TAXATION AND PORTFOLIO STRUCTURE OF SPANISH HOUSEHOLDS (*)

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ABSTRACT

Using a sample of 5,962 Spanish households from the Survey of Household Finances undertaken by the Bank of Spain, the paper describes the structure of their portfolio, and estimates both a Probit and a Tobit model to test how taxation affects, respectively, the decision to invest in each asset and the relative importance of each asset within household portfolio. The influence of taxation is measured using the average marginal personal income tax rate of the household. The estimations performed show that the marginal tax rate is significant and displays the sign expected to explain both the holding of tax favourable assets and their weight in household portfolio.

Keywords: Household portfolio, taxation.

JEL classification: H24, H31.

1. INTRODUCTION

There exist many studies in Spain which analyse the incidence of taxation upon household saving decisions and the destination of such saving. The majority, such as DOMÍNGUEZ-BARRERO (1999), GÓNZALEZ-PÁRAMO and BADENES (2000), DOMÍNGUEZ-MARTÍNEZ and CARRASCO (2000) and SANZ-SANZ (2000), adopt a theoretical approach. Those few taking an applied approach are concerned with partial investment decisions. Thus, it is of great interest to perform an empirical analysis of household investment decisions from a more general point of view than that adopted to date.

The objective of this paper is to empirically test the incidence of taxation upon household portfolio composition, employing the information supplied by the Survey of Household Finances (EFF) of the Bank of Spain. The paper is structured as follows. The second section reviews the literature on the relationship between taxation and household investment decisions, the third briefly describes the taxation of financial and real assets in Spain and the fourth describes the portfolio structure of Spaniards on the basis of the EFF. The fifth section presents the econometric estimations and their results. A Probit and a Tobit model are estimated to test how taxation affects, respectively, the decision to invest in each asset and the relative importance of each asset within household portfolio. The influence of taxation is measured using the average marginal personal income tax rate of the household. The estimations performed show that the marginal tax rate is significant and displays the sign expected to explain both the holding of tax favourable assets and their weight in household portfolio.

The paper concludes by summarising its main results.

2. LITERATURE REVIEW

An extremely broad range of literature has studied the incidence of taxation on the households portfolio and has found a relationship between investment taxation and portfolio composition, although other research has called this relationship into question. A recent review of the literature, from both the theoretical and applied point of view, can be found in POTERBA (2001). The majority of the applied research concerns the United States, but some studies of other contexts exist.

Particularly noteworthy as a theoretical analysis is the study by AUERBACH and KING (1983), which analyses the effects of taxes upon the portfolio structure and the building of clienteles. According to these authors, the differences in effective tax rates between assets may lead to specialisation, so that households may manage to optimise income flows net of tax. Households with high tax rates obtain advantages by holding shares and participating in collective investment undertakings. Also from a theoretical viewpoint, MILLER (1977) defines the characteristics of the clienteles of two sources of company financing, borrowing and equity, concluding that it is predominantly individuals with high rates who hold shares.

In the applied literature BUTTERS, THOMPSON and BOLLINGER (1953) and BARLOW, BRAZER and MORGAN (1966) conclude that taxes do not affect portfolio composition for high-income individuals.

FELDSTEIN (1976) finds a positive relationship between the level of income and wealth and the holding of shares. Assuming that a direct relationship exists between the wealth of an individual and the marginal tax rate, he concludes that high marginal rates encourage shareholding.

HUBBARD (1985) finds a close relationship between taxes and portfolio composition, employing as explanatory variables wealth, income and the marginal tax rate, calculated directly.

In turn, KING and LEAPE (1998) find a relationship between marginal tax rates and the range of assets an individual decides to include in his or her asset portfolio, but find little relationship between marginal rates and the fraction of wealth allocated to each asset. Our focus in the present paper is closely related with that of KING and LEAPE (1998), although the results differ in some respects.

From a longitudinal analysis, SCHOLZ (1994) observes that the changes produced in portfolio structure as a result of changes in marginal rates are exiguous. In the same line, SAMWICK (2000) doubts that variations over time in portfolio composition can be explained by the marginal rate but nevertheless finds, in a cross-section study, a close relationship between the marginal rate and portfolio structure. SCHOLZ observes, in turn, a restructuring of household indebtedness in favour of debts with tax advantages. This conclusion is confirmed by MAKI (1996).

POTERBA and SAMWICK (2003) and BERGSTRESSER and POTERBA (2004) reach results that are broadly consistent with theoretical models of portfolio selection in the presence of taxes. High marginal tax rate households are more likely to own tax-advantaged assets (equities) and to hold assets in tax-deferred accounts.

Away from the United States, AGELL and EDIN (1990) detect an important effect of taxes upon portfolio decisions in Sweden. STEPHENS and WARD-BATTS (2004) find evidence in the United Kingdom that spouses shift income from capital towards the spouse with lower labour income.[1] In the same vein, ALAN *et al.* (2009) find evidence in Canada (which has an individual taxation system) that couples arrange their capital income to take advantage of the lower marginal tax rate of

[1] An analysis of the composition of personal sector wealth in the UK can be seen in BLAKE (2004). Wealth, returns, market imperfections and labour market turn out to be significant variables.

secondary earners, but these authors find no evidence of any intra-household shifting of capital income in U.S. (which has a system of joint taxation).

In Spain, estimations by DOMÍNGUEZ-BARRERO and LÓPEZ-LABORDA (2007) show that the sums invested annually in a pension plan are partially due to tax planning: although the marginal tax rate does not appear to be significant, the tax bill (*i.e.* the difference between the tax due and prepayments made) is relevant, as are the sums allocated to the purchase of the main residence, a variable which also permits tax savings to be obtained in the IRPF (Personal Income Tax).

DOMÍNGUEZ-BARRERO *et al*. (2009) find evidence that taxpayers liable for Spanish Wealth Tax restructure their asset portfolios to enjoy the exemption of assets held by family firms under that tax. The application of the exemption depends positively on the marginal tax rate of the investor.

Finally, DOMÍNGUEZ-BARRERO, LÓPEZ-LABORDA and RODRIGO (2005) find that tax variables are not determinant in the choice of organisational form by Spanish firms.

3. ASSET TAXATION IN SPAIN AND HYPOTHESES TO BE TESTED

With the aim of establishing the expected effects of taxation upon the holding of diverse assets, we shall begin by describing their taxation in the period 2002-2005, years in which the two waves of the Survey of Household Finances were performed. We shall concentrate on the investment, accumulation and liquidation phases of each asset, both financial and real, leaving aside financial assets with payment in the form of an annuity.

a) *Bank deposits*

In general, investment in an annual term bank deposit is not eligible for any deduction or tax credit. Its returns are taxed annually in the general base of the IRPF at the marginal tax rate (t_p, in Table 1). In 2005, the marginal rates were 15, 24, 28, 37 and 45%. As an exception, investment in a home purchase account, on the condition that it is destined to the acquisition of the first main residence, is entitled to a tax credit of 15% of the sum invested, sum limited to 9,015 euros (see Table 1, Column 2). Fixed-income securities are taxed identically to deposits.

In deferred payment deposits, returns are not taxed until they are paid. When the investment is liquidated, the returns are included in the general base and, if they have been produced in a period exceeding two years, an allowance of 30% (40% since 2003) is applied, and tax is due only on the remainder (Table 1, Column 2).

b) *Life insurance*

The tax treatment of life insurance coincides, in general, with that of deferred payment deposits, although the part of the return taxed is different. The benefits are entitled to an allowance of 30, 65 or 75% of the return, for premiums paid over 2, 5 or 8 years ago, respectively. Later, these allowances were increased to 40 or 75% for premiums paid over 2 or 5 years ago, respectively (Table 1, Column 3).

c) *Shares*

The returns obtained from companies are subject to double taxation. Firstly, they are liable to Corporation Tax, the general rate of which was 35% until 2007. Returns are additionally taxed under the IRPF when they come into the hands of shareholders. Taxation depends on whether the returns take the form of dividends or capital gains. In the first case, the double taxation is softened by applying the imputation method. The shareholder includes in the general taxable base of the IRPF the dividend, increased by 40% of its sum, an increase which is subsequently deducted from the tax due. The greater the marginal tax rate of the investor, the lower is the excess taxation. In the case of capital gains there is no compensation for double taxation although long-term capital gains, which apply to assets held for more than one year, are taxed under the IRPF at the special rate of 15% (Table 1, Column 4).

d) *Mutual funds*

Mutual funds are a specific case of investment in shares, which are taxed under Corporation Tax (Table 1, Column 5) at the rate of 1%. Generally, returns are paid in the form of a capital gain.

e) *Pension plans*

Pension plans are deferred taxation assets. The total sum contributed is deducted from the taxable base of the IRPF, on condition that it exceeds neither 20% of the total labour income and business profits nor the sum of 6,611 euros per year. The sums contributed above this limit are not entitled to any tax allowance. Subsequently, the limit of 20% was eliminated, and that of 6,611 euros was significantly increased.

Until the time of payment no tax is levied, since pension funds are subject to zero-rating under Corporation Tax. At the time of receiving payment in the form of a lump sum, the total sum (both the returns produced and the sum contributed) are included in the general taxable base. If more than two years have elapsed since the first contribution, an allowance of 40% is applied, only the remaining 60% being taxed (Table 1, Column 6).

Table 1

FINANCIAL ASSETS

	Home purchase account (1)	**Long-term deposits (2)**	**Life insurance (3)**	**Shares (4)**	**Mutual funds (5)**	**Pension plans (6)**
CONTRIBUTION:						
Tax benefits	15% tax credit	—	—	—	—	100% tax allowance, with limits
ACCUMULATION:						
Tax rate	t_p	—	—	35%	1%	0%
DISPOSAL:						
Type of income	—	Capital income	Capital income	Capital gain	Capital gain	Labour income
Taxable base	—	Yield obtained	Final capital minus premium paid	Sale price minus purchase price	Sale price minus purchase price	Final capital
Tax allowances (from third year on)	—	40%	Depending how long ago the premium was paid (n): – If $2 < n < 5$, 40%. – If $5 < n$, 75%. – If $n > 12$, general allowance of 75%.	—	—	40%
Tax rate	—	t_p	t_p	– If $n \leq 2$, $t_g = t_p$. – If $n > 2$, $t_g = 15\%$.	– If $n \leq 2$, $t_g = t_p$. – If $n > 2$, $t_g = 15\%$.	t_p

Source: Authors' elaboration.

f) *Real estate*

Investment in real estate is taxed at the moment of purchase by VAT or the Property Transfer Tax and Stamp Duty (PTTSD), depending on whether it is the first or second and subsequent transfer, respectively (Table 2).

Table 2

REAL ASSETS

	Real estate for own use (1)	Let real estate (2)	Let dwellings (3)	Main residence (4)
CONTRIBUTION:				
Tax credit IRPF	—	—	—	15%
Tax on acquisition	VAT - PTTSD	VAT - PTTSD	VAT - PTTSD	VAT - PTTSD
ACCUMULATION:				
Taxable base	2% of cadastral value	Net yield	50% of net yield	—
Tax rate	t_p	t_p	t_p	—
DISPOSAL:				
Type of income	Capital gain	Capital gain	Capital gain	Capital gain
Taxable base	Sale price minus purchase price	Sale price minus purchase price	Sale price minus purchase price	Exempt, if reinvested
Tax allowances (from third year on)	—	—	—	—
Tax rate	– If $n \leq 2$, $t_g = t_p$. – If $n > 2$, $t_g = 15\%$.	– If $n \leq 2$, $t_g = t_p$. – If $n > 2$, $t_g = 15\%$.	– If $n \leq 2$, $t_g = t_p$. – If $n > 2$, $t_g = 15\%$.	– If $n \leq 2$, $t_g = t_p$. – If $n > 2$, $t_g = 15\%$.

Source: Authors' elaboration.

Taxation during the period of enjoyment of the real estate depends on the use made of it. Thus, the returns from properties used by their owners, other than their main residence, are taxed by including in the taxable base of the IRPF a return estimated at a fixed rate: 2% (or 1.1%) of the cadastral value of the buildings (Table 2, Column 1). If the buildings are let, the net returns produced are included in the general taxable base, after deducting all the expenditure required to obtain them (Table 2, Columns 2 and 3). At the time of disposal the difference between the sale and purchase price is taxed as a capital gain.

The taxation of the main residence has the following peculiarities: at the time of acquisition, the main residence enjoys a tax credit of 15% of the sum paid annually, sum limited to 9,015 euros. During the period of enjoyment of the home there is no taxation of the returns. At the time of disposal, the capital gain obtained by the sale of the home will be exempt in many cases (for example, in cases of reinvestment of the sale price or the transfer of the dwelling by over-65s).

The interest paid on the loans held by households is deductible from the taxable base of the IRPF when loans are allocated to financing the acquisition of real estate to be rented. The total annual payment on loans allocated to financing the acquisition of the main residence is entitled to a tax credit.

In accordance with the description above, and as the literature shows (DOMÍNGUEZ-BARRERO, 1999, DOMÍNGUEZ-MARTÍNEZ and CARRASCO, 2000, GONZÁLEZ-PÁRAMO and BADENES, 1999), pension plans, life insurance policies, deferred payment deposits and mutual funds are taxed more lightly than short-term deposits. The tax treatment of pension plans is especially advantageous. Shares are more heavily taxed, although excess taxation decreases as the marginal tax rate rises.

Diverse studies, such as GONZÁLEZ-PÁRAMO and BADENES (2000), SANZ-SANZ (2000) and LÓPEZ-GARCÍA (2001), clearly show that the main residence is a tax-advantageous asset. DOMÍNGUEZ-BARRERO and LÓPEZ-LABORDA (2001) also show that indebtedness incurred for home acquisition is advantageous.

As shown in the second column of Table 3, we can expect a direct relationship between the holding of an asset and the marginal tax rate of the investor in the case of the main residence, business-related assets, mutual funds, pension plans and life insurance policies, and similarly in the case of shares. However, an inverse relationship to the marginal tax rate is to be expected in the case of loans for main residence acquisition. Our study aims to test whether household investment decisions display the behaviour expected.

Table 3

EXPECTED EFFECTS OF THE MARGINAL RATE ON THE HOLDING OF AN ASSET AND ITS SHARE IN HOUSEHOLD PORTFOLIO

	Incentive	Expected sign of the marginal rate variable
Main residence	YES	+
Other real estate property	?	?
Business assets	YES	+
Works of art, jewellery etc.	?	?
Bank accounts	?	?
Fixed income securities	?	?
Shares	NO	+
Collective investment institutions	YES	+
Pension plans	YES	+
Life insurance policies	YES	+
Home loans	YES	–
Other loans	?	?

Source: Authors' elaboration.

4. DESCRIPTION OF THE SPANISH HOUSEHOLDS PORTFOLIO

Our study is based on the data provided by the Survey of Household Finances (EFF), performed by the Bank of Spain and undertaken every 3 years since 2002. It is a survey stratified by brackets of wealth, selected on the basis of tax filings for the IRPF and Wealth Tax. Currently, only data for the 2002 and 2005 surveys are available.[2]

We shall concentrate especially on the 2005 survey, which collects data for 5,962 households. Households with considerable wealth are overrepresented, to be able to analyse with greater precision the behaviour of asset portfolios, which are most highly diversified in the richest households. Throughout the study, we compare the data for 2005 with those for 2002.

The EFF gathers data regarding: 1) the demographic characteristics of households, such as the number of persons, educational level and age; 2) real assets, such as real estate, cars, other means of transport, works of art, etc.; 3) the income derived from real assets, acquisition price, current value, etc.; 4) debts, and the assets causing them; 5) financial assets, detailing asset types (bank deposits, shares, mutual funds, fixed income securities) and the value and income derived from them; 6) insurance policies and pension plans, indicating the values, contributions, etc., itemized by the owner, and 7) employment situation, and income from work (from self-employment or salaries) and that derived from personal wealth.[3]

The composition of Spanish household portfolio, in percentage terms, and the number of holders of each of the assets, is shown in Table 4 for the entire population, and in Table 5 for the components of the sample. Figure 1 shows the portfolio percentage structure for the entire population. Figure 2 breaks down the same information by wealth deciles.

The average gross wealth of the population in 2002 was 168,579 euros, average indebtedness was 14,410 euros and net wealth 154,169 euros. In 2005, average gross wealth was 283,674 euros, average indebtedness 26,357 euros and net wealth 257,317 euros. In the period 2002-2005, therefore, there occurred an increase in gross wealth of 68% (67% for net wealth). This notable increase was due to the sharp increase in the value of real assets, which rose by 72%, compared to a 43% increase in the value of financial assets.

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[2] See http://www.bde.es/webbde/es/estadis/eff/eff.html. Regarding the methodology for elaborating the EFF, see BOVER (2008a).

[3] For cases in which there was no response to some questions regarding amounts (the value of assets, income, etc), the value of zero was allocated.

Table 4

ASSET DISTRIBUTION OF THE POPULATION

	Year 2005			Year 2002		
	% Holders	Amount	% Wealth	% Holders	Amount	% Wealth
Financial assets	98.3%	31,436	11.1%	99.8%	21,910	13.0%
Bank accounts	97.9%	13,086	4.6%	99.6%	8,611	5.1%
Accounts usable to make payments	95.1%	8,334	2.9%	99.1%	4,640	2.8%
Accounts not usable to make payments	16.5%	4,531	1.6%	15.1%	3,728	2.2%
Home purchase accounts	2.5%	222	0.1%	2.2%	243	0.1%
Fixed income	4.8%	1,595	0.6%	5.8%	1,592	0.9%
Fixed income securities	1.5%	518	0.2%	1.9%	460	0.3%
Other financial assets	3.4%	1,077	0.4%	3.9%	1,132	0.7%
Collective investment institutions	8.8%	4,207	1.5%	7.3%	2,124	1.3%
Guaranteed mutual funds	2.6%	975	0.3%	2.6%	636	0.4%
Fixed income MFs	2.9%	1,194	0.4%	1.8%	472	0.3%
Equities MFs	3.4%	1,188	0.4%	2.7%	537	0.3%
Mixed MFs	1.9%	663	0.2%	1.5%	342	0.2%
International MFs	0.2%	56	0.0%	0.1%	18	0.0%
Other MFs	0.0%	131	0.0%	0.0%	121	0.1%
Shares	13.1%	6,394	2.3%	12.6%	6,012	3.6%
Quoted shares	11.4%	3,623	1.3%	10.8%	3,075	1.8%
Non-quoted shares	2.3%	2,771	1.0%	2.3%	2,937	1.7%
Contractual saving	40.7%	6,153	2.2%	33.5%	3,571	2.1%
Pension plans	28.5%	4,707	1.7%	23.7%	3,250	1.9%
Life insurance policies	23.3%	1,446	0.5%	16.4%	321	0.2%
Real assets	87.7%	252,239	88.9%	88.3%	146,668	87.0%
Real estate property	84.9%	226,736	79.9%	85.5%	132,913	78.8%
Main residence	81.3%	166,822	58.8%	82.4%	97,928	58.1%
Other real estate property	34.5%	59,914	21.1%	30.3%	34,984	20.8%
Other real assets	31.1%	25,503	9.0%	31.1%	13,756	8.2%
Business-linked assets	15.4%	24,023	8.5%	16.5%	12,859	7.6%
Jewellery, works of art, antiques	19.3%	1,480	0.5%	18.3%	897	0.5%
Loans	49.1%	26,357	9.3%	43.8%	14,410	8.5%
Loans main residence	26.1%	14,989	5.3%	21.7%	8,146	4.8%
Loans other real estate	7.7%	6,265	2.2%	6.3%	3,408	2.0%
Other loans	29.4%	5,103	1.8%	24.5%	2,856	1.7%
Gross wealth	100.0%	283,674	100.0%	100.0%	168,579	100.0%
Net wealth	100.0%	257,317	90.7%	100.0%	154,169	91.5%

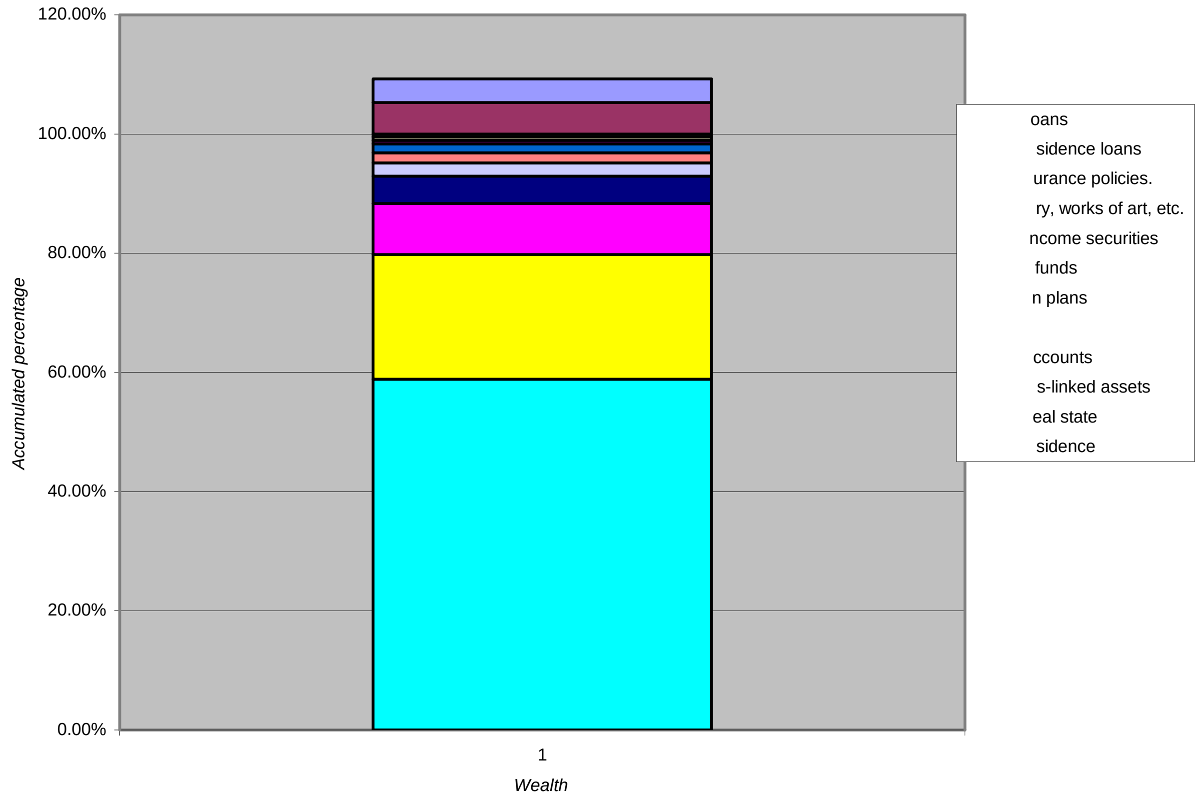
Source: EFF and authors' elaboration.

Table 5
ASSET DISTRIBUTION OF THE SAMPLE

	Year 2005				Year 2002			
	Holders		Amount		Holders		Amount	
Financial assets	5,858	98.3%	206,882	24.6%	5,113	99.4%	135,859	29.1%
Bank accounts	5,822	97.7%	31,301	3.7%	5,099	99.1%	21,770	4.7%
Accounts usable to make payments	5,642	94.6%	15,759	1.9%	5,078	98.7%	8,037	1.7%
Accounts not usable to make payments	1,304	21.9%	15,126	1.8%	1,105	21.5%	13,455	2.9%
Home purchase accounts	137	2.3%	416	0.0%	119	2.3%	278	0.1%
Fixed income	401	6.7%	4,506	0.5%	382	7.4%	5,053	1.1%
Fixed income securities	170	2.9%	1,803	0.2%	172	3.3%	1,517	0.3%
Other financial assets	245	4.1%	2,703	0.3%	213	4.1%	3,536	0.8%
Collective investment institutions	1,045	17.5%	31,721	3.8%	761	14.8%	13,917	3.0%
Guaranteed mutual funds	363	6.1%	6,586	0.8%	222	4.3%	2,030	0.4%
Fixed income MFs	293	4.9%	5,011	0.6%	216	4.2%	2,192	0.5%
Equities MFs	442	7.4%	9,578	1.1%	339	6.6%	4,733	1.0%
Mixed MFs	290	4.9%	7,753	0.9%	205	4.0%	2,926	0.6%
International MFs	35	0.6%	300	0.0%	21	0.4%	223	0.0%
Other MFs	13	0.2%	2,494	0.3%	4	0.1%	1,812	0.4%
Shares	1,515	25.4%	126,327	15.0%	1,230	23.9%	87,205	18.7%
Quoted shares	1,344	22.5%	41,203	4.9%	1,073	20.9%	24,418	5.2%
Non-quoted shares	395	6.6%	85,125	10.1%	356	6.9%	62,787	13.5%
Contractual saving	2,450	41.1%	13,026	1.6%	1,730	33.6%	7,915	1.7%
Pension plans	1,859	31.2%	10,931	1.3%	1,329	25.8%	6,667	1.4%
Life insurance policies	1,240	20.8%	2,094	0.2%	757	14.7%	1,247	0.3%
Real assets	5,404	90.6%	633,200	75.4%	4,636	90.1%	330,369	70.9%
Real estate property	5,257	88.2%	460,131	54.8%	4,520	87.9%	249,035	53.4%
Main residence	5,008	84.0%	243,935	29.0%	4,345	84.5%	141,624	30.4%
Other real estate property	2,878	48.3%	216,196	25.7%	2,143	41.7%	107,411	23.0%
Other real assets	2,306	38.7%	173,069	20.6%	1,812	35.2%	81,334	17.4%
Business-linked assets	1,170	19.6%	165,135	19.7%	982	19.1%	77,108	16.5%
Jewellery, works of art, antiques	1,524	25.6%	7,934	0.9%	1,113	21.6%	4,226	0.9%
Loans	2,381	39.9%	30,041	3.6%	1,683	32.7%	15,035	3.2%
Loans main residence	1,092	18.3%	11,802	1.4%	773	15.0%	6,544	1.4%
Loans other real estate	500	8.4%	9,629	1.1%	329	6.4%	4,566	1.0%
Other loans	1,370	23.0%	8,610	1.0%	889	17.3%	3,925	0.8%
Gross wealth	5,962	100.0%	840,082	100.0%	5,143	100.0%	466,227	100.0%
Net wealth	5,962	100.0%	810,041	100.0%	5,143	100.0%	451,192	100.0%

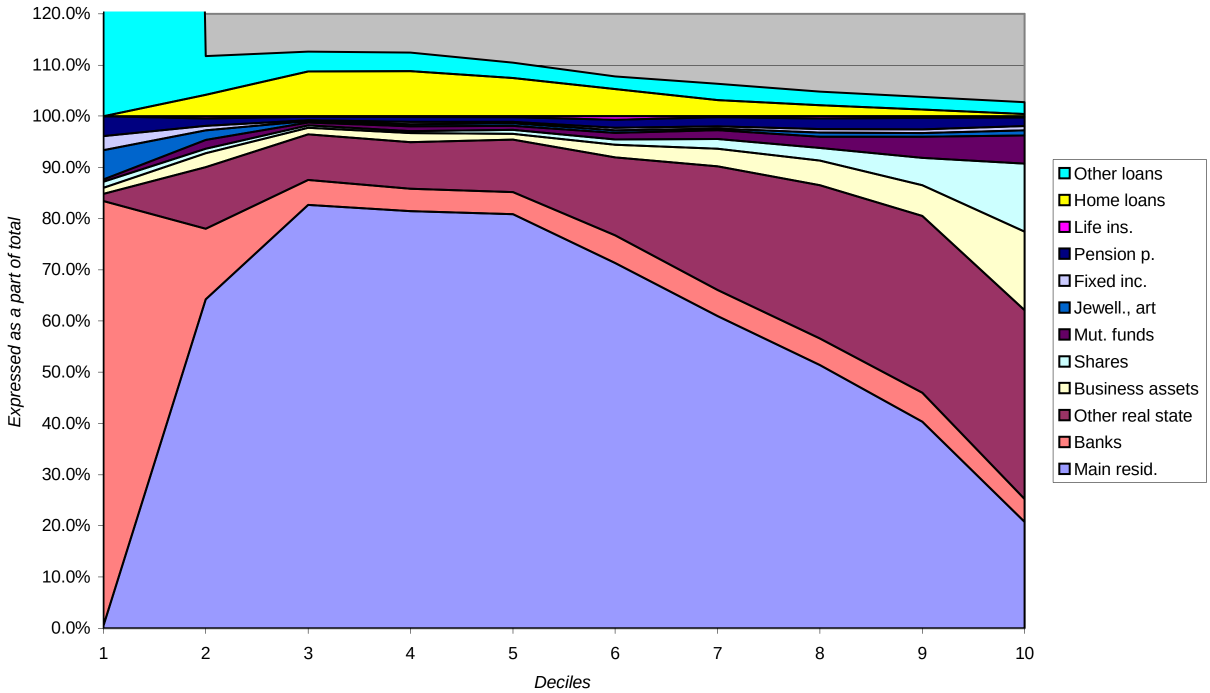
Source: EFF and authors' elaboration.

Figure 1
HOUSEHOLD WEALTH COMPONENTS



Source: EFF and authors' elaboration.

Figure 2
HOUSEHOLD PORTFOLIO COMPOSITION
(By wealth deciles)



Source: EFF and authors' elaboration.

Focusing on the type of assets which comprise the household portfolio, we observe that 88.9% of wealth is invested in real assets, while financial assets only account for 11.1%. Somewhat more specifically, 58.8% of wealth takes the form of the main residence, 21.1% is accounted for by other real estate properties and 8.5% by assets allocated to business activities. Bank accounts represent 4.6% of wealth, shares account for 2.3% (quoted shares for 1.3% and non-quoted shares for 1%), pension plans 1.7% and mutual funds 1.5%. None of the remaining assets represent more than 1% of gross wealth.[4]

As Figure 2 shows, portfolio composition varies significantly according to the level of wealth of the household. Thus, for persons in the first decile of wealth distribution, bank accounts represent over 80% of wealth. For the second to sixth deciles, real estate property accounts for approximately 80% of wealth. Financial assets acquire a greater weight in the upper deciles.

Table 6

NUMBER OF ASSETS IN HOUSEHOLD PORTFOLIO IN SAMPLE

Number of assets	Holders 2005	Percentage 2005	Accumulated percentage 2005	Holders 2002	Percentage 2002	Accumulated percentage 2002
0	28	0.47	0.47	7	0.14	0.14
1	430	7.21	7.68	349	6.79	6.93
2	1,133	19.00	26.68	1,216	23.64	30.57
3	958	16.07	42.75	924	17.97	48.54
4	884	14.83	57.58	771	14.99	63.53
5	736	12.34	69.92	563	10.95	74.48
6	572	9.59	79.51	441	8.57	83.05
7	416	6.98	86.49	340	6.61	89.66
8	349	5.85	92.34	229	4.45	94.11
9	224	3.76	96.10	137	2.66	96.77
10	132	2.21	98.31	97	1.89	98.66
11	50	0.84	99.15	36	0.70	99.36
12	32	0.54	99.69	20	0.39	99.75
13	10	0.17	99.86	8	0.16	99.91
14	5	0.08	99.94	3	0.06	99.97
15	1	0.02	99.96	2	0.04	100.01
16	2	0.03	99.99			100.01
	5,962	100.00		5,143	100.00	
Sample average		4.43			4.43	
Population average		3.67			3.67	

Source: EFF and authors' elaboration.

Households possess only a limited subset of the set of assets, that is to say incomplete portfolios. There are two reasons for this: firstly, the existence of

[4] A detailed analysis of the dynamics of the income and wealth of Spanish households in the period 2002-2005 can be found in BOVER (2008b).

positive holding costs (monetary costs of acquisition, management and deposit, and of time invested in information for portfolio management) and secondly, the restrictions upon the holding of assets in negative quantities. Thus, although some households would wish to hold negative quantities of an asset, this is impossible in some cases and subject to severe tax constraints in some others (the impossibility of deducting expenses, interest, losses, etc.). As can be seen in Table 6, the asset portfolios of Spaniards was diversified in the period 2002-2005, the average population portfolio changing from comprising 3.38 assets to comprising 3.67. The distribution is strongly biased to the right, the mode being 2 assets. Only 4% of the sample have over 9 assets.

As Table 4 shows, the asset possessed by the greatest number of households is bank accounts (97.9%), of which the largest part are accounts usable for making payments (95.1%), only 16.5% of the sample having accounts non-usable for payments. In second place is the main residence (81.3%), followed by other real estate property (34.5%), pension plans (28.5%), life insurance policies (23.3%), jewels and works of art (19.3%), quoted shares (11.4%), collective investment institutions (8.8%), other financial assets (3.4%), non-quoted shares (2.3%) and fixed income instruments (1.4%). By number of holders, the same order of assets is reproduced in 2002.

49.1% of the sample have some debt. 26.1% owe money on their main residence, 7.7% on other real estate property and 29.4% have other types of debts.

Table 7

RELATIONSHIP BETWEEN MARGINAL TAX RATE AND CLIENTELE OF EACH ASSET

Assets	2005			2002		
	Holders	Average marginal tax rate	Average marginal tax rate weighted by net wealth	Holders	Average marginal tax rate	Average marginal tax rate weighted by net wealth
Main residence	5,008	22.6%	28.4%	4,345	24.16%	28.3%
Other real estate property	2,878	25.7%	34.0%	2,143	26.68%	33.3%
Business-linked assets	924	32.6%	41.5%	740	29.53%	43.8%
Jewellery, works of art, etc.	1,524	27.3%	37.8%	1,113	27.33%	38.7%
Bank accounts	5,704	22.0%	30.7%	5,065	23.85%	30.8%
Fixed income securities	469	27.3%	33.3%	430	27.82%	36.8%
Mutual funds	1,045	29.9%	36.6%	761	29.58%	35.8%
Shares	1,509	29.9%	40.4%	1,229	29.69%	43.6%
Pension plans	1,837	30.3%	36.1%	1,310	29.58%	36.3%
Life insurance policies	119	32.4%	36.0%	86	32.44%	41.5%
Home purchase loans	1,092	26.9%	29.5%	773	26.26%	28.6%
Other loans	1,775	26.5%	34.4%	1,163	25.95%	32.3%
Average	5,962	21.8%	34.9%	5,143	23.81%	35.8%

Source: EFF and authors' elaboration.

We now observe what type of relationship exists between the marginal tax rate and the holding of each type of asset. Table 7 gives the marginal tax rates for the holders of each asset, both unweighted and weighted by the share of net wealth. For the total sample, the unweighted average tax rate in 2005 was 21.8%. Weighted by level of wealth, the rate rises to 34.9%.

In 2005, the clientele with the highest weighted marginal rate is that which invests in business-linked assets (41.5%), followed by the clientele of shares, jewellery and works of art, collective investment institutions, pension plans and life insurance policies. The clientele with the lowest marginal rate is that which corresponds to the main residence. In 2002, the highest and lowest marginal tax rate also correspond, respectively, to business-linked assets and to the main residence, the weighted average tax rate being 35.8%.

5. ESTIMATIONS AND RESULTS

To test the importance of taxation in the portfolio composition of Spanish households we shall perform a double approximation: firstly, we shall attempt to explain, using a Probit model, the number of assets which comprise household portfolio, measuring the probability of owning an asset, and we shall subsequently search for the explanation of the importance of each asset within household portfolio, using a Tobit model.

For the sake of clarity, we have chosen to group together some of the assets presented in Table 4, which hereafter are reduced to the following: main residence (*resid*), other real estate property (*prop*), business-linked assets (*busin*), jewellery and works of art (*jewel*), bank accounts (*bank*), fixed-income securities (*fixinc*), shares (*share*), mutual funds (*mutual*), pension plans (*pension*), life insurance policies (*insur*), loans for the main residence (*lresid*) and other loans (*lother*).

Our explanatory variable of interest is the marginal Personal Income Tax rate (*mrate*) which, following KING and LEAPE (1998) and POTERBA and SAMWICK (2003), we have constructed as the average marginal tax rate corresponding to a hypothetical income from capital, obtained by applying to total household wealth a specific interest rate, which in our case is that of Treasury bonds in each financial year.

The explanatory control variables are those used in the literature for this type of analysis, available in the EFF.[5] In both types of estimations –Probit and Tobit– the following variables are used: wealth (measured by its natural loga-

[5] See KING and LEAPE (1998).

rithm *lw*), the age of the first household member (*age*), marital status (*married* =1), having achieved some post-secondary education (*educ*=1), being a director (*director*), being a self-employed professional (*professional*), being an employee (*employee*), labour income, in thousands of euros (*labourinc*), and the degree of risk aversion (*riskav*). We measured risk aversion by the value, between 1 and 4, revealed by each household in the survey. Given that both wealth and age could have effects of different signs, depending on the amount of the variable, we also introduced as explanatory variables the squares of the basic variables (lw^2 and age^2).

a) *Holding of specific assets*

To test the influence of taxation upon the decision to hold each asset, we performed a Probit estimation, in which the dependent variable is the holding (value 1) or not (value 0) of each asset type. No problems of multicolinearity were detected. The results of the estimations, robust to heteroskedasticity, are given in Table 8.

To summarise, in accordance with what is to be expected from tax-advantageous assets, the marginal tax rate significantly and positively affects the holding of business-linked assets, pension plans and life insurance policies. The sign of this variable is also coherent for the holding of shares since, despite being a fiscally non-advantageous asset, disadvantage decreases with the marginal tax rate. The sign also coincides with that expected for loans which do not correspond to the main residence, if the interest is deductible. The same can be said of jewellery and works of art, as these are luxury goods.

In turn, the negative effect of the marginal tax rate upon possession of the main residence is striking (as is the positive effect for loans destined to the acquisition of that residence). The explanation is as follows. The number of owners of a main residence increases from a few households in the first wealth decile until almost all households in the fifth decile. In these five deciles, the marginal tax rate barely increases. However, in the remaining deciles, the number of owners of a main residence is reduced by a handful of individuals,[6] while the marginal tax rate increases by twenty points.

Among the control variables, the complex effect of wealth has been captured by the variables *lw* and lw^2. The aggregate effect of these two variables for diverse levels of wealth is given, for the mean value of the remaining variables, in Figures 3 to 14.

[6] Possibly due to problems with the sample or because these are individuals who, to obtain a tax advantage, declare the residence, for example, to be an asset linked to a business activity.

Table 8

PROBIT ESTIMATIONS OF PROBABILITY OF HOLDING EACH ASSET

Variable	resid	prop	busin	jewel	bank	fixinc	share	mutual	pension	insur	lresid	lother
mrate	-2.60082***	-0.141347	6.944602***	0.741249*	0.045034	0.679227	0.815706*	0.200162	2.252246***	2.290075***	1.1130871**	2.2668422***
lw	5.066738***	-0.493382***	-0.408053**	0.175702	-0.278908	-0.108555	-0.371175***	-0.124896	-0.020018	0.137006	6.3714292***	0.41282107***
lw^2	-0.176581***	0.043382***	0.02861***	-0.004612	0.0102	0.007814	0.03137***	0.016728**	0.009958	-0.002228	-0.2577306***	-0.0260510***
age	0.006104	0.060934***	0.029841	0.02243	0.041853*	0.012542	0.012199	-0.006719	0.16432***	0.025618	-0.0568624**	0.0921404***
age^2	1.6E-05	-0.000494***	-0.000534*	-0.000218*	-0.000426*	-0.000182	-3.67E-05	0.000141	-0.001683***	-0.000469***	0.00006574	-0.0010237***
married	0.166091	0.095761	0.328857**	0.082782	-0.056876	0.02446	0.055497	0.085058	0.050051	0.232805**	0.52805631***	0.29892959***
educ	-0.151043	-0.137848*	-0.118663	0.195928**	0.078902	-0.053898	0.290509***	0.185724*	0.065254	-0.04884	0.08746584	-0.1396776*
director	-0.359109**	0.32227***	1.048218***	0.069885	0.743395***	0.34304**	0.482013***	0.070348	0.305964**	0.19144*	0.14512401	0.08321847
professional	-0.083424	-0.014922	0.37107***	-0.021197	0.11217	0.05979	0.278564**	0.223784**	0.212662**	0.150973	-0.0122767	0.02961185
employee	0.116597	-0.085592	-0.687341***	-0.302564***	-0.251772	-0.168031	-0.068375	0.130108	0.146625*	0.012058	0.0806467	-0.0308193
labourinc	0.001539	0.000667	-0.04335***	0.005475**	0.015883**	-0.002122	0.006181**	0.004044	0.002436	0.002304	0.00311818	-0.0008130
riskav	0.218697**	-0.096203	-0.127792*	-0.061857	0.187375*	-0.04956	-0.371714***	-0.328186***	-0.129358**	0.027295	0.02518634	-0.043641
intercept	-34.40312***	-2.176774***	-0.875754	-2.824777***	2.165047	-1.530462**	-1.050012	-1.58433*	-5.719107***	-2.940444***	-38.018278***	-4.0158317***
Adjusted R^2	0.669	0.187	0.425	0.046	0.053	0.037	0.240	0.142	0.236	0.151	0.339	0.107
Log-likelihood function	-917	-3,103	-1,469	-2,783	-504	-1,105	-1,753	-1,515	-2,707	-2,730	-2,253	-3,193

*** Coefficient significant at 1%.
** Coefficient significant at 5%.
* Coefficient significant at 10%.

Figure 3. Probab. of holding resid

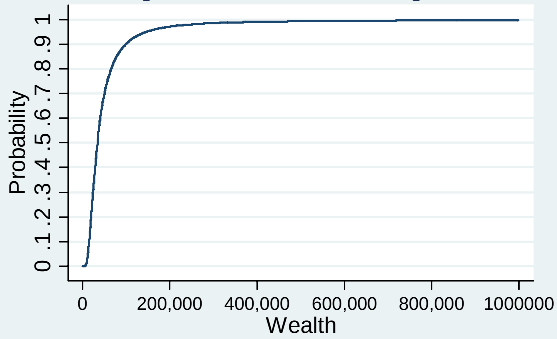


Figure. 4. Probab. of holding prop

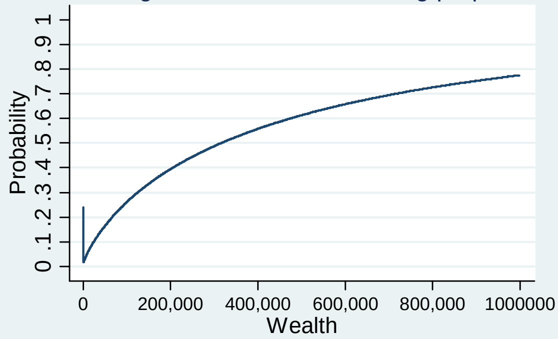


Figure 5. Probab. of holding busin

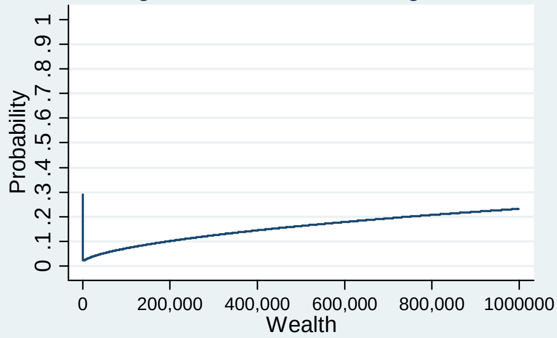


Figure 6. Probab. of holding jewel

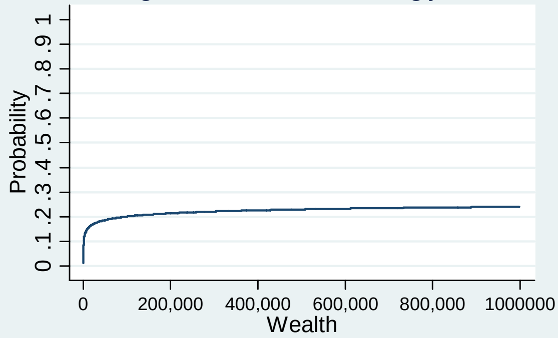


Figure 7. Probab. of holding bank

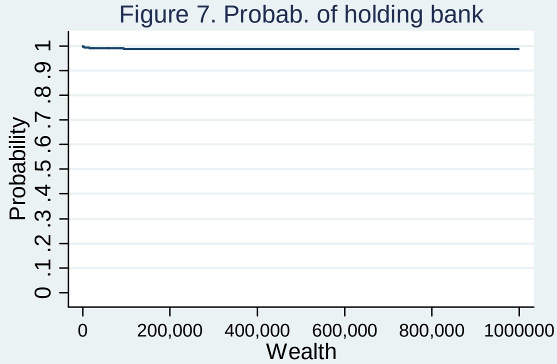


Figure 8. Probab. of holding fixinc

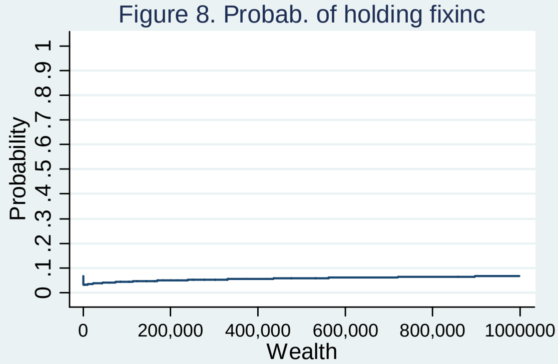


Figure 9. Probab. of holding share

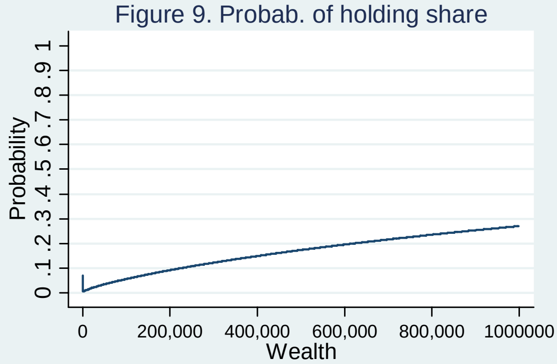
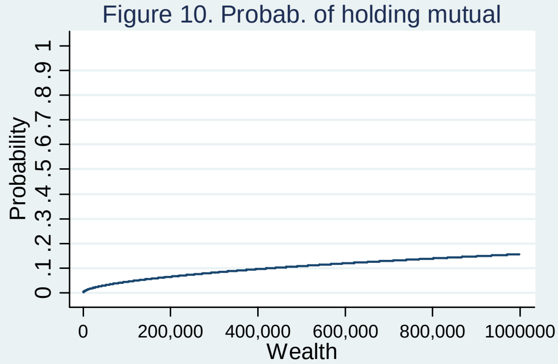
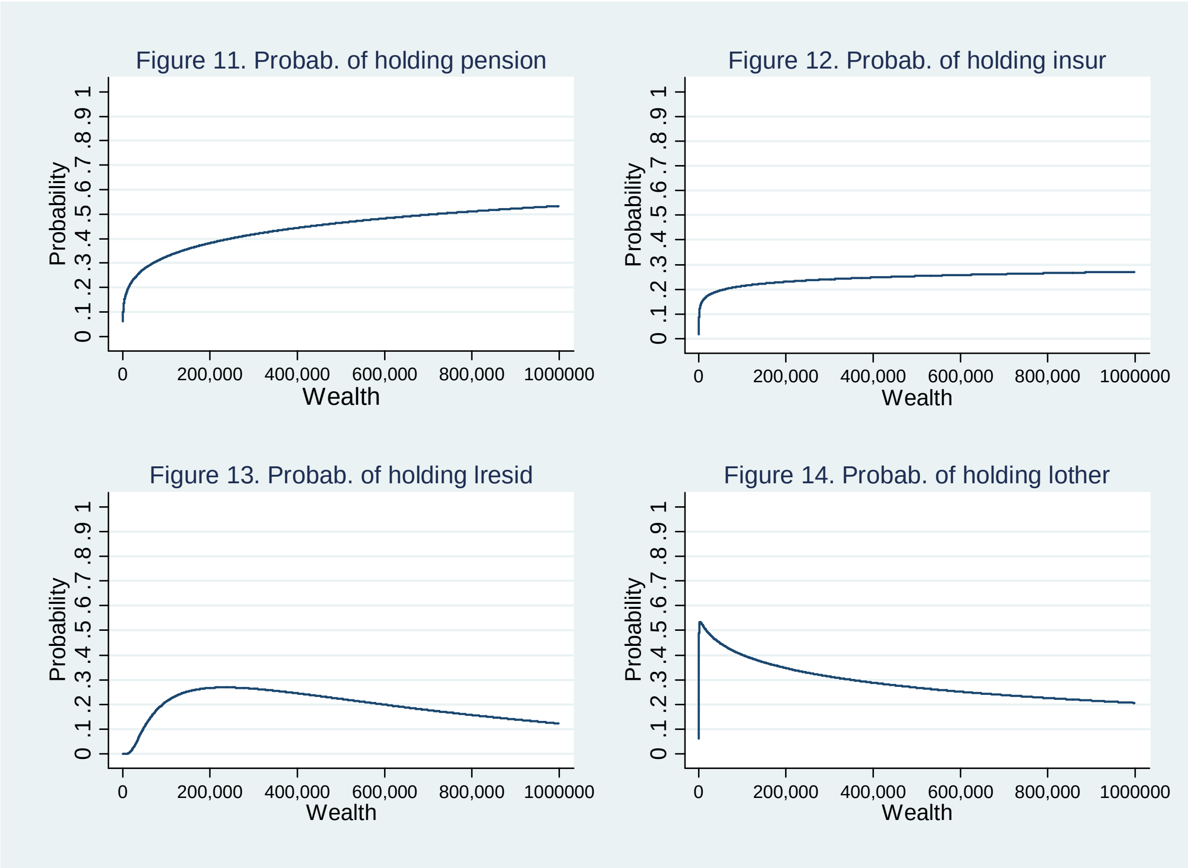


Figure 10. Probab. of holding mutual





Source: EFF and authors' elaboration.

b) *Share of each asset in household portfolio*

To explain the importance of each asset in household portfolio we adjusted a Tobit model. The dependent variable is the weight of each asset type in household portfolio. No problems of multicolinearity were detected. The results of the estimations, robust to heteroskedasticity, are shown in Table 9.

The marginal tax rate maintains the significance and sign obtained in the Probit model, with the following differences. On the one hand, as we saw in the Probit estimation, the marginal tax rate positively affects the possession of life insurance policies; however, the Tobit estimation shows that the tax rate does not influence the weight of this asset in household portfolio. And on the contrary, although the marginal tax rate does not affect the holding of bank accounts or fixed income securities, it does influence the share of this asset in the household portfolio.

Table 10 shows the marginal effects of the explanatory variables upon the endogenous variable. Figure 15 displays the values of the marginal effects of wealth upon the share of each asset in household portfolio, for average wealth (283,674 euros) and for wealth of 100,000 and 1,000,000 euros.

Table 9

TOBIT ESTIMATIONS OF THE SHARE OF EACH ASSET IN HOUSEHOLD PORTFOLIO

Variable	resid	prop	busin	jewel	bank	fixinc	share	mutual	pension	insur	lresid	lother
mrate	-0.449172***	-0.037771	1.752001***	0.248268**	0.264395***	0.471696**	0.109446*	0.039334	0.281072***	-0.499049	0.338961**	108.33059**
lw	2.625909***	-0.04312	0.019855	0.04606*	-0.193356***	-0.01788	-0.02690*	-0.00728	0.007429	0.054895	1.967154***	-41.544508
lw^2	-0.107072***	0.009513***	0.002294	-0.002756*	0.003047**	0.000879	0.002616***	0.00235	-0.000232	0.004192	-0.081242***	1.8030021
age	-0.006751**	0.022366***	0.025748***	0.004777	-0.004125**	0.004468	0.001325	-0.000207	0.022209***	0.023014	-0.022514***	6.0609257**
age^2	6.2E-05**	-0.00018***	-0.000316***	-4.54E-05	4.09E-05**	-6.96E-05	-2.48E-06	2.45E-05	-0.000221***	-0.000359	6.54E-05	-0.0670878*
married	-0.000848	-0.006836	0.165059***	0.011297	-0.009736	0.018191	0.005982	0.027758	0.005245	-0.004968	0.097073***	14.711154
educ	-0.006808	-0.058667*	-0.036615	0.028331*	0.044405***	-0.004741	0.035879***	0.049341*	0.009233	0.091844	0.028278	-0.16214368
director	-0.090276***	0.098676***	0.20157***	0.015394	0.043433***	0.087857*	0.053009***	0.025769	0.035662***	-0.199261	0.018979	0.8120025
professional	-0.046186**	-0.00008	0.110861**	0.014778	0.034203**	0.021706	0.039023**	0.055029*	0.020097*	-0.105722	-0.035782	-5.1544075
employee	0.040697*	-0.021906	-0.20375***	-0.063754***	-0.031243*	-0.083193*	-0.004596	0.032546	0.022236*	0.017973	0.034951	0.60771091
labourinc	0.001798**	5.72E-05	-0.012294***	0.000646**	0.00025	-0.002129*	0.00033	0.001034*	0.000142	0.00357	0.000933	-0.0213623
riskav	0.037636**	-0.027679	-0.050409*	-0.013056	-0.003207	-0.057486**	-0.043622***	-0.078868***	-0.009692	-0.127014**	0.002141	-0.85675044
intercept	-15.22078***	-1.54946***	-1.595356***	-0.467797**	2.026168***	-0.378933	-0.183988*	-0.506085**	-0.726383***	-2.442972*	-11.29056***	25.952404
sigma	0.289286***	0.459811***	0.381102***	0.200477***	0.176715***	0.36736***	0.12932***	0.271014***	0.143902***	0.672635***	0.317358***	74.529002***
Adjusted R^2	0.672	0.160	0.426	0.050	1.928	0.058	0.464	0.156	0.479	0.115	0.428	0.024
Log-likelihood function	-3,603	-7,976	-2,774	-3,389	4,073	-2,411	-1,352	-2,605	-1,368	-1,100	-4,218	-34,144
Left-censored observations	899	3,029	4,983	4,383	203	5,438	4,398	4,862	4,070	5,788	4,815	4,148
Uncensored observations	5,008	2,878	924	1,524	5,704	469	1,509	1,045	1,837	119	1,092	1,759

*** Coefficient significant at 1%.

** Coefficient significant at 5%.

* Coefficient significant at 10%.

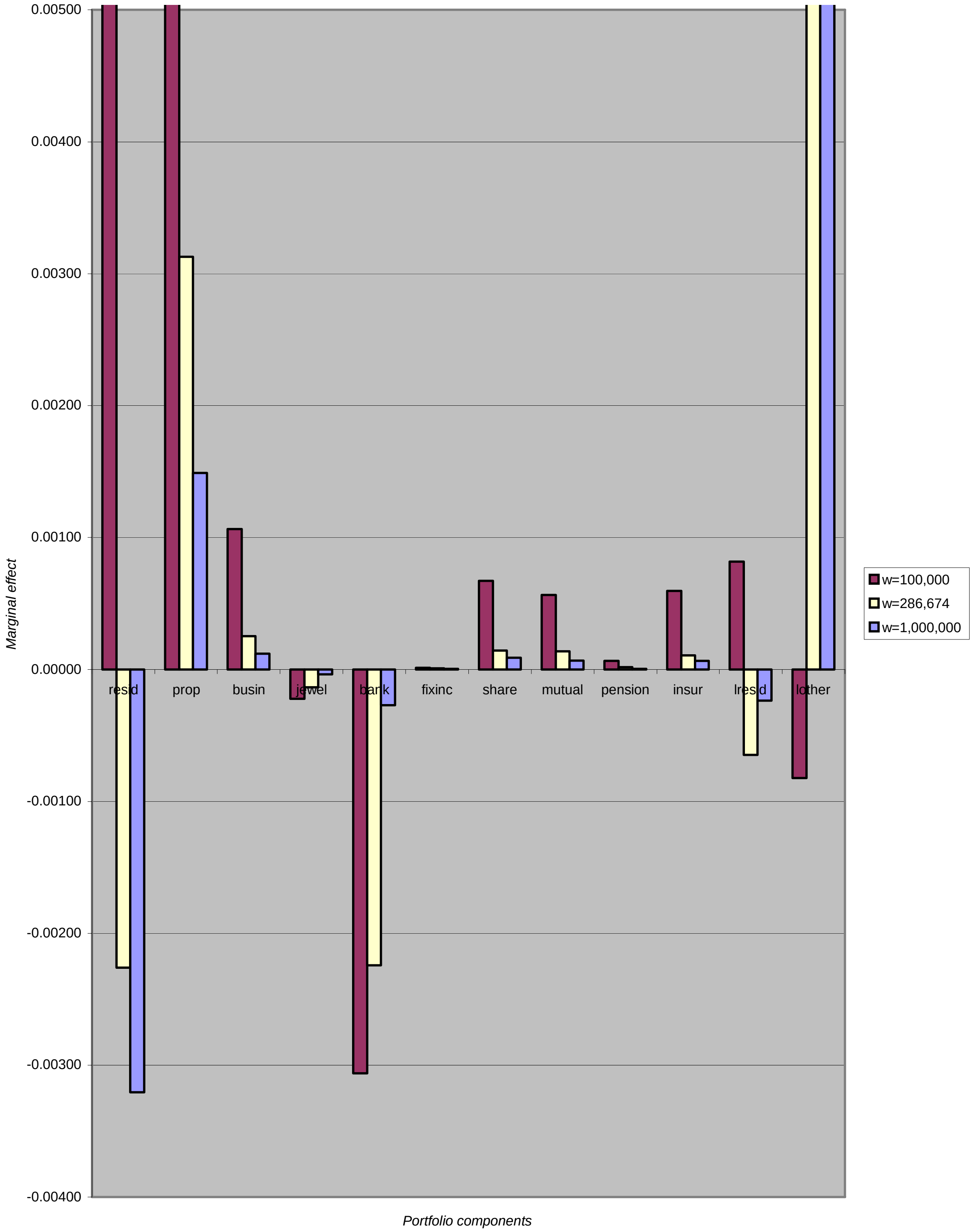
Table 10

Marginal effects of the explanatory variables on the dependent variable

Variable	resid	prop	busin	jewel	bank	fixinc	share	mutual	pension	insur	lresid	lother
mrate	-0.447406	-0.017295	0.1645199	0.0413966	0.1454943	0.0250647	0.011633	0.0030259	0.0889195	-0.009646	0.0844491	27.24458
lw	2.615588	-0.019744	0.0018644	0.0076802	-0.106402	-0.00095	-0.002859	-0.00056	0.0023501	0.001061	0.4900981	-10.44823
lw^2	-0.106652	0.0043557	0.0002154	-0.00046	0.0016766	0.0000467	0.0002781	0.0001808	-7.35E-05	0.000081	-0.020241	0.4534456
age	-0.006724	0.0102411	0.0024178	0.0007965	-0.00227	0.0002374	0.0001408	-0.000016	0.007026	0.0004448	-0.005609	1.524291
age^2	0.0000617	-8.26E-05	-2.97E-05	-7.56E-06	0.0000225	-3.70E-06	-2.64E-07	1.88E-06	-0.00007	-6.93E-06	0.0000163	-0.016872
married	-0.000845	-0.003137	0.0137056	0.0018552	-0.005396	0.0009494	0.0006267	0.0020643	0.0016469	-9.63E-05	0.0225913	3.538947
educ	-0.006781	-0.026205	-0.003312	0.0049554	0.0254047	-0.000251	0.004262	0.0041066	0.0029683	0.0019177	0.007226	-0.040753
director	-0.089747	0.0486221	0.0278488	0.0026901	0.0256013	0.0057121	0.0075226	0.0021327	0.0126073	-0.00291	0.0048771	0.2053676
professional	-0.045972	-3.66E-05	0.0124481	0.0025581	0.0196992	0.0012016	0.0049603	0.004826	0.006702	-0.001803	-0.008492	-1.258412
employee	0.0405408	-0.01	-0.018326	-0.010321	-0.017028	-0.004301	-0.000486	0.0025502	0.0071299	0.0003491	0.008803	0.1529545
labourinc	0.0017907	0.0000262	-0.001155	0.0001077	0.0001374	-0.000113	0.0000351	0.0000795	0.0000449	0.000069	0.0002323	-0.005373
riskav	0.0374876	-0.012674	-0.004734	-0.002177	-0.001765	-0.003055	-0.004637	-0.006067	-0.003066	-0.002455	0.0005334	-0.215468
% of marginal effect due to response of individuals above censoring limit (McDonald and Moffitt, 1980)	96.85%	34.19%	16.59%	20.29%	39.01%	14.03%	17.29%	15.60%	27.21%	11.05%	24.08%	34.91%

Figure 15

MARGINAL EFFECT OF WEALTH ON PORTFOLIO COMPONENTS

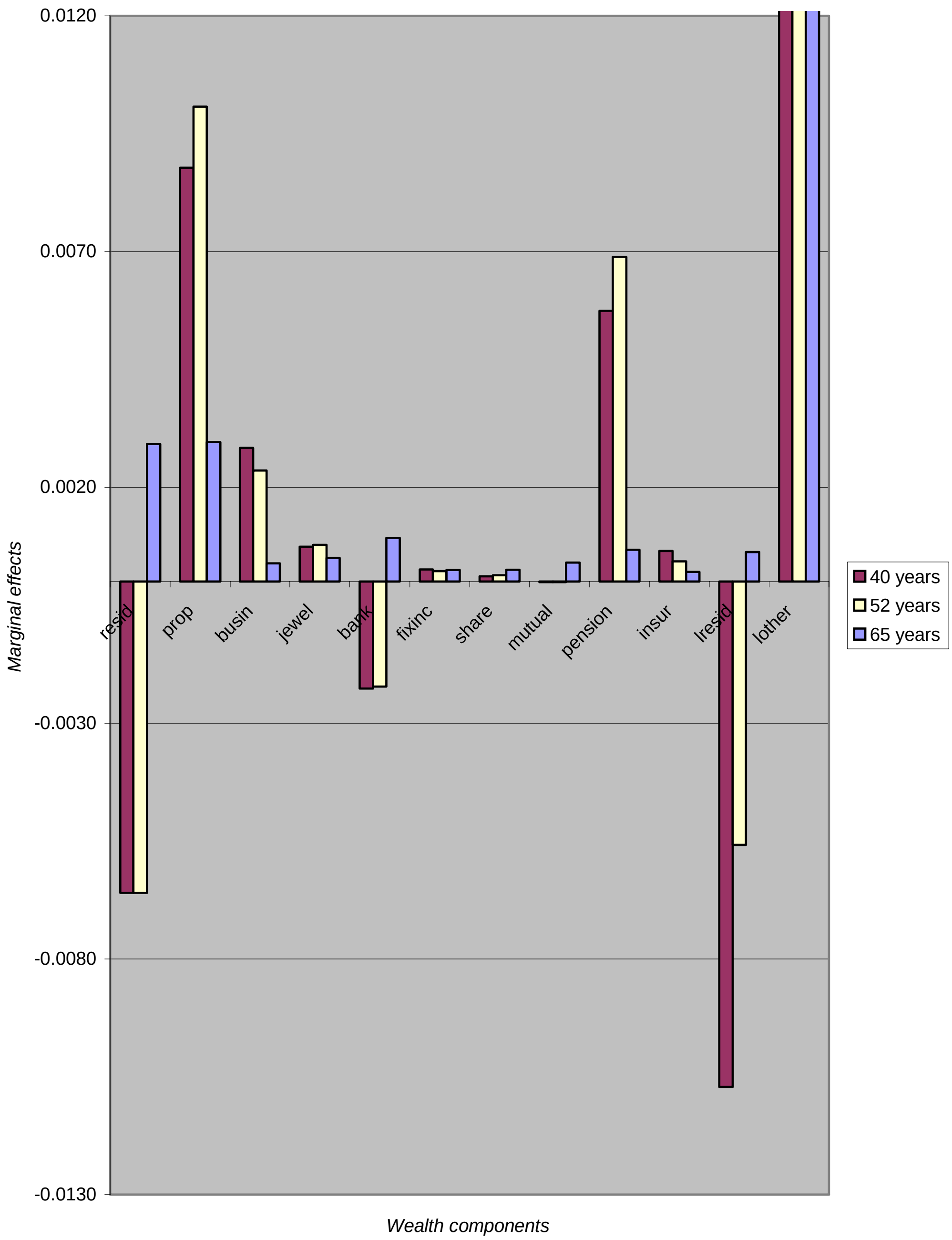


It can be observed that for average wealth this variable has a positive marginal effect on the share of portfolio invested in real estate property, business-linked assets, shares, collective investment undertakings and life insurance policies. It has an important negative effect upon the share invested in the main residence and bank accounts. Concerning debts, wealth has a negative effect on the share of portfolio financed by loans for home purchase, but a positive one on that financed by other loans. If wealth increases to 1,000,000 euros, there occurs a reduction in the share of the main residence and of bank accounts in household portfolio, being sharper the decrease in the former.

With regard to age, Figure 16 shows that at the age of 52 the share of portfolio invested in the main residence and bank accounts decreases, while the percentage invested in other real estate property, business-linked assets, works of art, pension plans and life insurance policies increases. At 65 the percentage invested in the main residence, bank accounts, shares and collective investment institutions increases.

Figure 16

MARGINAL EFFECT OF AGE ON PORTFOLIO COMPONENTS



The final row of Table 10 shows the result of decomposing the marginal effect following the methodology developed by McDONALD and MOFFITT (1980). These authors decompose the marginal effects into two parts: the change in the probability of the endogenous variable adopting a non-null value and the change in the value of the endogenous variable when it takes a positive value. It is clear that, except for the main residence, the marginal effect is explained to a greater extent by variations in the probability of exceeding the limit than by variations in the behaviour of taxpayers who are over that limit, which is coherent with the fact that the majority of taxpayers are only owners of a small set of assets.

6. FINAL REMARKS

Using a sample of 5,962 Spanish households, taken from the Survey of Household Finances performed by the Bank of Spain, the paper has described the composition of their portfolio and estimated a Probit and a Tobit model to test, respectively, how taxation (measured by the average marginal personal income tax rate) affects the decision to invest in each asset and the relative importance of each asset within household portfolio.

The estimations performed show that the marginal tax rate is significant and displays the expected sign to explain both the holding of tax favourable assets and their weight in household portfolio.

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SÍNTESIS

PRINCIPALES IMPLICACIONES DE POLÍTICA ECONÓMICA

El objetivo de este trabajo es contrastar empíricamente la incidencia de la fiscalidad sobre la composición del patrimonio de las familias españolas a partir de la información suministrada por la *Encuesta Financiera de la Familias* (*EFF*) del Banco de España para los años 2002 y 2005. El trabajo se estructura en seis secciones. Tras la introducción, en la sección segunda se hace una revisión de la literatura sobre la relación entre fiscalidad y decisiones de inversión. En la sección tercera se expone brevemente la fiscalidad de los activos financieros y reales en España y en la cuarta se describe la estructura del patrimonio de los españoles a partir de la *EFF*. En la sección quinta se presentan las estimaciones econométricas y los resultados de las mismas. El trabajo finaliza con una sección de conclusiones.

Para contrastar la importancia de la fiscalidad en la composición del patrimonio de los hogares en España se lleva a cabo una aproximación doble: en primer lugar, se trata de explicar, mediante un modelo *Probit*, el número de activos que componen el patrimonio de las familias, midiendo la probabilidad de que cada activo forme parte del patrimonio, y después se busca además la explicación a la importancia de cada activo dentro de ese patrimonio, utilizando un modelo *Tobit*.

Los activos considerados son los siguientes: vivienda habitual, otros inmuebles, activos afectos a actividades económicas, joyas y obras de arte, cuentas bancarias, renta fija, acciones, instituciones de inversión colectiva, planes de pensiones, seguros de vida, préstamos para vivienda habitual y otros préstamos.

La variable explicativa de interés es el tipo marginal en el IRPF, que se construye como el tipo marginal medio correspondiente a una renta del capital hipotética, obtenida mediante la aplicación al total de la riqueza de la familia de un tipo de interés determinado que, en nuestro caso, es el de las letras del tesoro en cada ejercicio.

Las variables explicativas de control son las usadas en la literatura para este tipo de análisis, y disponibles en la *EFF*: riqueza, edad, estado civil, educación, ocupación, importe de la renta del trabajo y grado de aversión al riesgo.

En general, las estimaciones realizadas muestran que el tipo de gravamen marginal es significativo y tiene el signo esperado para explicar tanto la tenencia de los activos incentivados fiscalmente como su peso en el patrimonio de las familias. Puede concluirse, entonces, que la fiscalidad es uno de los elementos que toman en consideración las familias a la hora de determinar la composición de su patrimonio.

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