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Effects of Fiscal Treatments of Second Home Ownership on Renting Supply*

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Abstract

A considerable proportion of the Spanish population has problems to access housing because of the high prices, consequence of successive 'housing booms'. Nevertheless, Spain is the EU country with a higher number of empty houses. This situation has been called the 'Spanish real estate market waste'. A potential solution to this problem could be implementing tax measures encouraging empty houses introduction into the market. This article analyzes the determinants of the decision of renting an empty house, emphasizing tax variables. Simulations of possible PIT (Personal Income Tax) reforms are also performed. Data is gathered from the European Community Household Panel.

JEL: H24, H31

Keywords: Housing, microsimulation, second home, fiscal incentives

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I. Introduction

One of the main concerns of Spanish people is the so called 'housing problem'. This problem dates back to the mid eighties' 'Spanish housing boom', characterized by an unprecedented rise in homeownership prices. Although this process slowed down at the beginning of the nineties, at the end of the decade there were significant and continuous price increases, which last up to the present date.

Homeownership shortage derives from an excess of demand, not only because new households are created, but also because of the appeal of the investment in housing, since it is characterized by wealth gains and a favourable tax system. This asset behaves as a defensive security in stock-market crisis and, further, tax evasion is very difficult to detect in this kind of investments.

While homeownership price is high, the alternative to fulfil the basic housing need –houses to rent- is scarce. Despite the eighties' and nineties' liberal policies on the rent market, Table 1 shows that Spain is the EU country with the lowest percentage of houses to rent. According to the European Community Household Panel of 1998, the percentage of rental houses to the total of main residences was only 11 percent.

TABLE 1
Percentage of houses to rent (year 1998)

Country	House ownership	Free transfer house	Renting			
			Total houses to rent	Public renting over total renting	Employer renting over total renting	Private renting over total renting
Denmark	64.25	0.40	35.35	54.25	1.36	44.39
Holland	55.89	1.05	43.06	88.10	0.42	11.47
Belgium	68.41	3.79	27.80	25.60	0.50	73.90
France	58.20	5.59	36.21	41.83	1.84	56.34
Ireland	84.43	2.16	13.41	60.22	1.10	38.67
Italy	76.70	6.06	17.24	27.96	2.93	69.11
Greece	82.74	3.92	13.33	2.16	2.34	95.50
Spain	**82.90**	**6.13**	**10.98**	**6.72**	**11.09**	**82.18**
Portugal	70.09	11.35	18.56	16.13	4.81	79.06
Austria	60.01	9.09	30.90	50.88	0.00	49.12
Finland	71.25	1.25	27.50	48.36	6.55	45.09
Germany	38.38	3.09	58.54	36.39	3.67	59.94
Great Britain	70.35	2.21	27.45	69.74	1.13	29.13

Source: European Community Household Panel

There are also qualitative differences regarding the type of renting, since no more than a 6.7 percent of all rental houses is social rent, much less than the European

average (Table 1). In part, this is a consequence of owners' reluctance to renting, owing to the risk of payment default and/or house damages. Low tax penalties for owning an empty second home favours this situation.

Although many Spanish families have economical problems to access housing, Spain is the EU country with the highest housing surplus. According to the Census of Population and Housing 2001 published by the INE (Statistics National Institute), the difference between the number of houses (20,946,554) and the number of households (14,187,000) is 6,759,554, which means a surplus of a 32.3 percent, the highest in Europe. This situation has been called the 'Spanish real estate market waste'.

Public authorities have tried to solve the problem by means of housing policies mainly focused on demand, particularly to ownership, with the consequent detriment of renting. Some of these policies have made the situation even worse, intensifying the price increase [López García (1996)].

As the Committee of Experts on Housing[1] (1992) pointed out, a possible improvement for this situation could be achieved by increasing the supply, implementing fiscal tools which affect the use of empty houses. The following suggestions were among the report specific proposals: 'The PIT could favour rental houses against empty ones. So, fiscal depreciation could be implemented, encouraging newly built houses' renting. On the other hand, empty houses –which are not a temporal second home and exceeding three houses per owner- may be penalized with imputed income from owner-occupied property higher than the habitual home's one." (p. 112). Some measures have been already implemented from the year 2003 on, such as tax deductible depreciation expenditures increase from a 2 to a 3 percent of the purchase price and a 50 percent reduction of the rental houses' taxable income. Other measures have not been applied yet, as a higher taxation on empty houses.

This article tries to analyze the effect of a higher relative taxation on empty houses through the Spanish personal income tax on the rent market.[2] That is, the effect of decreasing the relative taxation on rental houses compared to empty ones. Note that rental houses pay taxes according to their real income, while empty houses benefit from a low taxation (only a 2 percent of the fiscal value of housing or a 1.1 percent of the

[1] In view of homeownership price increase in Spain at the end of the eighties, the Ministry of Public Works and Transport ordered a study to experts on housing. In this study, an analysis of the Spanish housing market was presented and possible solutions to price increases were proposed. This study was published as part of the mentioned report. López García (1992) provides an analysis of this report.

[2] Homeownership is taxed by the personal assets tax and by the local property tax as well. See tax treatment of housing by Bilbao et al. (2006).

revised value[3]). We expect that a higher empty houses ownership penalization through PIT will cause an increase in the rental housing supply.

Although there are many studies on the choice of the main residence[4], there are no relevant studies on the decision of renting or not a second home, neither for Spain nor for any other countries. We believe this is a very interesting topic, especially for those countries, such as Spain, where a considerable part of the population –particularly the young people- has problems to access housing.

The article is organized into four sections. In the second part, a theoretical model considering housing as an investment good is introduced. According to this model, the investor's choice between several assets consists of two stages. In the first stage, the investor decides how to allocate its investment between the housing asset and another asset including every other asset but the housing one. If the investor chooses housing, in the second stage he will have to decide whether to rent it or not.

In the third section, the empirical model and the database employed are described, as well as the estimation results. The empirical model consists of a probit estimation, which enables us analyzing which variables, and to which extent, influence the decision of renting or not a second home. Data used are gathered from the European Community Household Panel (ECHP) for the period between 1994 - 1997 and the legislation for the PIT is the corresponding for this period (Law 18/1991).

Next, in section four, a simulation of the effect of changes in taxation of empty houses on the supply of rental housing is performed. Finally, the main research conclusions are presented.

II. Theoretical model: housing as an investment good

In this section, the behaviour of a second home owner is modelled, determining which variables influence the decision of renting or not. It is a partial equilibrium model

[3] Law 18/1991, Law 40/1998 and current Law 35/2006.

[4] There are also studies on the decision of renting or purchasing a car (see, for instance, Mannering *et al* (2002) and Johnson and Waldman (2003).

in which housing is seen as a pure investment good.[5] Housing is considered a investment good by Poterba (1985) and, later, by Grossman y Laroque (1990)[6].

The starting point is a neoclassical model of investment in a risky asset portfolio in which an individual who lives infinite periods maximizes the expected utility of his intertemporal consumption, Ct, deducted at a rate α, so that $0<\alpha<1$:

$$\max \ E\left[\sum_{t=0}^{\infty} \alpha^{-t} U(C_t, Z_t)\right] \qquad [1]$$

where the utility function is assumed to be strictly concave and shows the usual properties, and Z_t is the vector of demographic characteristics. It is assumed that leisure is additively separable of consumption. Consequently, the intertemporal wealth assignment among consumptions and different kinds of assets is independent from the real wage.

In the same way, it is assumed that there are two assets with different risk profiles. One of them is housing, while the other one is every other asset but housing. Individuals keep positive quantities of both of them if their marginal return is the same. In order to simplify the analysis, it is assumed that an individual can only purchase a second unit[7] and is able to lend or borrow any amount of money she wishes. On the other hand, investment in housing for each period can be allocated to rent the house or keep it empty. It is also assumed that the individual makes his investment choice through a budget assignment in two stages: in the first stage it is decided the desirable amount invested in the composite asset and/or in housing. If housing is included, in the second stage the individual has to decide whether she will rent or not the house.

Stated formally, in the first stage it is established the amount which will be invested in the composite asset and in the housing asset. Thanks to this investment, the individual gets returns which will increase his possible future consumption. If a_{t-1}^{h} shows the ratio of wealth invested in housing, r_{t-1}^{h} is the after-tax expected real return in period t-1 and r_{t-1}^{0} is the alternative asset return, the budgetary constraint at the beginning of period t is:

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[5] That is, houses occupied by their owners are not taken into account. In this case, the housing asset is a consumer good, as well as an investment good. This fact does not affect the theoretical model when the house occupied by its owner pay taxes through PIT in the same way a second home does, as happened in Spain until 1999 taxable period.

[6] Also, DiPasquale and Wheton (1994) and, for the Spanish case, Lasheras *et al.* (1994) and López García (1996, 1999, 2001, 2004). This study is based on the model proposed by Lasheras et al. (1994), adapting it to the decision of renting or not a second home.

[7] If it purchases more than one, the decision of renting will not be the same for all second homes.

$$A_t = (A_{t-1} + W_{t-1} - P_{t-1}C_{t-1})\,(1 + a_{t-1}^{h}\, r_{t-1}^{h} + (1 - a_{t-1}^{h})\, r_{t-1}^{0}) \quad [2]$$

where A_t is the assets' expected value at the beginning of period t, W_{t-1} is the income earned in t-1 and P_{t-1} is the consumer goods' price in t-1. For this decision the investor's expectatives are going to be decisive with regard to the capital gains [Garcia-Montalvo (2006)].

If a_{t-1}^{h} is distinct from zero, in the second stage the investor has to decide whether to rent or not the house in period t-1. u_t^a is the subutility function in case the individual decides to rent the house and u_t^v is the subutility function in case she decides to keep it empty. Then, the problem in the second stage is:

$$\max u_t^a\,(C_t, Z_t)$$
$$\text{subject to: } A_t^h = A_{t-1}^h\,(1 + r_{t-1}^a) \quad [3]$$

if the individual decides to rent the house or otherwise:

$$\max u_t^v(\,C_t, Z_t)$$
$$\text{subject to: } A_t^h = A_{t-1}^h\,(1 + r_{t-1}^v) \quad [4]$$

where A_t^h is the expected value of the housing asset at the beginning of period t, r_{t-1}^a is the after-tax expected real return in the renting period t-1 and r_{t-1}^v is the empty house return.

Solving equations [3] and [4] and equating them, it is obtained that if:

$$v_t^a\,(A_t^h, r_{t-1}^a, r_{t-1}^v, Z_t) - v_t^v(A_t^h, r_{t-1}^v, r_{t-1}^a, Z_t) > 0, \quad [5]$$

the individual will rent her house and if:

$$v_t^a\,(A_t^h, r_{t-1}^a, r_{t-1}^v, Z_t) - v_t^v\,(A_t^h, r_{t-1}^v, r_{t-1}^a, Z_t) \leq 0, \quad [6]$$

the individual will invest in empty housing, being v_t^a and v_t^v the indirect subutility functions at the beginning of period t in case the individual rent the house or not, respectively. These functions depend on the expected returns of rental housing and empty houses; on the individual's risk preferences, implicitly shown in the direct subutility functions' degree of concavity; and on the individual's sociodemographic characteristics.

According to Haig-Simons' extensive concept of rent, non-rented houses (empty houses or those occupied by the owner) produce an income in kind equal to that produced by rental houses. This income in kind is consumed by the house owner, so r_{t-1}^a and r_{t-1}^v are only fiscally different. In this way, rental houses are taxed by the obtained net income (income minus expenses) in accordance with most of the legislations, while empty houses are tax-free, France's and Great Britain's case, or subject to a lower tax than that corresponding to rental houses, Germany's and Spain's case.

If i_{t-1}^{h} is the expected real net return before-tax related to housing, either an empty or a rental house[8], then:

$$r_{t-1}^{a} = i_{t-1}^{h}(1-tmg_{jt-1}) \quad [7]$$

where tmg_j is the income tax marginal rate for individual j in period t-1. Given that:

$$r_{t-1}^{v} = i_{t-1}^{h} - i_{t-1}^{f} tmg_{jt-1} \quad [8]$$

where i_{t-1}^{f} is the empty house imputed income through the income tax. The arbitrage condition is:

$$r_{t-1}^{a} - r_{t-1}^{v} = i_{t-1}^{h}(1- tmg_{jt-1}) - (i_{t-1}^{h} - i_{t-1}^{f} tmg_{jt-1}) \quad [9]$$

$$r_{t-1}^{a} - r_{t-1}^{v} = tmg_{jt-1} (i_{t-1}^{f} - i_{t-1}^{h}) \quad [10]$$

that is, the rental house net return after-tax is higher than or equal to that of the empty house, when the empty house tax-base is higher than or equal to the house net return before-tax. That is, when the empty house tax-base is higher than rental house taxation: $i_{t-1}^{f} > i_{t-1}^{h}$

The house net return before-tax is [Laidler (1969), Aarón (1972), Rosen (1979) y King (1980)]:

$$i_{t-1}^{h} = \frac{R_{t-1} - D_{t-1} - i_{t-1}M_{t-1} + \pi_{t-1}V_{t-1}}{V_{t-1} - M_{t-1}} \quad [11]$$

where R_{t-1} is the second home gross income, D_{t-1} is the depreciation, repairs and maintenance expenditures, M_{t-1} is the mortgage amount, i_{t-1} is the mortgage interest rate, π is the expected house price increase and V_{t-1} is the house market value. All these magnitudes refer to period t-1. Assuming that the individual's rate of return on capital and the mortgage interest rate are equal; that depreciation, repairs and maintenance expenditures are a percentage (d_{t-1}) of the house market value in this period; that the individual get into debt a percentage (m_{t-1}) of the house value; and that capital gains are also a percentage (π_{t-1}) of the house value [Laidler (1969), Aarón (1972), Rosen (1979) and Ter Rele and Van Steen (2003)], then:

$$i_{t-1}^{h} = \frac{V_{t-1}(i_{t-1} - d_{t-1} - i_{t-1} m_{t-1} + \pi_{t-1})}{V_{t-1}(1 - m_{t-1})} \quad [12]$$

In case the second home is empty, in Spain the taxable return is equal to a percentage v_{t-1} of the fiscal value of housing VC_{t-1}, so that:

[8] Since 2003 the taxation for rented dwellings is reduced in a half, so equation [7] would be $r_{t-1}^{a} = i_{t-1}^{h}(1-0.5tmg_{jt-1})$. As it has already been stated, legislation in force for the period 1994-1998 is the one applied in this work.

$$i_{t-1}^{f} = \frac{v_{t-1} VC_{t-1} + \pi_{t-1} V_{t-1}}{V_{t-1}(1 - m_{t-1})} \quad [13]$$

If w_{t-1} is the ratio of the fiscal value of housing to the market value, then:

$$i_{t-1}^{f} = \frac{V_{t-1}(w_{t-1} \times v_{t-1} + \pi_{t-1})}{V_{t-1}(1 - m_{t-1})} \quad [14]$$

Through equations [12] and [14], it can be analyzed how these variables influence the decision of renting or not a second home. For instance, it can be calculated which is the individual's rate of return on capital making equal both equations:

$$i_{t-1} = \frac{w_{t-1} v_{t-1} + d_{t-1}}{1 - m_{t-1}} \quad [15]$$

assuming that fiscal value of housing is a 24 percent of the house market value[9] [Gonzalez-Páramo and Onrubia (1992)]; that the empty houses pay taxes of a 2 percent of their fiscal value of housing; that depreciation, repairs and maintenance expenditures are an annual percentage of a 3.5 percent of the house market value [Laidler (1969), Aarón (1972), White and White (1977), Jaen and Molina (1994)]; and that the external financing percentage is a 80 percent (as it can be seen, capital gains are irrelevant for this study), a value of i equal to a 19.9 percent is obtained. Below that return, $i_{t-1}^{f} - i_{t-1}^{h} > 0$ and according to the equation [10] the house is rented; otherwise, it will remain empty. As the financing percentage decreases, so does i (equation 15); and this way, there is a lower probability of renting the house. For instance, if the external financing percentage is 50 percent, i will be equal to a 7.96 percent. In this way, if the house net return before-tax is higher, implies that $i_{t-1}^{f} - i_{t-1}^{h} < 0$ and the best option will be not renting the house.

The remaining expenses related to the house have the same effect, since they are deductible in the income tax. Therefore, when these expenses are high, there are more incentives to rent the house. For example, if repairs and maintenance expenditures increase a 4 percent and assuming that the external financing percentage is a 80 percent and the rest of variables as before, the individual's rate of return on capital increases from 19.9 percent to a 22.4 percent. Below 22.4 percent, the house is rented.

[9] The study is for the years from 1994 to 1998. Most part of the fiscal values on those dates would not have been revised so it is reasonable the assumption by Gonzalez-Páramo and Onrubia (1992). In the case of fiscal value of housing revised it is approximately a 50 percent of the house market value but only until the year 1998. From that date on the high and progressive increase in the market prices makes this percentage decrease [Aguado (2004)].

On the other hand, increases in the empty house tax-base, due to fiscal value of housing increases or higher percentages of fiscal value of housing, produce an increase of i and therefore more incentives to rent the house. A decrease in the rental house taxed income would have the same effect. For instance, if empty houses pay taxes of 3 percent of their fiscal value and the rest of variables as before, i will be equal to a 21.1 percent.

III. Empirical model: choice between renting or not renting

Based on the previous theoretical model, this section analyzes determinants of the decision to rent an empty second home, emphasizing fiscal variables. This estimation was done using the first five waves of the European Community Household Panel (ECHP), corresponding to the period 1994-1998. However, since the information on individuals' and households' income lagged one year, the data employed belong to the period 1994-1997. Besides, we have use the SIRPIEF information on the type of tax statement and the marginal rate corresponding to the same period [Sanz et al (2004)]. The sampling unit is the individual. Although investment decisions are usually taken within the family environment, when its members earn their own income, they tend to choose the individual tax statement. In such case, there is no available information on family's marginal rates since both members will have a different one. There are 11,083 observations of residents in Spain, who declare to have at least one second home[10] in the period of this study. It is assumed that the individual who owns a second home and obtains the real estate return is renting the second home; while the rest of individuals who own a second home and do not declare real estate returns are keeping it empty[11].

According to the data provided by ECHP on individuals owning a second home, only a 5.38 percent of them decide to rent it, this is an average of four years to the sample's data. Note that this percentage only refers to houses rented by private owners, not to houses rented by social institutions or by estate agents.

A probit panel model with random effects is estimated, which attempts to represent the decision-taking process of equations [5] and [6]. The functional form chosen is the following:

[10] Information provided by the panel does not specify the number of second homes.
[11] Due to fiscal reasons, the respondent might lie about its second home use. There are no available data to take this fact into account.

$$I_{jt} = \sum_{t=94}^{97} \alpha_t t + \gamma_1 \ln Y_{jt} + \gamma_2 tmg_{jt} + \gamma_3 \ln(Pr_{jt}) + \gamma_4 \ln \pi_{jt} + \gamma_5 Statment + \gamma_6 Z_{jt} + v_{jt} + u_j \qquad [16]$$

where Y_{jt} is the individual's permanent income; tmg_{jt} is the marginal tax rate in the individual's PIT; Pr_{jt} is the proportion of taxed rental houses relative to empty houses after income tax; π_{jt} is the expected capital gains; Statement is a dummy variable, representing the choice between individual and joint tax statement; Z_{ijt} is a vector of socio-demographic variables, which can affect the decision of renting a second home and are used to control for some of the heterogeneity present in that decision. In order to take the temporal heterogeneity into account, four temporal dummy variables α_t are considered, one per year. The error term is assumed to have two components: v_{jt} and u_j. The second one, u_j, represents the individual's specific heterogeneity and is assumed to be uncorrelated with the vector of explanatory variables. For each individual, it is stated that, when $I_{jt} > I_{jt}^*$, the individual rents the house and, otherwise, keeps it empty.

The dependent variable takes the value one when the individual rents the house and zero otherwise. The model is estimated without including a constant term, since a temporal dummy variable for each year in the sample is included, so the corresponding coefficients, α_t, represent the specific effect of the corresponding period and not the difference regarding a possible reference period.

As it can be seen, this model resembles the election models of main residence tenure of Li (1977), Lee and Trost (1978), Rosen (1979), Horioka (1988) and Jaen and Molina (1994) [12]. However, in this case it is applied to the decision of renting or not a second home.

Next, we describe each of the explanatory variables included in the probit model. They are classified in two groups. In the first group, we present the economic variables, which are expected to influence the decision of renting a household. In the second group, we include a set of control variables, reflecting the socio-demographic characteristics of the individual and her household.

[12] The previous studies only distinguish two sorts of tenure, ownership and renting. There are multinomial studies which assume that there is rationing in some of the alternative tenures [King (1980), Börsch-Supan and Pitkin (1988), Bourassa (1995), Duce (1995), Rapaport (1997), Walker *et al.* (2002), Barrios and Rodríguez (2005)].

1. Economic characteristics

• The logarithm of permanent income, $\ln Y_j$. In order to obtain a measurement of this variable, the model used by Goodman and Kawai (1982)[13] is applied. We decide not to include the real estate return, in order to avoid endogeneity problems between the permanent income definition and the dependent variable in the probit. So, we perform an estimation in which the dependent variable is current income (without the real estate return) and the socio-demographic variables are independent. Prediction from this estimation is considered as permanent income, the residual part constituting the transient component. The results and the variables' definition are included in the Appendix.

• Marginal rate of the taxable income in the individual's PIT, tmg_{jt}. This variable reflects the effect of tax progressiveness on obtaining income. It can also be understood as a proxy for current income.

• The fraction of the rental house subject to tax relative to the empty household, after the income tax in logarithms[14], $\ln Pr_{jt}$. In order to compute this variable, we have to know the rental house real net of tax return, r_{jt}^a, and the empty house real net of tax return for individual j, r_{jt}^v, in both cases after the payment of PIT.

The rental house real net of tax return after PIT for individual j is as described in equation [7]:

$$r_{jt}^a = i_t^h (1\text{-}tmg_{jt}) \qquad [17]$$

where i_t^h is the net return of the household, either rented or empty, before tax.

Assuming that the percentage of external financing is 40 percent of the house value; that the rate of return on individual's capital and the mortgage interest rate are equal (we consider every financial institution's[15] average mortgage interest rate for more than three years for purchasing a free household); that the depreciation, repairs and maintenance expenditures are an annual 3.5 percent of the house value; and disregarding the capital gains, substituting [12] it is obtained:

$$i_{94}^h = \frac{V(0{,}1026 - 0{,}035 - 0{,}1026 \times 0{,}4)}{V(1 - 0{,}4)} = 0.044$$

[13] For the Spanish case, see Barrios and Rodríguez (2005).

[14] According to equations [5] and [6], the probit model should include the real net of tax return of the rental house for individual j, r_{jt}^a, and the real net of tax return of the empty house, r_{jt}^v, both of them after the payment of PIT. Nonetheless, since the correlation between these variables is high, as it can be seen in equations [7] and [8], we choose to substitute them by their proportion.

[15] Source: Central Bank of Spain. Year 1994, i=10.26 percent; year 1995, i=11.01 percent; year 1996, i= 8.17 percent; year 1997, i=6.91 percent.

$$i_{95}^{h} = \frac{V(0,1101 - 0,035 - 0,1101 \times 0,4)}{V(1 - 0,4)} = 0.0517$$

$$i_{96}^{h} = \frac{V(0,0817 - 0,035 - 0,0817 \times 0,4)}{V(1 - 0,4)} = 0.023$$

$$i_{97}^{h} = \frac{V(0,069 - 0,035 - 0,069 \times 0,4)}{V(1 - 0,4)} = 0.011 \qquad [18]$$

where V is the house market value.

As defined in equation [8], the real return of the empty house after-tax, r_{jt}^{v}, for individual j is:

$$r_{jt}^{v} = i_t^h - i^f \, tmg_j \qquad [19]$$

where i^f is the imputed return of the empty house in the income tax. In Spain, empty houses produce an annual imputed income of a 2 percent of their fiscal value of housing[16]. Considering a 24 percent as the percentage representing the fiscal value of housing with respect to the market value [Gonzalez-Páramo and Onrubia (1992)], it is obtained[17]:

$$i^f = \frac{V(0,02 \times 0,24)}{V(1 - 0,4)} = 0.008 \qquad [20]$$

In this way, it is possible calculating the proportion in which rental houses are taxed with respect to the empty houses before-tax, as:

$$P_t = \frac{i_t^h}{i^f} \qquad [21]$$

so that, Pr_{jt} is equal to:

$$Pr_{jt} = P_t(1 - tmg_{jt}) \qquad [22]$$

• The logarithm of expected capital gains, $ln\pi_{jt}$: it is defined as the logarithm of the average increment in housing price (measured by homeownership CPI) in the three years previous and subsequent to the corresponding one, which is also included, divided by the average CPI for the same period. In order to compute net gains, the taxation of these increases in the personal income tax is subtracted from this amount, assuming that the house remains for one year or less as part of the individual's equity[18]. That is:

$$ln\pi_{jt} = \ln [\Delta_{medio} (1 - tmg_j)] \qquad [23]$$

[16] 1.1 percent in the case of fiscal value of housing revised according to Law 39/1988, December 18, regulating Local Finance and enforced from 01/01/1994. We consider a 2 percent for the period of study.
[17] Given the model's specification, changes in the assumptions used to compute i_t^h and i^f only modify the temporal dummy variables' coefficients.
[18] This variable is not defined for wealth gains beyond a year, due to the lack of available data to compute its taxation.

• Choice of tax statement, Statement: a dummy variable showing the choice of tax statement. It takes value zero if the tax statement is individual and one in case of joint tax statement.

2. Sociodemographic characteristics

• Individual's age and age-squared.

• Gender of the individual: a dummy variable taking value zero in case the gender is male and one in case it is female.

• Marital status: it is represented by two dummy variables, 'single' and 'married'. They take the value one if the individual is single or married, respectively, and zero otherwise. That is, the reference category is constituted by divorced, separated and widowed individuals.

• Number of children.

• Number of children under three years old: a dummy variable representing the presence of children under three years old.

• Education: it is represented by two dummy variables. The first variable, 'higher education', refers to individuals in possession of a university degree. The second variable is 'secondary education'. The reference category is constituted by individuals with primary education or uneducated.

• Work situation: it is represented by two dummy variables. The first variable, 'non-working', takes the value one when the individual does not have a job and zero otherwise. The second variable, 'working', takes the value one when the individual has a job and zero otherwise.

IV. Results

Next, we present the estimation's results. Since we estimate a probit model, the coefficients show the direction of the expected change in the dependent variable value when the corresponding independent variable increases in one unit, but they do not reflect the marginal effect of the mentioned change. As it can be seen in Table 2, all the economic variables, except capital gains, are significant at the usual confidence levels. This indicates the great influence of economic incentives on the decision of renting a house.

TABLE 2
Probit model estimation of the decision of renting a second home

Variables	Coefficients	t-statistic
$\ln Y_{jt}$	-0.038	-2.77***
tmg_{jt}	-7.562	-2.38**
$\ln Pr_{jt}$	-6.573	-3.15***
$\ln \pi_{jt}$	- 1.414	-0.40
Age	0.041	2.73***
Age squared	-0.0002	-0.29
Gender	-0.025	-0.15
Single	0.707	3.98***
Married	0.349	2.28**
Children	0.065	1.44
Children under three years old	-0.511	-2.78***
Higher education	0.832	7.09***
Secondary education	0.545	5.06***
Non-working	-0.125	-1.17
Working	-0.382	-3.34***
Statement	-0.308	-3.11***
Year 94	7.490	1.93**
Year 95	8.583	1.99**
Year 96	3.499	1.15
Year 97	-1.513	-0.72
ρ	0.676	39.86
Number of observations	11083	
$\chi 2$ (20 d.f.)	1204.42	

Note: ***Significant at 1 percent ($p<0.01$), **Significant at 5 percent ($p<0.05$), *Significant at 10 percent ($p<0.10$).

Regarding net permanent income, the negative sign of the estimated coefficient shows that there are fewer incentives to rent a second home when the net permanent income increases. Therefore, it is more likely that the second home is kept for individual and family use. This result is obtained after controlling for the rental house return and can be understood as an income effect on the decision of renting second homes.

The income effect is strengthened by the expected variation in the rental housing supply, when there are changes in the marginal rate. If the marginal rate is understood as an approximation of the annual current income, both the increase of annual and permanent income reduce the probability of renting. However, the changes caused by the marginal rate cannot be interpreted in (pure) income effect terms, since they are also reflecting the lower incentives to get gross income, as the marginal rate increases.

The coefficient on $Ln(Pr_{jt})$ is significant and negative, which shows that when the housing's relative taxation is higher, the probabilities of renting are lower. This fact, together with the fact that the marginal rate coefficient is also significant, shows that

taxation significantly affects the decision of renting a house. Therefore, tax reforms modifying these variables will have a significant effect on the number of houses for rent introduced into the market. Consequently, there is a clear possibility of increasing the stock of rental housing/houses for rent through a properly designed economic policy. The renting probabilities also decrease in case the individual selects the joint tax statement.

Regarding capital gains, the coefficient is not significant. This confirms the theoretical model's forecast, which predicts that capital gains do not influence the decision of renting a house.

As for the demographic variables, the probability that the individual decides to rent his second home increases with his age and education. Single or married individuals also have more incentives to rent its house than separated, widowed and divorced individuals. This is probably due to the fact that the latter group may have more incentives to use the second home themselves.

The probabilities of renting decrease in case the individual has children under the age of three and currently works.

With regard to the rest of sociodemographic variables, they turned out to not to be significant.

V. Simulation

Following the results presented in the previous section, this part analyzes the expected changes in the rental housing supply when the relative taxation of the second homes (rental houses compared to empty ones) is modified.

The simulations consist of diminishing the value of P_t, i.e. the relative taxation of rental houses is reduced with respect to the empty ones. These changes should increase the supply of second homes to rent and, depending on the demand elasticity, decrease the prices of rental houses. We are aware this implies an increase in the gross income of the individuals deciding to rent their house in the short, medium and long term. On the other hand, the expected prices changes would cause a decrease in the gross income of the individuals currently renting their house, particularly in the medium and long-term, as tenancy agreements are renegotiated. Nonetheless, these changes are not taken into account. What is computed is the expected 'day after' effect on the supply

of second homes to rent when there are changes in the relative taxation of rental houses[19].

Table 3 shows the expected changes in the percentage of second homes to rent when P_t is decreased in a 25, 50 and 75 percent. Since P_t takes different values in different years, the expected changes are individually computed for each panel wave. The second column collects the marginal effect of P_t on the percentage of second homes introduced into the rental market. The negative sign indicates that when the independent variable decreases, as in the case where the relative rental houses taxation decreases, there is an increase in rental housing. As the independent variable is defined in logarithm, this marginal effect can be understood as a semi-elasticity. This semi-elasticity fluctuates between a 7 and a 10 percent, depending on the year. For instance, in 1994 it is a 10 percent, which means that when P_t decreases in a one percent, the quantity of houses to rent increases in a 10 percent. In case P_t is a 25 percent lower in 1994, the supply of houses to rent is estimated to be a 2.5 percent higher (column 3). If it is reduced by half, as it happens from the 2003 taxable period onwards, there is a 5 percent increase (column 4). In case there is a 75 percent drop, the increase is a 7.5 percent (column 5). In 1994, the percentage of second homes to rent was a 5.8 percent, according to ECHP. If it is reduced in a 50 percent, the rental houses percentage is estimated to be a 10.8 percent. So, the supply in the rental market is doubled, which means a significant increase.

TABLE 3
Expected change in the percentage of second homes to rent

Years	$\partial Ij/\partial \%P_t$	$P_t'=0,75P$	$P_t'=0,5P_t$	$P_t'=0,25P_t$
94	- 0.10	2.5	5.0	7.5
95	- 0.07	1.8	3.6	5.4
96	- 0.08	2.0	4.1	6.1
97	- 0.08	1.9	3.9	5.9

Source: Own elaboration.

In Table 4, we analyze for the year 1997 the expected changes per deciles of income on the percentage of second homes to rent, for percentage changes in P_t. As it

[19] In order to perform behavioural microsimulations taking into account the effects on the incomes of property capital, the gross and net family income and the marginal rate, it is necessary to make some assumption on the renting prices change, which exceeds the purposes of this study.

can be seen, the rental houses relative taxation decreases cause gradual increases in the probability of renting for the lower deciles of income. It reaches its maximum near the income distribution median, then, it starts decreasing, and finally lightly increases again in the ninth decile. This shows that middle-class incomes are the most sensitive to reforms addressed to the increase of the rental houses taxation.

TABLE 4
Marginal effect on percentages per deciles of income in the year 1997

Income decile	$\partial Ij/\partial lnPr$	P_t is reduced in a 25 percent	P_t is reduced in a 50 percent	P_t is reduced in a 75 percent
1	-2.26	0.57	1.13	1.70
2	-4.05	1.01	2.03	3.04
3	-5.15	1.29	2.57	3.86
4	-7.69	1.92	3.85	5.77
5	-13.31	3.33	6.65	9.98
6	-10.47	2.62	5.23	7.85
7	-8.54	2.14	4.27	6.41
8	-7.84	1.96	3.92	5.88
9	-10.40	2.60	5.20	7.80
10	-8.48	2.12	4.24	6.36
MEDIAN	-7.81	1.95	3.90	5.85

Source: Own elaboration.

The previous simulations show that the relative taxation of rental houses, compared to empty ones', significantly affects the rental supply. If this relative taxation decreases, there are gradual increases in the supply of rental housing.

VI. Conclusions

The aim of this article is to analyze the way in which the fiscal treatment of second homes influence the supply of houses to rent and to simulate the possible effects of tax reforms on the taxation of this kind of incomes. The results obtained show the importance of taxation when deciding to rent a house or not. Therefore, favourable tax measures to incomes generated by renting cause a significant increase of the rental supply.

Another important result of this study shows that the middle-class income is the most sensitive one to changes in the taxation of rental houses. The tax reforms addressed to those taxpayers cause a more important increase of the rent supply than other tax brackets.

As we have already commented, in the 2003 taxable period two measures encouraging renting are implemented: a 50 percent reduction in the net income of rental houses and a depreciation expenditure increase from a 2 to a 3 percent of the house purchase value. The latter measure is applied to all leased real estate. According to this article, a 50 percent reduction of the rental houses will double the rent supply. This result can be interpreted as the upper limit of the effects caused by a tax policy in the private and *individual* rental market. On the one hand, such a significant increase in the supply of rental housing causes a considerable drop in the renting prices, counteracting the tax policy effect. On the other hand, the model employed is static, so it does not take into account the changes in income and marginal rates, which will appear when the second homes currently used by their owners are introduced into the market. Finally, we have to bear in mind that there may be geographical imbalance between the demand and the supply of rental houses.

As a consequence, the creation of appropriate tax incentives seems to be an efficient mean of increasing the number of houses to rent. The current quantity of empty houses apparently shows that there are not short-term supply constraints in this market.

Appendix:

TABLE A1
Permanent income estimation

Variables	Coefficient	t-statistic
Higher education	836272	49.26
Secondary education	297246	21.98
Female	-738474	-72.74
Age	41569	23.15
Age squared	-247.118	-13.85
Single	-387274	-17.69
Married	-251054	-14.46
Children	71802.5	12.94
Children under 3 years old	39641	2.24
Non-working	-170803.7	-11.36
Working	781882.2	47.80
Working part time	-560607.3	-17.78
Good health	89966.6	5.86
Looking for a job	-475454.4	-19.96
Regional migration	-78280	-2.13
International migration	106152.6	9.21
Constant	-176522.9	-3.98
R^2	42.02	
Adjusted R^2	42.00	
F	1823.31	
N	60408	

Note: The dependent variable is the current income without considering the incomes of the property. Variables reflecting temporal controls and type of employment are also included. The latter ones are dummy variables defined from ISCO, considering two digits.

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