Financial Restrictions, Personal Income Tax (PIT) and Demand for a Permanent Home in a Dynamic Model. An analysis with Panel Data for Spain

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Abstract

This paper analyzes the way in which income tax and liquidity determine the purchase or rental of a permanent home in Spain. To do this, we have developed a theoretical dynamic model based on Euler's equation. This model is verified using a sample from the 1991-1995 Panel of income taxpayers. Results suggest that the degree of financial restriction is the most relevant variable when determining the possibility of purchasing a home, while tax incentives increase their relative weighting once this asset has been acquired. Incentives for renting a home are relatively insignificant particularly for taxpayers who habitually rent their homes.

Key words: personal income tax, liquidity, permanent home, tax incentives

JEL classification: H21, H24, H31

1. Introduction

The preference to purchase a permanent home instead of renting one has been one of the principal characteristics of the demand for housing in the last 40 years in Spain. In the sixties, 67% of people owned their homes while in the eighties this percentage increased to 78% and in the nineties it reached 86%. In comparative terms, the distribution of the housing stock presents two features which differentiate the Spanish situation from other EU member States. Firstly, the ownership of permanent homes is greater in Spain than in the other EU members, the average in 1999 was 61%. Secondly, social renting represents 2% in Spain, this percentage being the lowest in the EU -the average EU value was 18% in 1999- (see Trilla, 2001).

These differences are due to the implementation of non-neutral public policies regarding modes of access to a permanent housing[1]. As a result market forces have been artificially biased towards home ownership therefore limiting citizens' ability to choose[2]. Tax policy implemented in Spain during recent years has encouraged this situation for different reasons. Firstly, tax incentives for the acquisition of a permanent home are more favorable. In the period 1978-1998, Income Tax Law allowed tax deductions from the tax base in terms of mortgage interests and from the tax liability in terms of sums paid for the purchase –i.e. reimbursement of the principal. Since 1999 both concepts have been applied at the tax liability level[3]. Secondly, renting has had very few direct grants and very few tax incentives –during the last two decades, income tax deductions with respect to the rental of a permanent home were only available between 1992 and 1998- while price control policies

[1] See González-Páramo and Onrubia (1991), for a detailed description of the arguments in favor of public intervention in housing.
[2] The theoretical effects of economic and tax variables on the housing market have been extensively studied by López García (1992, 1996, 1997a, 1997b, 2001)
[3] See Onrubia and Sanz (1999), Sanz (2000) and Onrubia, Romero and Sanz (2002), for an analysis of the effects of 40/98 Act on the tax treatment of homes.

have been in force until recently. Finally as we noted above, public resources devoted to building of subsidized housing have been few and far between[4].

In Spain, as in other developed countries there is an extensive literature on the study of different aspects related to the decision to buy a permanent home: the deciding aspects timing, location, quality, size, etc. The empirical evidence available for Spain enables us to conclude as follows:

- Disposable income is the major determinant in a house purchase (See Jaén and Molina, 1994, Lasheras, Salas and Pérez Villacastín, 1994, Duce, 1995, Sanromán, 2000).

- Price increases and levels are correlated to economic and tax variables. Thus, Bover (1993) found there was a positive relationship between price increases and income. However, López García's estimations (2001) implemented under different assumptions indicated that the permanent removal of incentives would reduce house price by 16%-30%.

- There is a certain contradiction in the results when the effectiveness of tax incentives is analyzed though on he whole there are more studies that question its efficacy. On the one hand, Jaén and Molina's simulations indicate that the removal of incentives would reduce the cost of house purchases by 16%-21%, contrary to results presented in López García's paper (2001). On the other hand evidence, provided in the studies carried out by Las Heras, Salas and Pérez Villacastín (1994) and Sanromán (2000) using

[4] For example, there have been almost 23,000 applications for renting social in the context of a recent promotion of less than 300 houses for rent carried out by the Empresa Municipal de la Vivienda de Madrid (the Madrid Local Authority Housing Company).

microdata, shows that the relevance of tax variables is small when compared with the influence of disposable income.

- Finally, other socio-economic and demographic variables are relevant when deciding to purchase a house such as marital status (see Sanromán, 2000), the age of the head of the household (see Jaén and Molina, 1994; Duce, 1995) their gender and educational level (Jaén and Molina, 1994; Colom and Cruz, 1997), the place of residence and their type of economic activity. (see Colom and Cruz, 1997).

Results indicate that disposable income is the most important variable when purchasing a permanent home in Spain. The purchase of a home (new or not) requires the payment of a deposit–which may account for 20% of the purchase price- and a capacity to borrow which house demanders who are subject to financial restrictions may not have (see Stiglitz and Weiss 1981) . Credit capacity as a requirement for buying a home is closely linked to variables such as income -current or expected- and wealth. Thus, individuals with fewer economic resources will face a greater likelihood of credit rationing, which presents an obstacle to a house purchase, and affects issues such as the timing of purchasing a home, the replacement of purchasing by renting in order to obtain access to a home and a delay to children leaving the family home.

The purpose of this research is to build and estimate a theoretical model which will enables us to analyze the joint role which financial and tax variables play in the marginal decisions about permanent housing. For this, we will analyze the main tools in the income tax supporting the purchase or rental of the habitual residence. In this context individuals have, in the absence of perfect capital markets –as defined by Modigliani-Miller (1958)-

different degrees of financial restrictions. To this effect, a dynamic model of demand for housing is used and is verified by a sample of the 1991-1995 income taxpayers.

The study is structured as follows: Section I describes income tax incentives for purchasing and renting a permanent home in Spain. Section II advances a dynamic model of demand for housing. Section 3 shows data used and parameterization. The specific econometric technique used and results are presented in section 4. Finally, we provide our conclusions.

2. Income tax treatment of the purchase and renting of a permanent housing in the 1991-1995 period

Until the 1998 Income Tax Reform, the treatment of the purchase of a permanent home had been characterized by the following: (a) a 2% tax allowance for the greatest of the following: cadastral value[5], or purchase value or value verified by the administration. (b) In relation to mortgage interest and property tax payments -800,000 pesetas (4,808 euros) and 1,000,000 pesetas (6,000 euros) for individual and joint taxation respectively- as deductible expenses. (c) a 15% tax credit on the sums paid for the acquisition or renovation of a permanent home. This deduction may be up to 30% of the net tax base. (d) Since 1992 a 15% tax credit has been introduced for contributions to a saving account targeted at the purchase of a permanent home.

As regards renting a permanent home between 1992 and 1995 Income Tax Law provided for a 15% deduction from tax liability on sums paid as rent. The limit on deductions in the time period studied is 75,000 pesetas (450 euros) for a maximum annual expenditure of 500,000 pesetas (3,000 euros). This deduction was subject to two additional

requirements. Firstly, the deduction was limited to fiscal units having a tax base smaller than a specific sum. Between 1992 and 1993 this sum was 2 million pesetas (12,000 euros) for a separate tax return and 3 million pesetas (18,000 euros) for a joint return. These sums increased in 1994 to 3 and 4 millions pesetas respectively (18,000 and 24,000 euros). In the 1995 tax year, such limits were 3.5 and 5 million pesetas (21,035 and 30,000 euros). Secondly, the rent paid had to exceed 10% of the taxpayer's net income.

3. Theoretical specification

A partial equilibrium model of demand for a permanent home is proposed in this section. Housing markets are considered to be competitive and thus require demand functions to be estimated assuming a perfectly elastic supply curve (see Lasheras, Salas and Pérez-Villacastín, 1994).

The approach we are using consists, using particular prices, in considering the behavior of the consumer as a problem of intertemporal maximization of liquidity, enabling us to reach a specific utility level. Liquidity is a broad concept comprising not only disposable income but also financial or real assets easily convertible into money. This approach provides us with an adequate framework to analyze explicitly the effects of liquidity and income tax incentives on the demand for a permanent home.

$$H_{it} = \underset{I_{it}}{Max}\left\{\pi_{i,t} + B_{i,t+1}E_{it}\left(\pi_{i,t+1}\right)\right\} \qquad (1)$$

Where H_{it} is the discounted value of the present and future liquidity in t, π_{it} is the available liquidity in the t period, $E_{it}(\cdot)$ is the expectations operator conditioned by the

[5] When cadastral values are updated, imputed income is 1.1%.

information available in t, and $B_{it} \in (0,1)$ is the discount factor applicable to each tax unit. The minimum utility level v_0 which must be reached under an intertemporal approach is as follows:

$$v_{it}(\overline{p}_{it}, H_{it}) + \beta_{i,t+1} v_{it+1}(\overline{p}_{i,t+1}, H_{i,t+1}) \geq v_0 \qquad (2)$$

$v_{it}(\cdot)$ being a growing, concave and twice differentiable function. Moreover, we assume that the utility function is separable and additive. However, $\overline{p}_{it}$ is a vector capturing the rent and purchase price of a permanent home , and the price of other durable and non-durable goods. The liquidity restriction is:

$$\pi_{it} \geq 0 \qquad (3)$$

As prices are considered exogenous, the accounting liquidity equation in which the tax treatment of the permanent home is explicitly incorporated is set out in expression (4). Herein we assume that individuals buy a permanent home and intend to keep it indefinitely. In short, we assume that a permanent home is not purchased for speculative purposes. For this reason, as our interest focuses on the analysis of the houses bought throughout the period under study, capital gains have not been taken into account.

(4)

$$\pi_{it} = [Y_{it}^{C}(B_{it}, G_{it}) + Y_{it}^{O}](1 - t_{it}) + [W_{it}^{C}(I_{it}, \gamma_{it}) + W_{it}^{A}(K_{it}, \Psi_{it}, \Gamma_{t}) + W_{it}^{O}] + D_{it} + L_{it}$$

Where Y_{it}^{C} denotes net returns from acquisition and ownership of a permanent home on PIT grounds - B_{it} and G_{it} - being respectively gross income and deducible expenditure from this income item. Variable Y_{it}^{0} denotes the other income in PIT and t_{it} is the marginal PIT tax rate. Variables W_{it}^{C}, W_{it}^{A}, W_{it}^{O} are respectively the effective tax credit related to the purchase and rental of a permanent home as well as the other deductions allowed according to this tax. On the other hand, γ_{it}, Γ_{it}, K_{it}, Ψ_{it} are respectively, the percentage of tax credit related to the purchase and rental of a permanent home, the stock of permanent homes at the end of the t period and a parameter weighting the rental price of a home. Finally, D_{it}, L_{it}, denote respectively the market value of the debt and assets in the t tax year.

The valuation of the stock of permanent homes on grounds of PIT is denoted in expression (5). The capital accumulation process depends on investment in houses i.e. the agreed price paid irrespective of inflation and economic depreciation processes.

$$K_{it} = I_{it} + K_{i,t-1} \tag{5}$$

Where K_{it} is the capital stock in period t, and I_{it} is investment in homes in the same period. In the PIT tax year, income in terms of permanent homes is calculated on the basis of its value for the purpose of this tax, K_i^* -cadastral or purchase value according to regulations- and of weighting coefficient α.

$$B_{it} = f\left(K_i^*, \alpha_t\right) = \alpha_t K_i^* \tag{6}$$

In PIT regulations, tax year expenditure derived from the purchase of a permanent home is defined as follows:

$$G_{it} = f\left(K_i^*, K_{i,t-1}, i_{i,t-1}, \beta_{it}, \Phi_i\right) = i_{i,t-1}\left(\Phi_i K_i^* - K_{i,t-1}\right) + \beta_{it} K_i^* \qquad (7)$$

The G value in the t period consists of two addends:

- Firstly, as specified on the right side of expression (7), the financial cost of the debt. To calculate it the following must be taken into account: a) the basis for calculation is the difference between percentage Φ_i of the purchase value debt-financed and the accumulated stock – as a consequence of the acquisition process- until the end of period $t-1$. For simplicity we assume that the payments are made annually and b) the interest rate of the payment is revised at the end of period $t-1$.

- Secondly, the above expression denotes the sum paid for the tax levied on immovable property (which is similar to the property tax in the United Kingdom)), β_{it} being the tax rate.

The tax saving for purchasing a permanent home is obtained through the application of a statutory (marginal) tax rate γ_{it} on investment in houses (8). This deduction being limited to 30% of the net tax base (9). Such a limit requires two essential issues to be borne in mind. Firstly, provided that this restriction is complied with, the tax will subsidize the marginal rate itself γ and an additional monetary unit of investment of any buyer of a permanent home. Secondly, conversely, an additional monetary unit of investment will provide a saving equal to its average value $\hat{\gamma}_{it}$.

$$W_{it}^{C} = \gamma_{it} I_{it}\left(K_{i,t-1},\ \cdot\right) \tag{8}$$

Subject to: $$\gamma_{it} \leq 0.30BL \tag{9}$$

Moreover, in expression (8) we explicitly assume that, provided that individuals plan their taxes, they may amortize a sum greater than the amount of the loan they are bound to pay contractually. For this reason, we consider that the unamortized loan at the end of the previous tax year is relevant. This variable, together with some others like the interest rate, the term of the loan, the tax treatment of these expenses or the liquidity *shocks* affect the tax strategy of individuals with regard to the optimum sum to be amortized in tax year t.

The value of the rental housing *stock* is denoted in (10), K_{it}^{m} being the value of this *stock* during the period t and h_t the inflation rate net of depreciation. Regardless of other requirements, the change in the value of a house to let is related to improvements carried out such as air conditioning, the installation of new baths and kitchens, new floors, etc. We assume that this investment I_{it}^{m} is made by the owner in accordance with the wishes of the tenants. The latter enjoy the benefits of this investment in exchange for a higher rental price which actually finances this investment. In other words, the tenant finances the investment which he has requested.

$$K_{it}^{m} = K_{i,t-1}^{m}\left(1 + h_{t-1}\right) + I_{it}^{m} \tag{10}$$

The rent for a permanent home paid by the tenants is determined as $\Psi_{it} K_{it}^{m}$, Ψ_{it} being the parameter weighting the value of the dwelling. As with the tax credit for the

acquisition of a permanent home, the fact that there is an absolute limit sum A, introduces differences between the marginal Γ_{it} and average legal rate $\hat{\Gamma}_{it}$ that must be taken into account when calculating the tax saving and the restrictions imposed on them. We assume that the loan sum is revised at the end of period $t-1$.

$$W_{it}^{A} = \Gamma_{it} \Psi_{i,t-1} K_{i,t-1}^{m} \tag{11}$$

$$\text{subject to:} \qquad \Gamma_{it} \Psi_{i,t-1} K_{i,t-1}^{m} \leq A \tag{12}$$

The Lagrangian and the first order condition determining the optimal investment policy on housing are respectively denoted in expressions (13) and (14), where μ_{it} represents the shadow price per marginal monetary unit of liquidity and λ_{it} is the parameter associated with the restriction (2).

$$L = \pi_{it}\left(1+\mu_{it}\right) + \beta_{i,t+1} E_{it}\left(\pi_{i,t+1}\right) + \lambda_{it}\left(v_{it} + \beta_{i,t+1} E_{it} v_{i,t+1}\right) \tag{13}$$

$$\begin{aligned} \frac{\partial H_{it}}{\partial I_{it}} &= \left(1+\mu_{it}\right)\left\{\frac{\partial Y_{it}^{C}}{\partial I_{it}}\left(1-t_{it}\right) + \left[\frac{\partial W_{it}^{C}}{\partial I_{it}} + \frac{\partial W_{it}^{A}}{\partial I_{It}}\right]\right\} + \\ &+ E_{it}\left[B_{i,t+1}\frac{\partial H_{t+1}}{\partial K_{it}}\right] + \lambda_{it}\left[\frac{\partial v_{it}}{\partial I_{it}} + \beta_{i,t+1} E_{it}\frac{\partial v_{i,t+1}}{\partial I_{it}}\right] = 0 \end{aligned} \tag{14}$$

Implementing the chain rule we have:

$$\frac{\partial Y_{it}^{C}}{\partial I_{it}} = \left\{\frac{\partial B_{it}}{\partial K^{*}}\frac{\partial K^{*}}{\partial I_{it}} - \left[\frac{\partial G_{it}}{\partial K_{i,t-1}}\frac{\partial K_{i,t-1}}{\partial I_{it}} + \frac{\partial G_{it}}{\partial K^{*}}\frac{\partial K^{*}}{\partial I_{it}}\right]\right\}\left(1-t_{it}\right) \tag{15}$$

There being:

$$\frac{\partial B_{it}}{\partial K_{i}^{*}}\frac{\partial K_{i}^{*}}{\partial I_{it}} = 0 \tag{16}$$

$$\frac{\partial G_{it}}{\partial K_i^*}\frac{\partial K_i^*}{\partial I_{it}} = 0 \qquad (17)]$$

The value of expressions (16) and (17) is null because K_i^* is a constant,[6] the value of which is assumed to be independent of the timeframe for the payment of the home by the taxpayer, i. e. $(\partial K_i^* / \partial I_{it}) = 0$. Finally:

$$\frac{\partial G_{it}}{\partial K_{i,t-1}}\frac{\partial K_{i,t-1}}{\partial I_{it}} = i_{i,t-1} \qquad (18)$$

The interest tax deduction –as already explained in section 1- is restricted to an absolute sum in PIT. The right side of expression (18) contains the tax saving net of depreciation, by monetary unit devoted to the interest payments within the purchase of a permanent home. If this limit is not reached, the tax saving will have its marginal value and in the opposite case it will be its average value.

$$\frac{\partial W_{it}^C}{\partial I_{it}} = \gamma_{it} \qquad (19)$$

$$\frac{\partial W_{it}^A}{\partial I_{it}^m} = -\Gamma_{it}\Psi_{i,t-1}\frac{1}{1+h_{t-1}} \qquad (20)$$

Expressions (19) and (20) respectively, denote individuals' tax saving when devoting an additional monetary unit to the purchase and rental of a permanent home. The negative sign of (20) indicates that, for a value of $\mathrm{K}_{it}{}^m$, and given $W_{it}^A = f(K_{i,t-1}^m, \cdot)$, the higher the value of $K_{i,t-1}^m$ the smaller the investment $\mathrm{I}_{it}{}^m$ is. Taking into account expressions (15) to (19), equation (14) becomes:

[6] At least as long as there are no changes to cadastral values.

$$\frac{\partial H_{it}}{\partial I_{it}} = (1+\mu_{it})\left\{-i_{i,t-1}(1-t_{it}) + \left[\gamma_{it} - \Gamma_{it}\Psi_{i,t-1}\frac{1}{1+h_{t-1}}\right]\right\} + \\ + E_{it}\left[B_{i,t+1}\frac{\partial H_{i,t+1}}{\partial \mathrm{I}_{it}}\right] + \lambda_{it}\left[\frac{\partial v_{it}}{\partial I_{it}} + \beta_{it}E_{it}\frac{\partial v_{i,t+1}}{\partial I_{it}}\right] = 0 \quad (21)$$

Using the envelope theorem[7]:

$$\frac{\partial H_{it}}{\partial K_{it}} = (1+\mu_{it})\left\{i_{i,t-1}(1-t_{it})\left[-\gamma_{it} + \Gamma_{it}\Psi_{i,t-1}\frac{1}{1+h_{t-1}}\right]\right\} + \\ + E_{it}\left[B_{i,t+1}\frac{\partial H_{i,t+1}}{\partial \mathrm{I}_{it}}\right] + \lambda_{it}\left[\frac{\partial v_{it}}{\partial I_{it}} + \beta_{it}E_{it}\frac{\partial v_{i,t+1}}{\partial I_{it}}\right] \quad (22)$$

Combining (21) and (22) to eliminate $E_{it}(\cdot)$ and $\lambda_{it}(\cdot)$, and replacing the result in (21) we obtain the implicit Euler's equation. Reordering the terms we obtain the following expression:

$$(1+\mu_{it})[-i_{i,t-1}(1-t_{it}) + \gamma_{it}] + E_{it}B_{i,t+1}\{2(1+\mu_{i,t+1})[-i_{it}(1-t_{i,t+1}) + \gamma_{i,t+1}]\} = \\ = (1+\mu_{it})\left[\Gamma_{it}\Psi_{i,t-1}\frac{1}{1+h_{t-1}}\right] + E_{it}B_{i,t+1}\left\{2(1+\mu_{i,t+1})\left[\Gamma_{i,t+1}\Psi_{i,t+1}\frac{1}{1+h_{t-1}}\right]\right\} \quad (23)$$

Expression (23) enables us to compare, in marginal terms, the purchase versus the renting option as regards a permanent home from a tax point of view. The left side of expression (24) includes the marginal tax savings derived from the purchase of a permanent home. The right side denotes marginal tax savings derived from renting a permanent home. This expression shows that economic agents will be, at the margin, indifferent to any of the options mentioned above provided that present value of marginal tax savings are identical. That is to say that, at in terms of marginal tax savings, the opportunity cost of renting a

[7] , $\partial W^c / \partial \mathrm{K}_{it} = -\gamma_{it}$, which denotes that tax credit decreases at a γ_{it} rate when the housing stock increases by one monetary unit.

permanent home will be the purchase price or vice versa. Expression (23) could not be verified in two cases:

-When the tax system is not neutral with respect to the choice between the purchase and the rental of a permanent home. As we saw in section 1 the Spanish PIT provides a better tax treatment for the purchase.

-The verification of equation (23) requires that $\mu_{it} = \mu_{i,t+1} = 0$, i. e., that perfect capital markets exist, characterized by the fact that all the agents may have the liquidity they need at the market interest rate in every time period. When this is verified, the shadow price of a marginal monetary unit of funds to finance a house is null $\pi_{it} = 0 \ \forall_{\text{i=1....n}}$. Conversely, when capital markets are imperfect, the shadow price will be positive, being greater in value the higher the degree of financial restriction faced by individuals.

Assuming imperfections in capital markets, the degree of financial restriction faced by houses' seekers is supposedly positive and constant in the short term, i. e. $u_{it} \cong u_{i,t+1} > 0$. Moreover, departing from the rational expectations assumption we may substitute an observed value for an expected one in (23). We use logarithms on both sides of expression (23) and we add a *dummy* variable for the effects that do not change over time and another for the temporal ones. However, we introduce a variable including the expectations error $\varepsilon_{i,t+1}$, which is white noise and is not correlated with any information available in period t.

Finally in order to include in more detail the differences between houses' demanders a change in scale has been carried out by dividing the different variables in expression (23) for each tax unit by the net base. The expression to be estimated is (24) where the asterisk denotes the change of scale mentioned above.

(24)

$$\Phi_1 L(1+\mu_{it}^*)+\alpha_1 L\{[-i_{i,t-1}^*(1-t_{it}^*)+\gamma_{it}^*]+B_{i,t+1}2[-i_{it}^*(1-t_{t+1}^*)+\gamma_{i,t+1}^*]\}-$$

$$-\Phi_2 L(1+\mu_{it}^*)-\alpha_2 L\left\{\left[\left(\Gamma_{it}\Psi_{i,t-1}\right)^*\frac{1}{1+h_{t-1}}\right]+B_{i,t+1}2\left[\left(\Gamma_{i,t+1}\Psi_{i,t}\right)^*\frac{1}{1+h_t}\right]\right\}+f_i+f_t=\varepsilon_{i,t+1}$$

Parameters to be estimated in the expression (24) are Φ_1, Φ_2, α_1 y α_2. The first two show the role of financial restrictions on permanent home seekers: the purchase of a house in the first case and its rental in the second one. The two other parameters are related to the effects of tax incentives on the respective choice of a purchase and rental of a permanent home.

4. Data used and parameterization

In the econometric estimate, we use a representative sample of the Panel of income taxpayers containing tax micro data of 3216 individuals. This panel has been constructed by the Instituto de Estudios Fiscales of the Spanish Ministry of Economy and Finance. Given that the decisions regarding a demand for a dwelling are taken within the family, two separate tax returns filed by spouses are combined into one. In this way the number of tax units is 1423 in this study.

The econometric estimate of expression (24) must face the upper-censored problem related to restrictions on tax deductions introduced by regulations when purchasing and renting a house. However, the censored problem is not really relevant.

Firstly, the number of cases of upper-censored tax deductions for interest is smaller than 10%. Secondly, there is not a single upper-censored deduction from tax liability. Finally, the censor observed in the tax deduction for rents is less than 20% -in this case it is more significant because of the absolute low limit operating in this tax deduction-.

The gross interest rate i_{it} used was the average rate applicable to mortgage loans for terms longer than three year periods provided by the range of financial institutions. The values used were, respectively, 16,16%, 15,84%, 14,82%, 14,06% and 10,78%, respectively for the tax years 1991 - 1995. The net interest rate paid by borrowers in each tax year is determined as $i_{it}(1-t_{it})$, where the PIT rate t_{it} is obtained by applying the tax rate of the related tax year to the net tax base.

The tax saving in relation to the tax liability per marginal unit of investment in a house purchase and on the rental of a house are respectively $\gamma = 0{,}15$ and $\Gamma = 0{,}15$. Note that even in the upper-censored cases, the marginal deduction rate and not the average one has been used as a measurement of the marginal tax saving. This is due to the fact that the total invested in a house and the total expenses are not directly observable. In spite of that we think that the bias created by this hypothesis will not be significant for the reasons we gave before.

The calculation of liquidity for each home seeker would require bearing in mind income as well as financial, immovable capital and durable assets.[8] However the options provided by the data panel on personal income tax are limited as regards the different capital assets:

- The panel of income taxpayers does not contain information in a strict sense about the capital assets of families. That is, it does not capture the stock valuation of the different types of wealth cited above.

- The information on wealth provided by the panel of income taxpayers is always indirect and partial. It is indirect because it gives us an imperfect and approximate value through the income flows of this capital. For instance, we do not know the stock of securities with fixed income but we do know the value of dividends derived from it. It is partial because we do not have complete information on some types of capital assets such as, for instance, capital in vehicles, ships or works of art.

Consequently, restrictions on constructing this variable are numerous, which means that we must be careful when interpreting the results. For this reason we have had to build a *proxy* variable for liquidity (LF). This variable includes income from movable capital –current accounts, dividends, Treasury bonds, etc.-, the savings obtained in terms of tax deductions related to houses other than the permanent home, investment on cultural works as well as charitable donations allowable in each tax year. The degree of financial restriction is defined as:

$$\mu_{it} \cong \frac{\frac{1}{LF_{it}}}{BL_{it}} = \frac{1}{LF_{it} * BL_{it}} \qquad (25)$$

With a net tax base with a value (BL), the degree of financial restriction is smaller the greater LF is and will be higher when LF is smaller.

[8] See Estrada and Buisán (1999) for a discussion.

5. Results

In the estimation of the model (24) we have used a Maximum Likelihood with Complete Information, and iteration control using the Generalized Moment Method (GMM)– *Marquardt's algorithm*-. This model's equations have been stated in first differences to eliminate the action of fixed effects in the estimates.

Other alternative methods of estimation have been tested. These have been as follows: GMM for time series and their different options, two-stage and three-stage least squares. The results of all these are similar to those we set out below. This is the same when different control techniques are used for iterations which make the estimates more robust. Individual significance of parameters is analyzed through the T Student test and the joint significance is carried out using the Wald's test. Detecting a self correlation is performed using the Durbin-Watson's statistic.

Firstly, the model has been estimated using the entire sample. That is to say, tax units are used, regardless of whether they benefit from tax deductions for purchasing or renting a home. The results of this analysis are shown in Table 1. Moreover, the model has been checked with two sub-samples. *Subsample* 1 consists of tax units with tax deductions for the purchase or rental in a tax year. Thus, we study taxpayers who meet one of the following requirements: a) They have bought a home before or during the period studied, b) They have been tenants of a permanent home for or during the period studied, c) They meet one or two of the previous requirements such as for example, firstly being a tenant and then a purchaser of a permanent home. The results of this analysis are shown in Table 2. Finally, *Subsample* 2 consists of taxpayers who benefited from tax deduction for the purchase or rental every year. The results are shown in Table 3.

The individual significance of estimated parameters, as well as the joint-significance of the Wald's test has a degree of confidence higher than 95%. However, the Durbin-Watson's statistic indicates that there is no self-correlation problem in the model studied, the residuals tending to behave as a white noise.

As regards the purchase of a permanent home, results obtained are as follows. Firstly, the relative weighting of parameter Φ_1 is high in all estimates carried out, which confirms the barrier effect of liquidity when deciding to buy a permanent home. Secondly, in relative terms, financial restrictions are more relevant than tax tools assisting the purchase when we test the model with *Subsample* 1 –which includes, among other people, those who purchase their home in this period. However, tax incentives for purchasing a house notably increase their relative weighting when our analysis focuses on *Subsample* 2 –which only contains individuals who bought their home before the period analyzed-. This means that the results seem to suggest that the relative significance of financial and tax variables is related to the subsample used. Thus, entering into a contract seems to be for the most part influenced by liquidity with tax incentives having a secondary role in this case. On the contrary, tax incentives are important once the purchase contract has been executed.

As for the rental of a permanent home, the following conclusions may be drawn. Firstly, the relative importance of parameters Φ_2 and α_2 is less in all studied cases than that observed for parameters associated with the purchase of a permanent home. Secondly, the relative weighting of the financial restriction and tax incentives for renting a house are very similar when the model is tested with the two *subsamples* previously mentioned. Finally,

taxation does not play a significant role with respect to taxpayers renting a house as their habitual residence during the period under analysis (*subsample 2).*

Table 1
Total Sample of PI Taxpayers
(1421 observations)

Parameters	Weight of Coefficients	Significance
Φ_1	0.37	> 99%
α_1	0.19	> 99%
Φ_2	0.27	> 99%
α_2	0.17	> 99%
Wald's Contrast ($\Phi_1 = \Phi_2 = \alpha_1 = \alpha_2 = 0$)		Rejected at 95%
Wald's Contrast ($\Phi_1 = \alpha_1;\ \Phi_2 = \alpha_2$)		Rejected at 95%

Table 2
Taxpayers with a Tax Deduction for the Purchase or Rental of a Home in a Tax Year
(883 observations)

Parameters	Weight of Coefficients	Significance
Φ_1	0,37	> 75%
α_1	0,30	> 60%
Φ_2	0,16	> 60%
α_2	0,17	> 75%
Wald's Contrast ($\Phi_1 = \Phi_2 = \alpha_1 = \alpha_2 = 0$)		Rejected at 95%
Wald's Contrast ($\Phi_1 = \alpha_1;\ \Phi_2 = \alpha_2$)		Rejected at 95%

Table 3
Taxpayers with a Tax Deduction for the Purchase or Rental of a Home during every Tax Year in the Sample
(334 observations)

Parameters	Weight of Coefficients	Significance
Φ_1	0,24	> 95%
α_1	0,73	> 95%
Φ_2	0,02	> 95%
α_2	0,01	> 95%
Wald's Contrast ($\Phi_1 = \Phi_2 = \alpha_1 = \alpha_2 = 0$)		Rejected at 95%
Wald's Contrast ($\Phi_1 = \alpha_1;\ \Phi_2 = \alpha_2$)		Rejected at 95%

6. Final remarks

The role of liquidity and PIT tax incentives in the choice between purchasing and renting a house as a way of obtaining a permanent home is studied. For this we constructed and tested a theoretical model based on Euler's equation using a representative sample from the 1991-1995 Panel of income taxpayers.

A Maximum Likelihood with Complete Information through GMM was the estimation procedure used. Results are considered to be robust as they are very similar to those obtained with other alternative estimation methods. Evidence suggests that financial restrictions are more important than tax incentives when deciding to purchase a permanent home. This result is very similar to those obtained in other studies using micro data for the Spanish case as for example Lasheras, Salas and Pérez Villacastín (1994) and Sanromán (2000). On the other hand, tax incentives are more important once the dwelling has been bought. These results call into question the design of Spanish public policies in relation to housing. In short, tax incentives for the purchase of a home are hardly effective at all when individuals face a high degree of financial restriction. This seems to indicate that it would be advisable to have recourse to other tools that may smooth financial restrictions such as public warranties or subsidies. As for the rental, the relative weighting of tax incentives and financial variables is very similar, it being in general small for those individuals who habitually rent a house as their permanent home.

The results obtained must be considered with caution because of the limitation with regards to the calculation of the degree of financial restriction.

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