensions on saving, it is far from being definitive and further research in this area (particularly research based on field experiments) is needed.

Overall, our findings cast additional doubts on the convenience of using these kinds of tax relief for fostering national saving. Furthermore, one has to keep in mind that policies that rely on tax breaks for accomplishing such aims have been evaluated as having a strongly regressive impact on income distribution (Burman *et al.*, 2004; Hughes and Sinfield, 2004; Antón, 2007). In this respect, it seems reasonable to explore other alternatives that, according to empirical evidence, are likely to be more equitable and effective policies for raising savings than tax credits or tax relief, such as matching incentives (Duflo *et al.*, 2006, 2007) or the improvement of financial education (Lusardi, 2004; Lusardi *et al.*, 2008).

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Table A1. *Fixed-effects estimates of the impact of being a contributor to private pension plans on consumption and non-pension saving (detailed results, total sample)*

	Total consumption		Non-durables consumption		Total consumption (in logs)	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Constant	6,683.3	2,375.1***	5,283.3	1,322.4***	8.746	0.076***
Female household head	572.7	1,098.3	964.6	612.9	−0.021	0.035
Household head aged <35	1,158.9	2,831.9	−241.5	1,579.0	0.243	0.090***
Household head aged 35–44	−1,662.4	2,440.7	−2,036.3	1,351.7	0.092	0.077
Household head aged 45–54	2,118.5	2,190.1	−705.2	1,211.2	0.120	0.069*
Household head aged 55–64	−1,433.0	1,834.4	−1,499.9	1,018.8	0.023	0.058
Household head aged 75 and over	−1,367.7	1,844.9	−811.2	1,025.6	−0.091	0.059
Household head with Elementary education	1,373.2	1,045.1	856.6	579.3	0.045	0.033
Household head with Basic education	1,007.3	1,246.5	370.2	694.4	0.025	0.040
Household head with Medium education	−754.9	1,942.5	−1,200.6	1,093.2	0.024	0.062
Household head married	3,158.3	1,704.7*	2,237.5	948.9**	0.234	0.054***
Household head employed	−1,978.7	1,320.5	−201.6	740.6	−0.078	0.042*
Household size	730.1	789.9	2,052.0	438.8***	0.101	0.025***
No. of employed people	2,331.2	769.7***	508.4	430.9	0.128	0.025***
No. of children aged <5	−1,588.0	1,671.5	−1,781.5	932.1*	−0.081	0.053
No. of children aged 5–15	−777.7	1,160.4	−1,057.0	641.4	−0.030	0.037
No. of people aged 65 and over	212.1	1,174.3	−540.9	652.0	0.037	0.038
No. of people with Higher education	2,136.9	921.2**	1,344.1	524.9**	0.020	0.029
Household income	0.1	0.0***	0.0	0.0***	0.000	0.000***
Squared household income	0.0	0.0***	0.0	0.0***	0.000	0.000***
Year 2005	757.3	480.3	132.7	268.0	0.042	0.015***
Household contributor to a pension plan	2,613.3	1,121.5**	1,279.2	625.6**	0.086	0.036**

Notes: ***significant at 1%; **significant at 5%; *significant at 10%.
Source: Authors' analysis from SSHF.

Table A2. *Fixed-effects estimates of the impact of being a contributor to private pension plans on consumption and non-pension saving (detailed results, total sample) (continued)*

	Non-durables consumption (in logs)		Non-pension wealth		Wealth	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Constant	8.641	0.067***	546,814.8	654,948.9	554,242.4	654,276.6
Female household head	0.026	0.031	−21,508.8	304,929.4	−24,358.8	304,617.4
Household head aged <35	0.137	0.080*	−125,452.2	780,116.3	−124,942.8	779,343.7
Household head aged 35–44	0.073	0.068	5,805.8	673,891.6	5,919.8	673,180.9
Household head aged 45–54	0.091	0.061	125,925.4	603,820.1	127,056.4	603,209.7
Household head aged 55–64	0.010	0.051	162,753.3	508,133.2	168,148.1	507,616.3
Household head aged 75 and over	−0.055	0.052	36,991.3	512,720.4	37,114.3	512,198.4
Household head with Elementary education	0.015	0.029	81,040.9	289,572.3	77,709.9	289,280.6
Household head with Basic education	−0.003	0.035	95,408.9	344,326.7	93,334.8	343,962.3
Household head with Medium education	0.010	0.055	569,728.2	534,990.4	569,659.7	534,363.1
Household head married	0.196	0.048***	−225,802.1	471,634.8	−222,967.6	471,152.2
Household head employed	−0.015	0.037	−173,847.1	362,895.1	−177,792.8	362,534.2
Household size	0.148	0.022***	32,152.0	218,078.5	29,011.9	217,844.4
No. of employed people	0.056	0.022**	129,972.6	213,874.7	132,154.9	213,637.2
No. of children aged <5	−0.108	0.047**	−12,416.9	464,707.1	−12,494.2	464,216.2
No. of children aged 5–15	−0.059	0.032*	−169,617.5	323,084.3	−168,737.4	322,714.0
No. of people aged 65 and over	0.004	0.033	155,353.2	326,338.6	156,839.9	326,007.5
No. of people with Higher education	0.002	0.026	−518,304.5	255,812.6**	−519,136.2	255,477.9**
Household income	0.000	0.000***	5.7	1.8***	103,422.8	132,646.8
Squared household income	0.000	0.000***	0.0	0.0***	5.8	1.8***
Year 2005	0.003	0.014	101,402.2	132,785.5	0.0	0.0**
Household contributor to a pension plan	0.052	0.031	−622,305.6	312,483.8**	−604,152.1	312,141.1**

Notes: ***significant at 1%; **significant at 5%; *significant at 10%.
Source: Authors' analysis from SSHF.

Table A3. *Fixed-effects estimates of the impact of contributions to private pension plans on consumption and non-pension saving (detailed results, total sample)*

	Total consumption		Non-durables consumption		Total consumption (in logs)	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Constant	6,515.2	2,254.0***	5,303.7	1,301.9***	8.755	0.075***
Female household head	838.7	1,044.9	1,051.7	602.4*	−0.019	0.035
Household head aged <35	1,059.7	2,688.6	−259.0	1,552.9	0.244	0.090***
Household head aged 35–44	−2,046.8	2,319.6	−2,108.4	1,328.3	0.096	0.077
Household head aged 45–54	1,435.3	2,085.2	−881.9	1,191.2	0.120	0.069*
Household head aged 55–64	−1,695.9	1,740.7	−1,554.7	1,000.1	0.025	0.058
Household head aged 75 and over	−1,721.7	1,757.9	−925.8	1,012.1	−0.094	0.059
Household head with Elementary education	1,611.1	992.9	946.8	570.0*	0.049	0.033
Household head with Basic education	1,123.7	1,181.0	417.5	681.8	0.028	0.040
Household head with Medium education	−1,060.8	1,853.0	−1,282.0	1,078.2	0.023	0.062
Household head married	3,046.9	1,627.2*	2,207.9	937.7**	0.234	0.054***
Household head employed	−2,312.6	1,255.7*	−279.6	729.1	−0.077	0.042*
Household size	675.2	758.8	2,040.9	435.1***	0.101	0.025***
No. of employed people	2,396.7	731.9***	535.8	424.3	0.130	0.025***
No. of children aged <5	−783.3	1,591.2	−1,524.7	919.3*	−0.074	0.053
No. of children aged 5–15	359.5	1,107.2	−702.9	633.1	−0.022	0.037
No. of people aged 65 and over	344.3	1,115.5	−521.1	642.4	0.035	0.037
No. of people with Higher education	1,761.4	876.2**	1,232.5	517.0**	0.018	0.029
Household income	0.0	0.0***	0.0	0.0***	0.000	0.000***
Squared household income	0.0	0.0***	0.0	0.0***	0.000	0.000***
Year 2005	738.4	451.8	150.8	260.7	0.045	0.015***
Contributions to a pension plan	0.887	0.057***	0.276	0.034***	0.000	0.000***

Notes: ***significant at 1%; **significant at 5%; *significant at 10%.
Source: Authors' analysis from SSHF.

Table A4. *Fixed-effects estimates of the impact of contributions to private pension plans on consumption and non-pension saving (detailed results, total sample) (continued)*

	Non-durables consumption (in logs)		Non-pension wealth		Wealth	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Constant	8.755	0.075***	518,711.3	647,076.0	528,067.1	646,553.0
Female household head	−0.019	0.035	−58,227.7	303,522.9	−60,550.7	303,263.7
Household head aged <35	0.244	0.090***	−121,107.1	771,295.0	−120,328.4	770,653.0
Household head aged 35–44	0.096	0.077	23,694.4	667,340.3	24,675.0	666,744.4
Household head aged 45–54	0.120	0.069*	187,381.0	598,232.2	188,560.3	597,694.7
Household head aged 55–64	0.025	0.058	177,727.5	501,437.1	183,550.6	501,009.9
Household head aged 75 and over	−0.094	0.059	80,835.8	506,771.3	80,260.0	506,348.0
Household head with Elementary education	0.049	0.033	40,524.9	286,628.4	38,045.1	286,391.9
Household head with Basic education	0.028	0.040	75,419.6	340,160.7	73,878.5	339,867.4
Household head with Medium education	0.023	0.062	590,795.2	529,380.2	590,616.0	528,829.4
Household head married	0.234	0.054***	−214,526.9	466,346.4	−211,704.2	465,949.6
Household head employed	−0.077	0.042*	−151,259.7	361,219.0	−154,948.4	360,919.9
Household size	0.101	0.025***	34,620.2	215,228.3	31,576.8	215,036.4
No. of employed people	0.130	0.025***	118,158.8	211,383.2	120,656.5	211,183.9
No. of children aged <5	−0.074	0.053	−114,554.6	463,666.5	−113,199.9	463,263.1
No. of children aged 5–15	−0.022	0.037	−308,440.8	328,875.5	−305,799.7	328,618.4
No. of people aged 65 and over	0.035	0.037	155,458.2	323,243.8	156,527.1	322,992.7
No. of people with Higher education	0.018	0.029	−472,365.2	261,552.4*	−473,584.0	261,205.5*
Household income	0.000	0.000***	6.8	2.0***	92,579.3	132,347.5
Squared household income	0.000	0.000***	0.0	0.0***	6.9	2.0***
Year 2005	0.045	0.015***	89,846.4	132,479.5	0.0	0.0***
Contributions to a pension plan	0.000	0.000***	−109.221	75.664	−107.871	75.613

Notes: ***significant at 1%; **significant at 5%; *significant at 10%.
Source: Authors' analysis from SSHF.