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USER COST CHANGES, UNEMPLOYMENT AND HOMEOWNERSHIP: EVIDENCE FROM SPAIN

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SUMARIO

SUMMARY

In this paper we develop a new macroeconomic model that will allow us to analyse, using aggregate data at the provincial level within Spain, the relation-

ship between the unemployment and homeownership rates, besides other influential variables as the changes of the relative user costs of owning and renting or household life-cycle attributes. The model constructed permits us to question the evidence of OSWALD or partially of GREEN and HENDERSHOTT, that is homeownership leads to higher unemployment. Our results point out that, taking into account the simultaneity determination issue and reducing the omitted variable bias, higher unemployment discourage homeownership.

1. INTRODUCTION AND RELATED RESEARCH

Several authors have presented evidence of the links existing between the housing and the labour markets (HUGHES and MCCORMICK, 1987, BOVER *et al*., 1989, BLANCHARD and KATZ, 1992, and recently, MCCORMICK, 1997, OSWALD, 1996, 1999, HENLEY, 2001, CAMERON and MUELLBAUER, 2001, or, GREEN and HENDERSHOTT, 2001). On the one hand, it has been argued (BOVER *et al.*, 1989) that there are at least five sources of influence from the housing market onto the labour one: The effect of housing tenure choice on labour mobility, the cost of living effect on individuals, the cost of location effect on firms, the wealth effect on regional spending, and finally, the expectation effect on the future earnings derived from the movements of house and land prices. On the other hand, the incidence of the labour market on the housing one is driven mainly via the so called permanent income variable. Thus, there is a true bidirectional influence in many aspects between both markets.

In the last years, different relevant contributions to this subject have been carried out highlighting the first channel of influence between both markets mentioned above. First, A.J. OSWALD (1996, 1999) has postulated a surprising positive relation between homeownership and unemployment rates based on the restrictive effect of this kind of tenure choice on labour mobility. OSWALD provides multiple data over OECD countries and regions within countries (US states and the regions of UK, Italy, France, Sweden, and Switzerland) to support that homeownership and unemployment rates are positively correlated across nations and regions. He concludes that countries or regions with 10 percentage points higher ownership rates have approximately 2 percentage points higher the unemployment rate. This assertion helps him to explain an important part of the rise in the unemployment rate in Europe since 1960 in terms of the decline of the private house-rental market and the increase of homeownership.

Later, GREEN and HENDERSHOTT (2001) examine the OSWALD's argument in the US using aggregate data by State and age-class, analysing the cross sectional variation in changes in homeownership and unemployment rates between 1970 and 1990, in order to abstract from the existence of state fixed effects in levels and taking into account how ownership and unemployment correlate with age (older cohorts generally have both higher homeownership rates and lower unemployment rates than younger cohorts). They have encountered that only for the middle age-classes (35-64) is confirmed empirically this

positive relation, but at the same time, there seems to be little evidence of the existence of this relation for the youngest (less than 35) and the oldest age classes (more than 65), as well as for the total population.

The main objective of this paper is to look through the existence of such a positive relation between the homeownership and unemployment rates at the provincial level within Spain. The implications of this fact could be very serious from the point of view of the policy makers. As well OSWALD (1999) points out, Spain has nowadays both the highest unemployment rate (12,7 per cent in the third quarter of 2001) and one of the highest homeownership rates (79,6 per cent in 1991) from the European countries and US states. Moreover, some authors have pointed out the cultural importance of homeownership as a differential characteristic of the housing market in Spain (EASTAWAY and SAN MARTÍN, 1999). If that relation were true, it can be argued that promoting homeownership by means of the housing policy, as it is the case of the most of the developed countries and Spain is not an exception, creates negative externalities through the private and social costs of the unemployment generated, in addition to the positive externalities suggested before by several authors, as the increase in the success of children (GREEN and WHITE, 1997; AARONSON, 2000), citizenship (DIPASQUALE and GLAESER, 1999), and a variety of family outcomes and attitudes (ROSSI and WEBER, 1996).

In fact, at present the housing policy is, beyond all doubt, one of the characteristic elements of the modern Welfare State. Although the justifications to the public intervention on the housing market are of different nature, and do not escape from some controversy (see ROSEN, 1985, for a detailed explanation), the main objective pursued is to facilitate the access to housing to the citizens. The Spanish public administration, following this aim, have been especially worried in the recent decades in managing, along its different levels of government, a wide range of regulations and policies intended to reach this objective even established in the Spanish Constitution (article 47).

In Spain, since the arrival of the democratic institutions in 1978, the housing policies followed by the different public responsibles have favoured especially the access to housing by ownership, disregarding other tenure modes. This way, the different Spanish governments have become making stress on the demand side, providing a variety of incentives and subsidies aimed to increase the acquisitive capacity of the individuals (giving subsidies to the housing acquisition, to the mortgage interest payments, including homeownership tax allowances, etc.), and looking for palliate the existing wedge between the housing sale prices and the level of revenues of the families. Meanwhile, on the supply side, the housing policy has been limited basically to the regulation of the uses of land, legislation that has not been able to control the speculation on land mainly at the urban level, and has not promoted appropriately the subsidised housing programs *(Viviendas de Protección Oficial)* with both private and public participation (see EASTAWAY and SAN MARTIN, 1999, for a more detailed description of the Spanish housing policy).

At the same time, the unemployment issue in Spain has turned dramatically into one of the main problems for the Spanish families in the recent decades. Even though certainly the unemployment rate in Spain has descended in the last years from a level above 20 per cent by the middle of 90's to the current one around 12.7 per cent, it is still very above the registered one in the rest of the OECD countries.

With these backgrounds in mind, one may deduce that the purpose of this paper, that is to put into question the existence of a positive trade off between the unemployment and the homeownership rates, it is of enormous importance, not only as an internal matter of interest for the policy makers in Spain, but also, to contribute with some additional empirical evidence that allows us to corroborate or not if it is likely the hypothesis of OSWALD.

With this aim we have structured the paper in four sections. In the next section we present the theoretical macroeconomic model that allows us to set up the framework for displaying the bidirectional flows between the homeownership and unemployment rate. Next, we estimate a simultaneous equation model with cross sectional aggregate data at the provincial level within Spain in 1991, in order to calibrate the unemployment-homeownership relation along the Spanish provinces. The last section draws conclusions. At the end we include two appendixes, the Appendix A) showing the way we evaluate the relative cost of owning and renting at the provincial level in Spain, and the Appendix B) reviewing the sources of the data employed in the paper.

2. A MACROECONOMIC MODEL OF TENURE CHOICE AND UNEMPLOYMENT

2.1. A MACROECONOMIC MODEL OF TENURE CHOICE

In the recent literature on housing tenure choice, the decisions taken by the individuals on the tenure choice and the quantity of housing services demanded are considered interdependent and simultaneous (ROSEN, 1979; MEGBOLUGBE, *et al.*, 1991). From this point of view, the tenure choice (TC) is usually modelled as a discrete variable that depends on the same factors as the demand of housing services. If we focus our attention on two of the tenure choice modes most widely extended: owning and renting, a common specification is:

$$TC = f(C_{OH}/C_{RH},\ Y_p,\ D) \qquad (1)$$

with f a certain function that depends on the variables C_{OH}/C_{RH}, the relative cost of owning (C_{OH}) and renting (C_{RH}), Y_p the so called permanent income, and D a vector of social and demographic characteristics of the households reflecting life-cycle attributes.

A good number of studies that examine housing tenure choice are based on micro data (ROSEN, 1979; HAURIN *et al.*, 1994; BOURASSA, 1995; DI SALVO and

ERMISCH, 1997; ÅSBERG, 1999; GREEN and VANDELL, 1999). In this case, the equation (1) is interpreted from a probabilistic view, being TC the probability that an individual opts for a certain tenure mode and f a probability distribution function (generally normal or logistics).

Another way of looking at this question is from a macroeconomic perspective. Various authors have attempted to model, using aggregate data on some territorial units, the observed rate of homeownership (π) in front of other tenure modes. In this last situation it is the present paper, being necessary to carry out some modifications to the specification (1) to obtain our theoretical foundations. These are the following:

a) The first issue that arise from the macro view is the necessity to introduce an aggregate indicator of the relative cost of owning and renting C_{OH}/C_{RH} on some spatial units (ROSEN and ROSEN, 1980; HENDERSHOTT and SHILLING, 1982; EILBOTT and BINKOWSKI, 1985; GREEN and VANDELL, 1999). This relative cost index is usually obtained by taking into account the median household situation within each spatial unit (income, mortgage contract, property and income taxes, house price appreciation, median house values, median gross rents, etc.).

b) The model (1) is a static one and has been used basically in empirical studies that were limited because of the lack of data from cross sectional microeconometric samples. However, from a macroeconomic point of view, it could be more suitable to suppose that the households grouped in each territorial unit have taken their housing tenure decisions not only under the period studied, but also along periods before. Thus, their decisions on housing have been undertaken attending, not only to the current relative user cost of owning and renting (C_{OHt}/C_{RHt}), but also to its past evolution (C_{OHt-1}/C_{RHt-1},...). Alternatively, this hypothesis might be rethinked as a way to model the expectations made by the households on the future evolution of the relative cost of owning and renting in terms of the past information that they are likely to have (similar assumptions are made by ROSEN and ROSEN, 1980, and, ROSEN *et al.*, 1984). Anyway, to agree with the usual suppositions in Housing Economics, one may expect an inverse relationship between the formed expectations on the relative user cost and the observed homeownership rate, that is, if the formed expectation is that the relative user cost is increasing (decreasing), then, the homeownership rate should decrease (increase).

c) From the aggregated approach, it is difficult to obtain a properly measure of the permanent income variable. For this reason, in this case, most of the authors opt to include as proxy indicators the per capita income, per capita disposable income, or, per capita consumption ROSEN and ROSEN, 1980; ROSEN *et al*., 1984; EILBOTT and BINKOWSKI, 1985; GREEN and VANDELL, 1999). Anyway, it is more interesting to our

objective that some authors have introduced as well the unemployment rate (U) as a good proxy of the permanent income variable (DI SALVO and ERMISCH, 1997).

d) The social and demographic variables commonly used in the aggregated models aimed to explain the housing tenure choice are, among others less important: percentages of population by age-class, the average number of members by household, or, the percentages of population by marital status (alone, married, separated, divorced, widowed), especially the percentage of married people. Generally speaking, the empirical evidence have showed that the homeownership rate increases with the ageing of population, at least to levels near the 65 years, as well with variables that have a positive influence on the household formation, as it is the case of the rate of marriages, the rates of families with children, etc. (ROSEN, 1979; EILBOTT and BINKOWSKI, 1985; HAURIN *et al.*, 1994, 1997; DIPASQUALE and WHEATON, 1996, pp. 186-188; GREEN and VANDELL, 1999; ASBERG, 1999). Additionally, there is some evidence that points out that increases in the population rates of separated, divorced, or widowed, will decrease the homeownership rate (BOURASSA, 1995).

Compiling all above, we arrive to a theoretical model that explains the homeownership rate of the form:

$$\pi_t = f\,(C_{OHt}/C_{RHt},\ C_{OHt-1}/C_{RHt-1,...},\ U_t,\ D_t) \qquad (2)$$

2.2. A MACROECONOMIC MODEL OF UNEMPLOYMENT

We develop here a parsimonious model that pursues to characterize the rate of unemployment at the provincial level in Spain in connection with the housing tenure mode. This model will allow us to scrutinise the OSWALD's evidence. Although up to now most of the models that relate the unemployment level and the housing tenure mode had formulated this relationship concentrating exclusively on the effects that generate the relative housing prices on unemployment (BLANCHARD and KATZ, 1992; CAMERON and MUELLBAUER, 2001), our intention here is to specify a model that relates both directly, without variables that make as proxies among them (this last situation is also the case of OSWALD, 1996, or GREEN and HENDERSHOTT, 2001).

Apart from the homeownership rate, in the modern literature that attempts to model the unemployment rate (BLANCHARD and SUMMERS, 1986; BENTOLILA and BLANCHARD, 1990; LAYARD *et al.*, 1991; OSWALD, 1996) stress is made in the idea of hysteresis, and therefore that unemployment follows a certain autoregressive process, as well as in the existence of a wage curve (BLANCHFLOWER and OSWALD, 1994), that is, the employees who work in areas of high unemployment earn less, other things constant, than those who are surrounded by

low unemployment. Following these ideas we arrive to a specification of the form:

$$U_t = g\,(U_{t-1},\ U_{t-2},...,\ Y_t,\ \pi_t) \qquad (3)$$

being U_t the unemployment rate, Y_t the per capita income, and π_t the homeownership rate. All other factors held constant, we expect a positive influence on the current unemployment rate of its past values, and a negative one of the per capita income variable. The sign of the influence of the tenure variable is ambiguous and depends on the likelihood of the hypothesis of OSWALD.

3. EMPIRICAL ESTIMATES AT THE PROVINCIAL LEVEL WITHIN SPAIN

To obtain the empirical counterpart of the equations (2) and (3), and keeping in mind the important lack of data for the homeownership rate in Spain (the availability of the housing tenure mode rates in Spain is limited practically to the information coming from the censuses of population and housing, that have been carrying out every ten years, being the last one the realized in 1991), we have started from cross sectional data in 1991, where the observation units relapse on each one of the 46 Spanish provinces with a common regulation on both income and property taxes.

In order to improve the models developed in the previous literature on our matter of concern, we proceed in the following way:

First, to handle the simultaneity or endogeneity problem associated with the relation between the unemployment and the homeownership rates, we adopt a simultaneous equations approach at the time of estimating the system that embraces equations (2) and (3), being employed instruments for both the homeownership and unemployment rates.

Additionally, we will adopt as dependent variables, we will denominate it ***LOGITEN*** *and* ***LOGIUNE***): $log\left(\frac{TEN}{1-TEN}\right)$, $log\left(\frac{UNE}{1-UNE}\right)$, being ***TEN*** and ***UNE*** respectively the homeownership and unemployment rates in each Spanish province in 1991. This way, we ensure that any estimated rate from the regression equations obtained will be properly defined between 0 and 1.

Finally, to reduce the omitted variable bias we include in both equations other important influential factors. In particular, first we consider the following explanatory (exogenous) variables in the tenure equation apart from the unemployment rate:

a) $\Delta C_{OH}/C_{RH}$**:** As an approach to the expectations formed by the individuals on the relative user cost of owning and renting, we adopt the first

difference of the ratio of the owning user cost on the renting one. This is: $\Delta C_{OH}/C_{RH} = C_{OHt}/C_{RHt} - C_{OHt-1}/C_{RHt-1}$. Here, C_{OH}/C_{RH} is an indicator of the relative user cost on each Spanish province. We leave to the appendix A) the technical issues relative to the definition of this indicator in the Spanish context.

It could be supposed that this variable is inversely related with the homeownership rate, that is, if $\Delta C_{OH}/C_{RH} = 0$, and it is not expected that the relative cost varies, then, the homeownership rate will remain invariable; instead, if $\Delta C_{OH}/C_{RH} > 0 \; (< 0)$, and it is expected therefore that the relative cost increases (diminishes), the homeownership rate will spread to diminish (to increase).

b) ***PO2039:*** It represents the population's percentage between 20 and 39 years, included both ends, on the total population of each Spanish province. It is interesting to remark that the census information includes population's rates in intervals of 5 years age-classes. We have tried to include all the possible populational rates corresponding to different age-classes with the aim to detect those ones that influence significantly in the homeownership rate, and at the end we obtained that this age-class is the best explanatory variable in this case. We expect, in consonance with the empiric literature, that increases in this variable diminish the observed homeownership rate, surely because it corresponds to a segment of population that for their youth, they don't generally access to a house in property until superior age levels (or near to the 39 year-old frontier). This is exactly what occur in EILBOTT and BINKOWSKI (1985), or, GREEN and VANDELL (1999), for the segment of population under 35 years.

c) ***DISEWI:*** This is the percentage of each province population that presents the marital status of divorced, separated or widowed. We also verified that variables as the rate of single or married population are significant, being selected this variable finally because it improves the adjustment of the regression notably as well as it reduces the standard error of the regression. It is of foreseeing that this variable affects inversely the homeownership rate (as it is the case in BOURASSA, 1995).

On the other hand, we choose as explanatory variables for the unemployment equation, apart from the homeownership rate, the following ones:

a) ***LINC:*** It is the logarithm of the per capita disposable income at the province level in Spain. Under the usual hypothesis, increments in this amount should decrease the observed unemployment and increase the homeownership rate. Because this variable is highly correlated with the unemployment rate, it is included in the unemployment equation and not in the tenure equation. Nevertheless, it is included as an instrument to estimate both equations.

b) ***$LUNE_{89}$:*** To reflect the hysteresis idea, we introduce the logarithm of the unemployment rate at the province level with a time lag of two years. We have tried to include in the model the unemployment rate lagged both one and two years and in levels or logarithms. We have encountered better levels of significance and fit with a logarithm transformation and a time lag of two years.

We leave for the appendix B) the details on the sources of data used to evaluate the above variables. It's of highlight that we have not observed dependence among the level of the relative cost of owning and renting and the homeownership rate.

In consequence, the model of simultaneous determination of both the homeownership and unemployment rates at the Spanish provinces level here proposed will respond to the following equations

$$LOGITEN_i = \alpha_0 + \alpha_1 PO2039_i + \alpha_2 DISEWI_i + \alpha_3 \Delta C_{OHi}/C_{RHi} + \alpha_4 UNE_i + \varepsilon_I \quad (4)$$

$$LOGIUNE_i = \beta_0 + \beta_1 LINC_i + \beta_2 LUNE_{89i} + \beta_3 TEN_i + \eta_i \quad (5)$$

where the subindex i runs over the 46 Spanish provinces of common tax legislation, and ε_i and η_i represents independent error terms.

To estimate this simultaneous equation system we have used the three stage least squares procedure (3SLS) included in Limdep 7.0 econometric software (for detailed information on this procedure see GREENE, 1997), with all the exogenous variables as instruments. We do not include as instrument the $LUNE_{89}$ variable because the possibility of being correlated with the error component. We resume the results obtained in table 1.

TABLE 1

3SLS estimation of the simultaneous system of equations (4)-(5)

Housing tenure choice equation (4)				
Variables	Coefficients	t statistics	Levels of significants	Mean Values
Constant	9.273	11.022	0.0000	
PO2039	-18.436	-9.031	0.0000	0.2927
DISEWI	-28.061	-5.923	0.0000	0.0747
$\Delta C_{OH}/C_{RH}$	-0.085	-4.240	0.0000	1.7739
UNE	-1.553	-2.297	0.0216	0.1558
Fit statistics				
R^2	0.7223	$\overline{R^2}$	0.6952	
F	26.66			

Unemploymemt equation (5)				
Variables	Coefficients	t statistics	Levels of significants	Mean Values
Constant	9.328	1.945	0.0518	
LINC	-0.556	-1.693	0.0905	13.8330
$LUNE_{89}$	0.9606	7.227	0.0000	-1.9095
TEN	-1.998	-2.554	0.0106	0.7957
Fit statistics				
R^2	0.9079	$\overline{R^2}$	0.9014	
F	138.10			

From the estimated results, one may stand out the significance of the variable associated to the relative cost of owning and renting, as well as the signs presented by all the coefficients of the exogenous variables that are the expected ones. Moreover, our findings suggest that there is a significant effect between both the homeownership and the unemployment rates, but this effect is negative in each other. Thus, with this model we confirm that in Spain, higher levels of owner occupation do not lead to higher levels of unemployment, against what it is concluded from the evidence presented by OSWALD. At the same time, we have obtained what it maybe seen as a more natural relation, that unemployment clearly discourage the access in property to housing. Particularly, we encountered that at the mean values, Spanish provinces with 10 percentage points higher unemployment rates have approximately 2.5 percentage points lower the homeownership rate. HENLEY (2001) arrives to similar conclusions from microeconometric data in UK.

Therefore, one may explain the persistence in Spain of high levels of both owner occupation and unemployment in front of the evidence for other countries and regions as presented by OSWALD (1996, 1999) or GREEN and HENDERSHOTT (2001), in terms of the cultural importance of homeownership in Spain. Anyway, in Spain as it comes off from the results here obtained, the persecution of two objectives of economic policy as they are to facilitate the access to housing in property and the reduction of the unemployment, are not in opposition to each other as it could be deduced from the works of OSWALD or GREEN and HENDERSHOTT. Moreover, any advance in one of these two objectives will redound in an improvement of the other one.

4. CONCLUSIONS

In the recent literature that concerns on the link existing between the homeownership and unemployment rates there is some controversy on the nature and the properly direction of this relation.

To contribute to this discussion, in this work we propose a methodology to model and quantify this relationship through a macroeconomic model that relates both the homeownership and the unemployment rates in a simultaneous system of equations, together with other influential variables as a measure of the relative cost of owning and renting, other sociodemographic variables and income indicators. The particularity of the model resides in that the observation units, instead of being the observed behaviour of the individuals, relapse on the behaviour of the residential real estate markets at the Spanish provinces level.

The results obtained permit us to put into question the hypothesis of OSWALD, that is, homeownership limits the efficient matching of jobs within the labour market. Moreover, based on aggregate data from OECD countries and regions within countries, OSWALD (1996, 1999), and subsequently GREEN and HENDERSHOTT (2001) partially for middle-aged households, has stated that countries or regions with 10 percentage point higher homeownership rates have approximately 2 percentage point higher unemployment. However, the Spanish regions or provinces were not included in the data base of those studies.

Here, we have intended to solve some objections observed in those previous works, in particular, to deal with the problem of endogeneity, to reduce the omitted variable bias, and to inspect what occur within a country, Spain, that is persistently characterized by the highest unemployment rate and one of the highest proportions of homeownership from the OECD countries.

We have encountered that the OSWALD's hypothesis is no longer true in the case of Spanish regions. Furthermore, at the mean values, Spanish provinces with 10 percentage points higher ownership rates have roughly 2.5 percentage points lower the unemployment rate. This result surely will please those policy makers that have been carrying out economic policies aimed to promote the access to housing in property, and at the same time, to reduce the unemployment rate. We conclude that, at least in the Spanish case, it doesn't exist any contradiction between both objectives.

As extensions of the present work, when the information of the population and housing's censuses that it is being realized along the year 2001 in Spain were available, we propose to modify the model in order to deal with the longitudinal data in a way that allows us to isolate the existence of provinces effects, as well as to analyze the possibly variation of the effects produced by the variables that we consider. Moreover, given the inclusion in the tenure equation of variables as the relative user cost of owning and renting, the model will permit us to simulate the impact on homeownership of alternative economic policies, as a variation in the tax legislation on housing. It will be of enormous interest to carry out this last exercise to provide our policy makers of a simple way to evaluate the incidence of diverse economic policies in terms of facilitating the access to housing in property.

5. APPENDIX A): EVALUATION OF THE RELATIVE COST OF OWNING AND RENTING AT THE PROVINCIAL LEVEL IN SPAIN

The *user cost of the residential capital*, in their two modes: in rent and in property, can be defined as the final price (annual or total) that has to pay an individual to enjoy the services generated by a housing unit.

Although several authors (HENDERSHOTT and SHILLING, 1982, FOLLAIN and LING, 1991) argue that an appropriate measure of the user cost of the residential capital must attend to the flow of present and future net rents that generates a housing (*total user cost*), also in HENDERSHOTT and SHILLING (1982) or BARRIOS (2001) it is showed that the dynamic or total focus, at least in their discrete version, coincides with the annual one when some simplifying hypothesis are added. In this paper we opt, as so many other authors, to use an annual or instantaneous measure of the user cost.

To develop an indicator of the user cost of residential capital in their two modes: in owning and in renting, we proceed in a similar, but not equal, way to HAURIN *et al.* (1994), BOURASSA (1995), or ÅSBERG (1999), taking into account the Spanish context. First, we take a characteristic housing in Spain of 90 m^2 and we estimate on this basis both the user cost of renting or owning in the following ways:

5.1. THE USER COST OF RENTING

We have obviated the tax provisions on renting in the Spanish case because its relative scarce importance. Thus we take as the user cost of renting at the province level in Spain (C_{RH}) just the average market rent for a housing of these characteristics in each location.

5.2. THE USER COST OF OWNING

To obtain an indicator the user cost of owning we should proceed with more thoroughness. In BARRIOS (2001) it is realized a theoretical survey of this concept in the Spanish context, arriving to the following expression of the annual user cost of the residential capital in property:

$$C_{OH} = OCE + MOR + DEP + MAN + IBI + IRPF_H - \Delta HP \qquad (1A)$$

or, in unitary terms, in proportion to the market price of the housing p_H:

$$C_{OH} = (OCE + MOR + DEP + MAN + IBI + IRPF_H - \Delta HP)/p_H \qquad (2A)$$

where the different components that appear in these expressions are defined as following:

a) If p_H represents the nominal price of housing (to the producer), the final price (p_f) to the buyer should include the payment of VAT (IVA) if it is a new construction housing or the transmission tax (ITP) if it is a second hand housing. To that amount would be necessary to add the payment for the formalization of entitlement (IAJD) and of the mortgage contract in the case of acquisition with a mortgage loan. Thus, we can write:

$$p_f = (1 + \tau_{ITP})\, p_H \tag{3A}$$

where $\tau_{ITP} = t_{ITP} + t_{IAJD} + c_{MOR}$, being t_{ITP} the VAT (IVA) or the transmission tax rates, depending on the nature of housing, t_{IAJD} the proportion of p_H paid for the formalization of entitlement, and c_{MOR} the formalization cost of the mortgage in proportion to p_H.

b) If we denominate i_o the interest rate for the best alternative asset to the housing with the same risk level, then, the opportunity cost of the own funds invested in the acquisition of the housing (OCE) will come given, after taxes, by:

$$OCE = (1 - \tau_{IRPF})\, i_o\, (1 - r)\, p_f \tag{4A}$$

with r the proportion of the final price of the housing that is financed in the mortgage market, and τ_{IRPF} the individual marginal income tax (IRPF) rate.

c) The capital gains (ΔHP) represent the variation in the nominal price of housing during the period. Taking into account that in Spain the capital gains are only included in the taxable income in the event of sale of housing, being exempt after a certain lapse from the acquisition, we will simply suppose that they are free of taxation, and so their expression will be:

$$\Delta HP = \frac{p_H\,(t + 1) - p_H(t)}{p_H(t)} \tag{5A}$$

where $p_H(t)$ is the average nominal price of housing at the year t. It should be noticed that we have supposed that the individuals have a perfect foresight of the capital gains in the current period.

d) If the mortgage interest rate is i_{MOR}, the annual payment for interests (MOR) will come given approximately by:

$$MOR = i_{MOR} r p_f \tag{6A}$$

e) We take the depreciation (DEP) and maintenance (MAN) as certain proportions δ y m, respectively, of the house market value:

$$DEP + MAN = (\delta + m)\, p_H \tag{7A}$$

f) We reduce the property taxes in Spain to the local tax on real estate (IBI). This is established as a percentage τ_{IBI} of the registered value of the property (cadastral value). This registered value of house is

formalized as a proportion (k) of the market value of the house, and thus we can write:

$$IBI = \tau_{IBI} k p_H \quad (8A)$$

g) To determine the part of the income tax derived from the owning of the habitual housing ($IRPF_H$) we should follow the precepts of the Spanish Law 18/1991 that affects to almost the whole decade of the 1990's, with slight punctual modifications along the period that it has been in force. This way we arrive to an expression as the following:

$$IRPF_H = [\tau_{IRPF}[(a - \tau_{IBI})k - \tau_{MOR} ri_{MOR}(1 + \tau_{ITP})] - t_d C_a (1 + \tau_{ITP})] p_H \quad (9A)$$

where:

$$\tau_{MOR} = \begin{cases} 1 \text{ ,if } ri_{MOR} p_f \leq 4808 € \text{ in the individual income tax return (IRPF)} \\ 1 \text{ ,if } ri_{MOR} p_f \leq 6010 € \text{ in the combined income tax return (IRPF)} \\ \dfrac{4808}{ri_{MOR} p_f} \text{ ,if } ri_{MOR} p_f > 4808 € \text{ in the individual income tax return (IRPF)} \\ \dfrac{6010}{ri_{MOR} p_f} \text{ ,if } ri_{MOR} p_f > 6010 € \text{ in the combined income tax return (IRPF)} \end{cases}$$

This last above is a parameter that captures the existing limitation in the income tax provisions to the deductibility of mortgage interest payments [it should be noticed that all amounts are quantified in euros (€)], a is the implicit income attributable to habitual housing in proportion to its cadastral value, C_a is the amortized capital in the period for the mortgage loan in percentage of the final price o housing (to what it may be necessary to add the quantity of the house value not financed with the mortgage loan if we are located in the period of the housing purchase), and t_d is the reduction rate recognized to the amortized capital in the period. Also, in fact in the income tax provisions, the sum of the investment deductions (among them that of investment in the habitual housing) should be subjected to the limit of the 30 per cent of the total taxable income. Here we will obviate the other investment deductions, and so it should be verified that:

$$C_a p_f \leq 0.3 \cdot (\text{Taxable Income})$$

Assembling expressions (1A) - (9A), we proceed to evaluate an indicator of the user cost of owning at the Spanish province level of the common tax regime for the decade of the 1990's [see appendix B) for sources of data]. Table 2 shows the evolution of this variable in unitary terms (in proportion to the price of housing) at the beginning and at the end of the decade (it should be noticed that in 1999 there was a change in the income tax legislation that slightly modified the expression 9A, for more details see BARRIOS, 2001), being also distinguished the user cost of owning net of the nominal inflation in housing (without the component of capital gains ΔHP), which could be thought more as an annual user cost in the accounting sense (since the implicit earnings of the residential capital are only realized in the event of alienation of housing).

TABLE 2

Estimated user cost of owning at the Spanish provinces

	Unitary user cost (%)						Unit. user cost (without ΔPV) (%)					
Provinces:	1991	1996	1997	1998	1999	2000	1991	1996	1997	1998	1999	2000
Albacete	13.1	6.5	3.7	5.7	2.5	-4.2	16.3	10.4	8.6	7.0	6.6	7.7
Alicante	17.1	5.7	2.9	6.1	-2.6	-2.1	16.0	10.3	8.5	7.1	6.6	7.8
Almería	16.6	3.5	3.4	-0.3	-5.3	0.2	16.0	10.4	8.6	7.1	6.6	7.8
Ávila	13.0	0.9	5.5	1.5	3.0	4.3	16.3	10.5	8.7	7.3	6.6	7.8
Badajoz	18.0	14.0	8.1	4.7	2.7	4.0	16.4	10.5	8.7	7.3	6.6	7.6
Baleares	17.5	8.7	6.2	-2.3	-1.8	-5.2	15.7	10.3	8.5	7.1	6.6	7.8
Barcelona	12.9	8.3	4.9	0.8	-2.2	-6.8	16.5	10.2	8.6	7.0	7.1	8.6
Burgos	12.6	6.7	1.1	1.3	-2.2	-3.4	15.9	10.2	8.4	7.0	6.8	8.0
Cáceres	18.0	11.7	13.2	5.5	2.3	4.9	16.3	10.5	8.6	7.3	6.6	7.7
Cádiz	16.6	13.0	6.0	4.3	-2.3	-2.4	16.0	10.4	8.6	7.1	6.7	7.9
Castellón	17.2	5.6	4.8	3.7	0.4	1.4	16.0	10.4	8.6	7.1	6.6	7.7
Ciudad Real	13.1	2.5	6.0	6.6	2.2	-0.9	16.4	10.5	8.7	7.1	6.6	7.8
Córdoba	17.0	11.1	7.9	4.1	1.9	-5.2	16.4	10.5	8.7	7.1	6.6	7.9
La Coruña	13.6	7.5	5.5	-1.2	-1.1	5.1	15.9	10.2	8.4	7.0	6.7	7.9
Cuenca	12.7	10.2	9.7	5.8	2.6	5.4	15.9	10.2	8.5	7.0	6.5	7.7
Gerona	12.1	7.8	2.3	-0.6	-3.3	-2.1	15.7	10.3	8.5	7.1	6.7	7.8
Granada	17.0	3.7	11.4	3.5	-3.3	-4.2	16.3	10.4	8.5	7.0	6.6	7.8
Guadalajara	12.7	9.9	7.9	1.5	1.9	-5.9	15.9	10.2	8.4	7.0	6.6	7.9
Huelva	16.6	10.0	4.8	1.3	-4.7	-1.1	16.0	10.4	8.6	7.1	6.6	7.8
Huesca	16.7	5.5	1.6	2.8	0.2	4.2	16.0	10.3	8.5	7.1	6.6	7.7
Jaén	16.9	8.6	6.7	5.4	0.6	-3.9	16.3	10.5	8.6	7.3	6.6	7.7
León	12.4	8.2	7.4	2.2	-6.9	-2.2	15.7	10.2	8.5	7.1	6.7	7.9
Lérida	12.1	7.7	8.5	6.1	-7.1	-0.8	15.7	10.2	8.5	7.0	6.6	7.8
Logroño	8.8	8.3	7.8	3.9	-2.7	-6.3	15.7	10.2	8.4	6.8	6.6	7.8
Lugo	13.6	8.3	6.9	4.5	-1.4	5.7	15.9	10.4	8.6	7.0	6.6	7.7
Madrid	19.9	10.9	4.2	2.1	-1.6	-1.5	16.6	10.0	8.5	6.9	6.9	8.4
Málaga	16.6	8.4	8.4	0.9	-7.3	-0.5	16.0	10.4	8.6	7.1	6.6	7.8
Murcia	18.8	10.8	5.3	1.9	-4.0	-3.6	16.0	10.4	8.6	7.1	6.6	7.8
Orense	13.6	4.9	3.5	2.9	-0.9	-1.1	15.9	10.4	8.5	7.0	6.6	7.8
Oviedo	20.5	9.6	4.3	3.4	-3.9	-3.2	15.8	10.3	8.5	7.1	6.8	8.0
Palencia	12.6	5.6	5.3	2.0	2.8	0.9	16.0	10.2	8.5	7.0	6.6	7.8
Las Palmas de G.C.	19.3	6.3	2.5	-5.4	-2.0	-8.5	16.0	10.2	8.5	7.0	6.7	7.9
Pontevedra	13.4	10.6	7.3	4.7	1.5	4.1	15.7	10.2	8.5	7.0	6.6	7.8
Salamanca	13.1	6.1	9.2	3.5	-2.9	-3.1	16.4	10.5	8.6	7.3	6.7	7.9
Santa Cruz de Tfe.	19.3	6.4	6.5	-0.1	-2.1	-10. 6	16.0	10.4	8.6	7.1	6.7	7.9
Santander	7.5	6.1	5.8	4.0	1.8	2.8	16.1	10.3	8.5	7.0	6.7	7.9
Segovia	12.7	3.2	8.8	2.1	3.0	1.9	16.0	10.4	8.5	7.0	6.6	7.8
Sevilla	16.6	8.0	5.5	-2.7	-4.3	-1.5	16.0	10.3	8.5	7.1	6.7	7.9
Soria	12.7	10.2	7.2	0.4	-2.0	-1.2	16.0	10.2	8.4	7.0	6.6	7.8
Tarragona	12.1	10.3	4.3	-2.8	-1.9	-6.1	15.7	10.3	8.5	7.1	6.7	7.9
Teruel	16.7	0.5	2.4	2.4	3.0	4.2	16.0	10.4	8.6	7.0	6.6	7.7
Toledo	13.1	7.2	5.7	1.4	1.4	2.3	16.3	10.3	8.5	7.0	6.5	7.7
Valencia	17.2	5.7	6.1	3.6	-5.2	-0.2	16.0	10.4	8.6	7.1	6.7	7.9
Valladolid	12.4	14.2	3.8	-0.1	-6.0	-2.3	15.7	10.2	8.5	7.0	6.7	7.9
Zamora	13.0	5.0	2.1	3.7	-6.2	-3.3	16.3	10.4	8.5	7.0	6.6	7.8
Zaragoza	16.7	6.2	4.6	-0.8	-3.3	-4.9	16.0	10.3	8.4	7.0	6.7	7.9
National Means	14.9	7.6	5.8	2.3	-1.5	-1.2	16.0	10.3	8.5	7.1	6.6	7.9

6. APPENDIX B): VARIABLE DEFINITIONS AND DATA SOURCES

TEN: Homeownership rate at the province level in Spain. Source: INE. Census of housing. 1991.

UNE: Unemployment rate at the province level in Spain. Source: INE. Active population survey (EPA). 1991.

$LUNE_{89}$: Logarithm of the unemployment rate at the province level in Spain. Source: INE. Active population survey (EPA). 1989.

PO2039: Proportion in unitary terms of the population between 20 and 39 years, inclusive both ends, on the total population of each Spanish province. Source: INE: Census of population. 1991.

DISEWI: Percentage of the population at the Spanish provinces that presents the marital status of divorced, separated, or widowed (expressed in unitary terms). Source: INE: Census of population. 1991.

LINC: Logarithm of per capita disposable income at the Spanish province level. Source: Fundación BBVA: National Income in Spain and its provincial distribution. 1995 and advances to 1996-1999.

$\Delta C_{OH}/C_{RH}$: First difference of the relative cost of owning and renting, that is in 1991: $\Delta C_{OH}/C_{RH} = C_{OH91}/C_{RH91} - C_{OH90}/C_{RH90}$. To obtain this indicator, we proceed as it is explained in Appendix A) based on the following suppositions and sources of data:

Source for the average market rent at the Spanish province level: Rodríguez de Acuña y Asoc.

Sources and Suppositions to evaluate the indicator of the user cost of owning at the Spanish province level:

1) We take as the mortgage interest rate (i_{MOR}) the annual series of the average mortgage interest rate for the overall group of credit firms in the mortgage loan contracts to more than three years for acquisition of not subsidised housing. Source: *Boletín estadístico del Banco de España.*
2) The rate of the opportunity cost of the housing equity (i_o) coincides with the 10 year treasury-bonds rate. Source: *Boletín estadístico del Banco de España.*
3) We assume the ratio of the mortgage loan on the final price of housing as r = 0.8. Recent studies on the mortgage market in Spain have shown that this is approximately the mean loan-to-value ratio. Similar values were taken in GREEN and VANDELL (1999).

4) The depreciation and maintenance rates are considered to sum 3 per cent. In the literature this sum usually moves between 2 per cent and 4 per cent (ROSEN and ROSEN, 1980; ROSEN *et al.,* 1984; GREEN and VANDELL, 1999).

5) The value of the tax rate that burdens the transmission of the housing τ_{ITP} [VAT (IVA) if it is a new construction and a transaction tax (ITP) if it is a second hand one, plus the cost of formalizing the entitlement (IAJD) and the mortgage contract] is taken to be a 7.3 per cent of the housing price [we arrive to this value compiling a tax rate of the ITP or VAT (IVA) of 6 per cent, plus 0.5 per cent of the IAJD, plus 0.8 per cent = 1 per cent ·80 per cent as the cost of formalization of the mortgage loan].

6) We have taken a characteristic housing of 90 m^2, evaluating its price from an annual average market housing price series for new constructions in each of the provincial capitals. As well from this series we have calculated the capital gains component (ΔHP). Source: Sociedad de Tasación.

7) The average income of the households at the province level in Spain in 1991 is that picked up from the Spanish survey of household's budgets of 1990/91. To obtain the corresponding income data in other years we update the 1991 data with the help of the general price index. We prefer this variable in front of others as the average wage at the province level because the former include all the income components, and not only those coming exclusively from work. Source: INE. Encuesta de Presupuestos Familiares 1990/91.

8) The property tax rate (τ_{IBI}) to be applied at the province level is taken as the average urban IBI tax rate in each one. Furthermore, the cadastral value (the basis of the property tax) is assumed to be a proportion of k = 0.28 of the house value. Source: Local taxes (Tax rates, indexes and coefficients). General Direction of Coordination with the Territorial Treasury. Ministry of Economy and Treasury. Spain.

9) Based on the average incomes of households at the province level, it is calculated the marginal tax rate. Source: Annual tributary report of the Ministry of Economy and Treasury. 1991.

10) Also, in the calculation of the component $IRPF_H$ it is assumed that the implicit return of the habitual housing is, as a general norm, a = 2 per cent of the cadastral value. The reduction rate recognized to the amortized capital in the period is taken t_d = 15 per cent. The amortized capital in the period is adopted as a fraction C_a = 2 per cent of the final price of the housing, this value corresponds in average with the amortized quantity in the first years, under the mortgage contract regulation most extended in Spain (that is what it is called the French method of amortization and an average duration of the mortgage loan of 15-25 years).

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