Housing Tenure in Ireland

R. A. SOMERVILLE*
Trinity College Dublin

Abstract: This paper investigates the sources of the extremely high level of owner occupation in Ireland. After using census data to explore the evolution of this phenomenon, the paper makes a cross-country comparison of owner occupation within the EU-15. Explanations are found for the high level of owner occupation that go beyond fiscal privilege to include wider microeconomic factors, as well as historical factors. Within the EU-15, the Irish housing stock is exceptional not just in the high incidence of owner occupation, but also in the small number of dwellings relative to population.

I INTRODUCTION

Ireland has long experienced a remarkably high level of owner occupation of residential property, both absolutely and relative to neighbouring countries. According to the first census after the second world war, 52.7 per cent of private dwellings were owner occupied in 1946.[1] That approximates to the

[1] To avoid cumbersome terminology, the terms 'houses' and 'housing' will generally be used as synonymous with dwellings of all types, where precision is unimportant. However, in relation to census data, the distinction between 'housing units' and 'dwellings' is important, in that a housing unit may contain more than one dwelling, so that in aggregate the number of housing units is always less than the number of dwellings. Detailed published tabulations in the censuses of 1946, 1961 and 2002 were based on dwellings; those in 1971 were based on housing units; and those in 1981 and 1991 were based on both categories. The data presented for dwellings for 1971 are based on special tabulations provided by the CSO, or on published data after adjustment by the author. The figures for Ireland quoted in this paragraph and used as the basis for Figure 1. are drawn from successive editions of the *Census*, 1946, 1961, 1971, 1981, 1991, 2002. Data for the rest of the EU are drawn from *Housing Statistics in the European Union 2004*.

current rates of owner occupation in Denmark, France, Netherlands and
Austria, which were in the range 53 per cent to 58 per cent in 2001-2003, and
comfortably exceeds the current rate for Germany, which was 45 per cent in
2002 excluding the former DDR.[2] After 1946, successive Irish censuses
recorded increases in owner occupation up to 1991 when the proportion
reached 79.2 per cent. A small reduction to 77.4 per cent was recorded in the
intercensal period 1991-2002, although the absolute number of owner-
occupied dwellings grew by 22.6 per cent. Within the EU-15,[3] Ireland's
proportion of owner occupation in 2001-2003 was exceeded only by the
Spanish figure of 82 per cent. Luxembourg was the median country, at 67 per
cent.

The main trends in tenure shares in Ireland since 1946 are displayed in
Figure 1, and recent comparisons with the rest of the EU are drawn in Figure
2.

Figure 1: *Household Tenure Shares Per Cent: Ireland, Private Dwellings,*
1946–2002
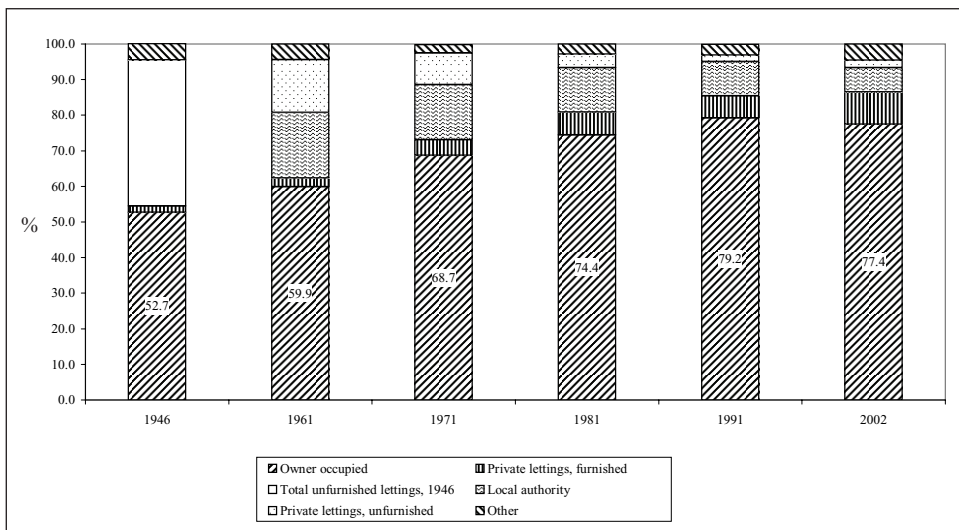
Source: Census, 1946 to 2002. Data for 1971 are from special tabulations supplied by the CSO.

The essence of this is widely appreciated among economists, journalists
and other commentators, and it has often been used as the starting-point for
critical analysis and comment on Irish housing policy, on the interaction of
fiscal policy with the housing market, and on the preferences and actions of

[2] The figure for the former DDR was 34 per cent.
[3] Hereinafter, the fifteen member-countries prior to enlargement in 2004.

Figure 2: *Owner-Occupied Dwellings as Per Cent of Total Housing Stock: EU-15, 2001–2003[a]*
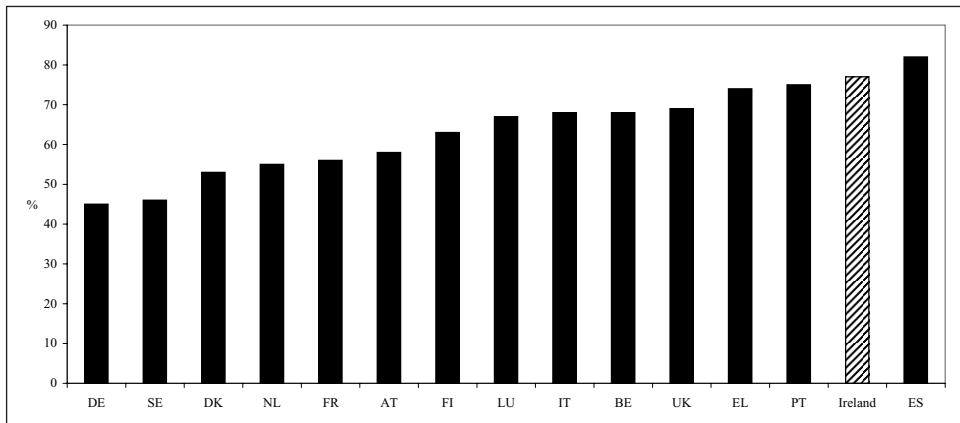
individual house purchasers and occupiers. Some quotations illustrate this point; they are also noteworthy in illustrating how comment on Irish tenure habits frequently includes normative judgements:

> Excessive focus on promoting owner occupation [via the fiscal system] encourages owners to acquire accommodation in excess of their needs... (Memery 2000, p. vii.)
>
> Why is it that Irish people in such numbers seek to own their own homes? They are prepared to take on huge mortgages, the repayments on which may reduce greatly their discretionary income … Elsewhere … It is common to rent...Continentals, as a consequence, often enjoy a better lifestyle. (*The Irish Times*, leader, 8 March 1997, p. 15.)
>
> We consider that owner occupation is a desirable social goal...However, the [present tax system] has resulted in an undue proportion of investment in certain types of housing to the detriment of more productive uses. Demand has in many cases been increased above real needs...It has also led to over investment and trading-up in house property and a waste of scarce resources... (Commission on Taxation, 1982, p. 138.)

This rest of this paper attempts to answer the following questions: what are the sources of Ireland's rate of owner occupation? and has a high rate of owner occupation resulted in an excessively large housing stock? These issues are taken up in turn in Sections II and III, and conclusions are drawn in Section IV.

II TENURE CHOICES

2.1 Public Policy

At least two elements of public policy bear heavily on tenure choices: namely, fiscal incentives, and local authority tenant-purchase schemes.

Over the years, the fiscal system has favoured house-purchase by way of various tax provisions and, between 1977 and 2002, cash grants to first-time buyers. Currently, buyers of new houses are eligible for relief of stamp duty,[4] subject to certain restrictions. In the case of second-hand properties purchased by first-time buyers, lower rates of duty applied before 2005 when the price was below a specified limit; after the 2005 budget, there has been complete exemption, again subject to the purchase price falling below a specified limit.

From the tax year 1969-70, when Schedule A income tax was abolished, the imputed rent from owner-occupied dwellings has not been taxed, and from that date until 1974,[5] house-purchasers were treated more advantageously under the income tax code than at any other time. First, before 1974 all loan interest was deductible at the taxpayer's marginal rate of income tax, and it was only from 1974 onwards that any restriction was placed on deductibility of interest payments. Second, during the period 1969-70 to 1974, the maximum marginal rate of tax, which was then the maximum rate at which interest payments could be relieved, was 80 per cent. Since 1974, various cash limits have been placed on the interest deduction, while since 1975 the top marginal rate has fallen in stages to reach 42 per cent in 2001, with a further reduction to 41 per cent announced in the budget speech in December 2006. The deduction attracted relief at the taxpayer's marginal rate up to the tax year 1993-4, while from 1997-8 the relief has been entirely at the standard rate (currently 20 per cent) for all taxpayers.[6] Under current legislation, first-time buyers are allowed a larger deduction for the first five years.

Ireland is not exceptional among the EU-15 in its fiscal treatment of home-ownership or purchase. It is among the majority in not taxing owner occupiers on the imputed rental-value of their properties, and also in allowing some degree of deductibility of mortgage interest for income tax purposes. Moreover,

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[4] This is a tax levied on the value of residential (and other) property at point of sale. Stamp duty on residential property is payable by the purchaser. The rate of duty rises with the sale-price, up to a maximum rate, and the applicable rate applies to the entire value.
[5] Information on the tax system was obtained from successive editions of the *Annual Reports* and *Statistical Reports* of The Revenue Commissioners, and also from the annual *Budget*.
[6] Until 1981, the income tax code did not distinguish at all between housing-related debt and other personal debt; since 1985 only interest payments on the former have been deductible.

the rate of VAT on new dwellings, at $13\frac{1}{2}$ per cent, is at or close to the median value in a range of zero to 25 per cent.[7]

As regards housing subsidies as a share of GDP, Ireland at 0.10 per cent is second from lowest in a range of 0.1 per cent to 1.9 per cent among twelve countries for which EU-15 data are available.[8] This information should be interpreted with caution, because of the likelihood of inconsistency between the self-reported data from different countries, but it does not lend support to any belief that the fiscal system in Ireland is exceptionally generous in its treatment of house-purchase and ownership.

For many years, sitting tenants of local authorities have had the option of buying their dwellings. Various types of incentive have been offered, and the cumulative total of purchases up to 1987 was more than 180,000 (Blackwell, 1988, p. 173). From 1988 until December 2005, a further 53,000 sales were completed, compared with approximately the same number of dwellings newly constructed for local authorities or acquired by them during the same period. (Annual/Quarterly *Housing Statistics Bulletin*.)

In contrast to the fiscal treatment of home ownership, rent payments have attracted only a small level of tax relief. The relief was introduced in 1982 for persons over fifty-five only, and since 1995 then it has been available to all tenants. In 2006, the Rent Tax Credits ranged from maxima of €330 for single persons under fifty-five to €1,320 for married or widowed persons over fifty-five. Norris and Winston (2005, p. 66) state that "the relief is minimal when rent levels are considered", and report an estimate by the Commission on the Private Rented Residential Sector that in 2000-2001 the average relief was worth €5 per week.

These aspects of public policy, while important, do not fully explain the high rate of owner occupation. For a complete explanation we must look at the microeconomics of the tenure-choice decision, including life-cycle and portfolio considerations, and also at historical factors.

2.2 The Microeconomics of the Tenure-Choice Decision

Consider an individual's tenure choice concerning a given dwelling, where the property may be purchased, or alternatively rented from a private-sector landlord. Suppose that the landlord's required annual compound rate of return

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[7] The minority where imputed rent is taxed consists of Belgium, Denmark, Greece, Italy, Luxembourg, Netherlands; the minority in which interest is non-deductible consists of France, Germany, Spain and the United Kingdom, with no information available for Austria. See *Housing Statistics in the European Union 2004*, Table 4.14, which also records details of VAT rates on new dwellings.

[8] *Housing Statistics in the European Union 2004*, Table 5.4. Data are absent for Austria, Italy, United Kingdom.

on residential property is R, and that R is also the rate of interest on property-related debt. For simplicity we ignore maintenance costs and depreciation, and initially we ignore taxes.

Assume that landlords, tenants and purchasers have a time-horizon T with homogeneous expectations, and that V_0 and V_T are the initial and expected terminal market values of the property. The annual average growth rate of prices expected by all parties is c, so that that $V_T = V_0 e^{cT}$, and we assume that the expectation V(t) at any interim date t satisfies $V(t) = V_0 e^{ct}$. Suppose that at any date t, the minimum or "reservation" rent $\rho(t)$ at which the property will be let satisfies the condition that the expected present value of the potential cash-flows (rents plus terminal value) equals the current market value. We define the rate of reservation rent λ by $\rho(t) = \lambda V(t)$. We may easily show that $\lambda = R - c$ for a one-period time horizon, and for longer horizons we also have $\lambda = R - c$ if we restrict λ to be constant. Formal derivations of this and subsequent expressions in this section are set out in Appendix A.

Now consider a buyer. On each €1 worth of the property that is currently debt-financed, he pays annual interest €R currently; to the extent that he holds equity in the property, each €1 of equity imposes an opportunity cost of €R currently. However, he expects that in either case each €1 of property value will grow at the rate c per annum. Thus the net annual cost per €1 after expected capital appreciation is R – c. This is the user cost of housing,[9] and in this case it equals λ, the rate of reservation rent. In long-run competitive equilibrium where rents equal reservation levels, and ignoring taxes, we have: *market rent*/V = λ = R – c = *user cost*: the individual will then be indifferent between renting and buying, assuming that purchased and rented property are regarded as perfect substitutes.[10]

The equilibrium condition $\lambda + c = R$ has a simple interpretation. If a renter actually succeeds in obtaining the reservation rent, then the condition $\lambda + c = R$ means that rent plus capital appreciation just equals the interest rate R on property-related debt, i.e. the required rate of return on housing. Alternatively, from an owner occupier's perspective, R is the cost of debt finance, or the opportunity cost of equity in housing, while R–c is the net cost after capital appreciation. The condition $R - c = \lambda$ states simply that this net cost should equal the cost of renting housing services in equilibrium, where again the reservation rent λ is the actual rent also. Taxes complicate the picture, and distort it if landlords and owner occupiers face different tax

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[9] Strictly, user cost should also include maintenance and depreciation costs. These are ignored here, as they are likely to be very small in relation to house prices.

[10] From this point it will be convenient to treat the term "reservation rent" as synonymous with the *rate* of reservation rent, i.e. relative to the price of the property.

schedules. In what follows, the expressions for reservation rent and user cost become more complicated, but their interpretation remains the same.

As matters stand in Ireland, landlords' rents are taxed, unlike owner occupiers' imputed rental income; interest paid is allowed as a deduction for tax purposes in either case, subject to certain restrictions in the case of owner occupiers; interest received (i.e. the opportunity cost of equity in property) is taxed; and finally, taxes are levied on capital gains by landlords but not on sales of primary residences, including a site of up to one acre, by owner occupiers.

Putting all this together, using t_y and t_c to denote the marginal rates of income and capital gains taxes respectively, and assuming that t_y has the same value in all circumstances, the reservation rent is $R - c(1 - t_c)/(1 - t_y)$, which would also be the user cost if owner occupiers paid income tax on imputed rent (net of interest) and were liable to tax on capital gains. However, in the absence of those two taxes, the user cost is $(1 - t_y)R - c$, where t_y is the rate of income tax at which interest payments are relieved or investment income is taxed.

In Ireland, mortgage interest is relieved at the 20 per cent tax rate, subject to an annual cap on the total interest payment that may be relieved. In 2005, the cap for a married couple was €8,000 if they were first-time buyers or €5,080 otherwise, which corresponded to outstanding mortgages of about €230,000 or €150,000 respectively, at a time when the average price of a new house was about €276,000. Clearly, for many households in 2005, as also in other years, not all interest payments would have been relieved. In effect, the average €1 of debt interest is relieved at less than the standard 20 per cent tax rate, so that $(1 - 0.2)R - c$ is a lower bound for user cost, in the case of debt-financed owner occupation, while $R - c$ is an upper bound. $R - c$ is the user cost in the case of a zero marginal tax rate, and it is also the (marginal) user cost where a taxpaying purchaser is above the limit for interest relief. In the case of equity held in owner-occupied property, the expression for user cost is the same, but t_y becomes the individual's marginal tax rate on investment income. The upper bound on user cost is still $R-c$, corresponding to the case where no tax would arise: for example, a low-income elderly couple inhabiting a low-value property, who fall below the income-tax exemption limit. However, the lower bound is now $(1 - 0.42)R - c$, corresponding to the case where all investment income is taxed at the higher marginal rate of 42 per cent.[11]

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[11] In 2006, falling to 41 per cent in 2007. Note that many taxpayers are also subject to the Health Levy on their gross investment incomes; for them, this has the effect of increasing the marginal tax rate by 2 per cent up to 2006, and by either 2 per cent or 2.5 per cent, depending on income level, from 2007. PRSI is not relevant in this context.

If $t_c = t_y$ the expression for reservation rent becomes R – c, in which case we conclude that the tax system certainly drives user cost below reservation rent levels. In Ireland the current value of t_c is 0.2, which is also the value of the standard rate of income tax, while the rate of corporation tax applied to rental income is 0.25.[12] Thus for individual landlords paying tax at the standard rate, reservation rent is R–c, and certainly exceeds user cost; however for landlords paying income tax at the higher marginal rate, or for corporate landlords paying corporation tax, reservation rent is below R–c, because $(1 - t_c)/(1 - t_y) > 1$. It may be larger or smaller than user cost depending on the values of R, c, t_c and t_y.

From April 1998 until December 2001, interest on property loans was not allowed as a deduction from rental income for tax purposes, and during that period, rates of reservation rent were in consequence higher than they would otherwise have been (see Appendix, equation (A2)).

2.3 User Cost and Reservation Rent Data and their Time-Series Properties

Time series for reservation rent and user cost (all *ex post*) are displayed in Figure 3. These data are expressed in nominal terms: we shall be concerned with the relative magnitudes of user cost, reservation rent, and the rate of market rent, and there is nothing to be gained by deflating their nominal values.

The calculations for Figure 3 are based on data for the interest rate and the annual rate of growth of house prices. Monthly data from 1970 for the average interest rate on variable-rate mortgages were obtained from the Central Bank of Ireland and converted into annual averages, and the annual rates of house-price growth were calculated from the annual average data for house prices that are published in the Department of the Environment's *Housing Statistics Bulletin* and its predecessors[13] for the entire country and all lending agencies. New house prices were used, because that series covers a longer span than the series for second-hand properties.

Of course, decisions are based on expectations rather than on *ex post* data, which suggests that we might attempt to estimate an autoregressive expectations mechanism. Applying an Augmented Dickey-Fuller test to each of the annual user cost and reservation rent series (in levels), 1970-2005, we cannot reject the unit root hypotheses in any case. For example the ADF statistic is –1.7272 for user cost at the top marginal tax rate, compared with a 95 per cent critical value of –2.9528, and the results for the other series are

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[12] Information concerning corporation tax has been obtained from the Irish Taxation Institute.

[13] *House Purchase Loans by Building Societies Assurance Companies and Local Authorities*, December 1969 and February 1970, and *Quarterly Bulletin of Housing Statistics*, from 1970, first quarter. Both were published by the Department of Local Government.

Figure 3: *Reservation Rent and User Cost,[a] 1970-2005*
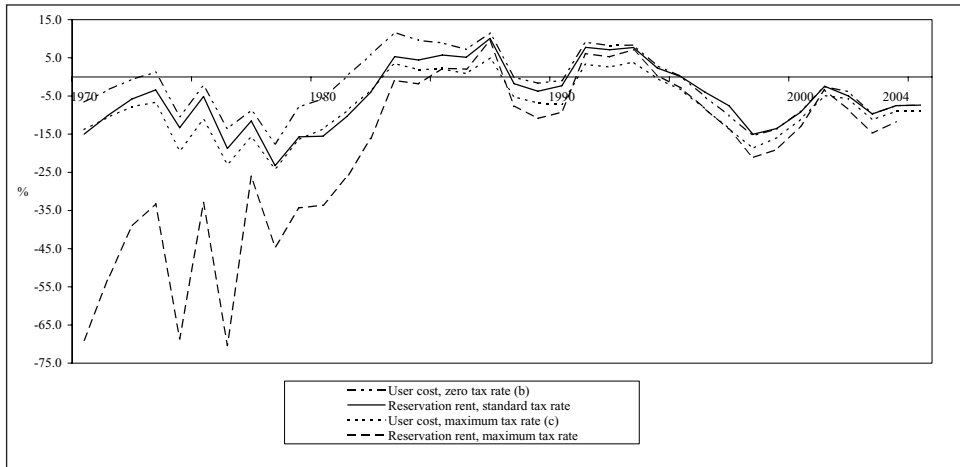
Notes: (a) All in nominal terms: see text.
(b) Applies at the margin to a mortgagor who has exhausted the allowable interest relief.
(c) Applies to equity in property for a higher-rate taxpayer.

very similar. If there is indeed a unit root, then the corresponding series is nonstationary. At the same time, there is no evidence of a unit root in the differenced data. This suggests that we should explore the possibility of a relationship in the lagged differences. For each series, regressions were then run between the first differences and their lagged values, at various lag-lengths, but in no case could a significant relationship be found. From this we conclude that each series follows a random walk, so that the best forecast for the next period is the current value. We shall henceforth take this to be the case for the time-series that are analysed in this paper. The small sample size limits the power of the ADF test, but at the same time limits the scope for carrying out more sophisticated time-series analysis.

2.4 Analysis of User Cost and Reservation Rents

For the most part, the series that are displayed in Figure 3 evolve along approximately a common path, so that the fact that they are hard to distinguish visually is of little consequence. The user cost series at a zero tax rate is the upper bound to actual user cost in any given instance, while the series at the maximum tax rate is the lower bound. Reservation rent at the maximum marginal rate of income tax is a clear outlier from the other series during 1970 to 1985 when the top marginal rate of income tax was at or above 60 per cent.

Much recent experience in Ireland has been of disequilibrium with excess demand for housing. In these circumstances market rents exceed the

reservation rent, and in fact the *ex post* value of the latter was negative for most of the period 1970-2004. Reservation rent was positive in only ten out of thirty-six years when computed at the standard rate of income tax, and for seven years at the top marginal rate. Moreover, these are over-estimates of reservation rent to the extent that landlords have had access to tax-shelters such as the Section 23 provisions. When reservation rent has been negative, user cost has usually been negative also, and consequently has been below the market rent. During the most recent ten years 1996-2005, the user cost of an average new house was in the range [–15.4 per cent, –2.6 per cent], ignoring taxes, or [–18.7 per cent, –4.9 per cent] in the case of owner's equity where investment income is taxed at the top marginal rate. Over the entire period 1970 to 2005, user cost at a zero tax rate had a mean of –2.2 per cent and was positive in only thirteen of thirty-six years, while at the standard tax-rate the mean was –5.2 per cent with positive values in ten years. When the calculation is repeated with the standard rate of tax replaced by the maximum allowable rate for mortgage interest relief,[14] or by the top marginal rate, then user cost is found to have been positive in only eight years. The conclusion from these data is that for most of the time since 1970, with user cost usually negative, purchase and ownership has certainly been far more attractive than renting, given that rents must be positive. In the less common periods of positive user cost, the ranking depends on the relative magnitudes of user cost versus the market rate of rent.

A first response to these data might be that they are a consequence of the fiscally privileged position of house owners and purchasers. However, under a neutral fiscal system, user cost would equal reservation rent. For twenty-six years during 1970-2005 this was below user cost for higher-rate taxpayers, so fiscal neutrality would have involved a lower user cost for them for most of the time; even in years when user cost was below reservation rent the gap was small, with an average of 1.6 per centage points in those years. For standard rate taxpayers, user cost was below reservation rent for most of the time (twenty-three years), but again the gap was small with a similar average value. However, before conclusions from these comparisons are pushed too far it must be understood that, under a neutral tax regime, the growth of property prices would very likely be slower, with the implication of a higher user cost.

In fact this purely financial analysis is incomplete. First, it describes the alternatives at the point of tenure decision. However as time passes, debt-

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[14] I.e. the top marginal rate up to the tax year 1993-94 (by which date the income-tax system provided for only a single rate above the standard rate), and the standard rate from 1997-98. In the transition years, higher-rate taxpayers were permitted to deduct at a weighted average of the standard rate and the higher rate, the weights being $(\frac{1}{4}, \frac{3}{4})$, $(\frac{1}{2}, \frac{1}{2})$ and $(\frac{3}{4}, \frac{1}{4})$, respectively, in the three successive years.

service costs for buyers continue to relate to the original purchase price whereas rents generally relate to current prices or at least to lagged prices. This makes purchase significantly more attractive than renting, unless prices fall.

Secondly, the analysis ignores risk. Some risks make renting more attractive than purchase - for example, the risk of falling property prices and "negative equity"; perhaps also the risk of becoming unemployed during a property slump while encumbered with mortgage debt; and finally, interest-rate risk, although the availability of fixed-rate mortgages mitigates this. However, for many households these risks may be discounted, while renting in the private sector raises other risks that may exclude it as a long-term option. When purchase is planned to take place eventually and prices are rising, then delaying purchase will be seen as risky. Moreover, renting exposes the household to other risks: of an unsatisfactory landlord, and of the possibilities of loss of tenancy and of unpredictable periodic rent increases.

2.5 Purchase versus Renting: Life-Cycle Considerations

Differences in the perceived risk attached to each option are an aspect of a wider consideration: at the point of tenure decision, rented and purchased housing are unlikely to be viewed always as perfect substitutes, with the choice being governed only by financial considerations. Some households may value the flexibility of renting, with its potential for mobility. Others, at a point in the life-cycle where decisions are being made for the long term, may reject renting because of the limits that it imposes on a household's control over its own physical surroundings.

Disposable income tends to rise from the early through the middle years of the lifecycle of the typical household, and for this reason and also for others connected with changing family circumstances, we expect many households to wish to move away from renting towards owner occupation as time progresses. Special tabulations of census data reveal a strong relationship between the age of the head of household (or "reference person" in census terminology) and the proportions of households in each tenure category. Figure 4 displays data for 2002, but the picture was similar in 1971, 1981 and 1991. We assume that the age of the "reference person" in the census data is a good proxy for the position of the household in the lifecycle. In the 20-24 age-group, fewer than 30 per cent are owner occupiers and more than 70 per cent are renters. As we move across the age spectrum, the proportion of owner occupiers rises and that of renters falls, until we reach the age-group 70-74, after which the movement reverses very slightly. It certainly appears, therefore, that there is a typical life-cycle dimension to the tenure decision, to which most households adhere.

Figure 4: *Proportions of Owner-Occupied and Rented Dwellings,ᵃ Classified by Age Group of Reference Person, 2002*
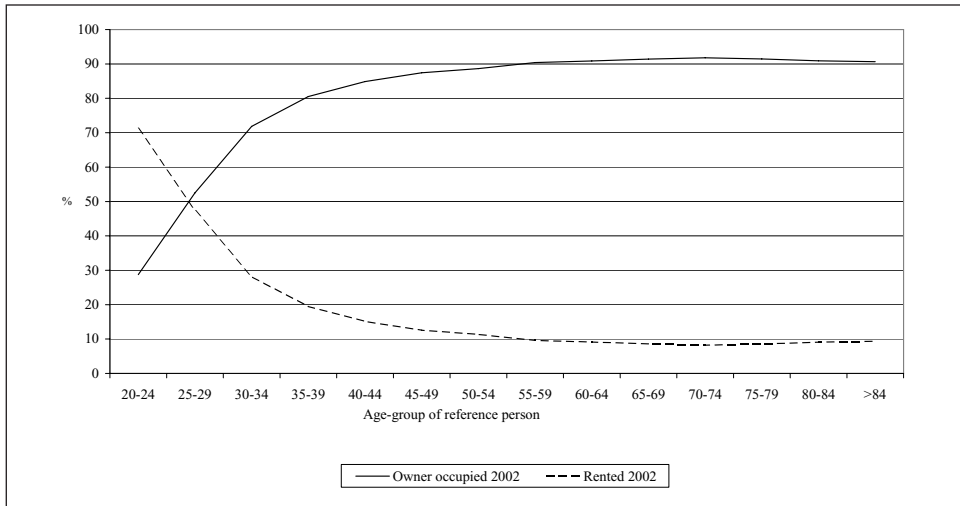
Source: CSO, special tabulation of 2002 Census.
Note: ᵃ excluding dwellings "occupied rent-free" or "not stated". Of the remaining 95.4 per cent, 81.2 per cent were owner occupied, and 18.8 per cent were rented.

More limited data from the *Quarterly National Household Survey* support this conclusion. According to Table 8 of the *Housing and Households* report for the 3rd quarter of 1998, the proportion of owner occupiers rises steeply across the age-spectrum of the reference person up to age 64, and then reaches a plateau, while the proportion of renters falls to a corresponding plateau.[15]

According to the special census tabulations, there has been a rise recently in the age of the reference-person beyond which the tenure-pattern stabilises, which is visible graphically when tenure-pattern is plotted against age-group. A formal investigation involves computing the variability (standard deviation) of tenure-shares among age cohorts whose age of reference person exceeds a given threshold: by choosing successively larger values of threshold, we establish a value beyond which the variability stabilises. In the census of 1971, 1981 and 1991, this occurred before age 54, whereas in 2002 the plateaux for tenure-shares were only approached once the 60-64 cohort was reached. Table 1 shows that from age 60 there is very little variability across the age-groups in any of the four sets of census data, as measured by the standard deviation of the tenure-group shares; the table also shows that the plateau-value for the share of owner occupation has been steadily rising, from

[15] The most recent QNHS *Housing Module* was 2003, third quarter. However, it contains no data on the age-profile of the different tenure-categories.

Table 1: *Mean and Standard Deviation of Tenure Shares of 60+ Age-Groups[a]*

	Owner Occupiers:[b] Mean Share %	Renters:[b] Mean Share %	Both Groups:[c] Standard Deviation of Shares %
1971	75.5	24.5	1.2
1981	81.5	18.5	1.2
1991	86.7	13.3	1.1
2002	91.2	8.8	0.4

Source: Central Statistics Office, special tabulations of census data.
Notes:
[a] The six groups are 60-64, 65-69, 70-74, 75-79, 80-84, greater than 84. These relate to the age of the "reference person".
[b] The categories "occupied rent-free" and "not stated" have been excluded.
[c] The proportions owning and renting sum to unity in each age group, so the standard deviations of the two proportions are identical, in any year.

75.5 per cent among those aged 60+ in 1971 to 91.2 per cent in 2002.

There are two other illuminating ways of analysing these data. First, we may look at how the total numbers in each tenure-group are distributed across the age-spectrum, and compare these distributions with the population of all reference persons in the "owner occupied" and "rented" categories. We find that, while owner occupiers are distributed much like the defined population, renters are concentrated in the younger age-groups, particularly between 20 and thirty-four years. In 2002, 48 per cent of renters were in that age-cohort, compared with 21 per cent of the defined population, and 15 per cent of owner occupiers. This concentration was visible in earlier years, but it has been increasing.

Second, given the availability of data since 1971, we may track the progress of different cohorts as they age, and Table 2 does this. Reading the table vertically, it is clear that in every cohort, as we track it through successive censuses, the proportion of owner occupiers rises and thus the proportion of renters falls. For example, 63 per cent of the 30-34 age-cohort were owner occupiers in 1971, and ten years later, 83 per cent of the same cohort (now aged 40-44) were owner occupiers in 1981. By 1991 the value for this group was 88 per cent, and by 2002, 91 per cent.

2.6 Purchase Versus Renting: Portfolio Considerations

The decision whether to purchase or rent is partly a portfolio decision, concerning the form in which household assets should be held, and to this we now turn.[16]

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[16] For an alternative view of how house-purchase should be viewed, see Drudy and Punch (2005).

Table 2: *Proportions of Age-Cohorts having Owner-Occupier Status, Tracked though Successive Census Tabulations*

Owner Occupiers as Percentage of Households in Age-Group

Age-group in 1971 →							15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	>84
Owner occupiers, 1971							19%	24%	50%	63%	70%	72%	72%	75%	75%	75%	74%	75%	76%	76%	77%
Age-group in 1981 →					15-19	20-24	25-29	etc. →													
Owner occupiers, 1981					20%	29%	59%	73%	80%	83%	83%	82%	83%	83%	81%	80%	81%	81%			
Age-group in 1991 →			15-19	20-24	25-29	etc. →															
Owner occupiers, 1991			17%	25%	62%	78%	83%	86%	88%	88%	87%	87%	86%	85%							
Owner occupiers, 2002	40%	29%	52%	72%	81%	85%	87%	89%	90%	91%	91%	91%	91%								
Age-group in 2002 →	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	>84						

Source: Central Statistics Office, special tabulations of census data.
Note: the Table should be read vertically. For example the 15-19 cohort in 1971 becomes the 25-29 cohort in 1981, 35-39 in 1991 and 45-49 in 2002. The effects of migration and mortality are ignored.
Because the census planned for 2001 was postponed until 2002, there is an inconsistency of one year between the 2002 age-groups and those of the earlier years, but this does not affect the broad conclusions that may be drawn.

The total return on property is the capital appreciation plus rental income, whether actual or imputed. Let c, R, m and R_A be the expectations of the annual rates of, respectively: the appreciation of house prices; the required return on property loans; the market rental rate on property; and the return on an alternative (non-property) asset. Income is taxed at the rate t_y, but housing gains and imputed rents are untaxed. Consider an owner occupier who owns a portion worth €E of a property that has a market value V_0, with the balance being debt-financed. The excess return of owning over renting is:

$$[m - ((1 - t_y)R - c)]V_0 - (1 - t_y)[R_A - R]E,$$

or as a rate of return on the total investment V_0,

$$[m - ((1 - t_y)R - c)] - (1 - t_y)[R_A - R]E/V_0.^{17}$$

The term $(1 - t_y)R - c$ is the user cost u_2, as discussed in section 2.2.[18] Clearly, if $R_A = R$, then ownership dominates renting from a financial perspective, if market rent m exceeds user cost, as has been the case for much of the recent past. If $R_A \neq R$, then the comparison must be modified to take account of the difference in the returns on the two assets and the level of financial gearing E/V_0. In the following, we explore the case where $E = V_0$, so that the excess return of owning over renting is: $m + c - (1 - t_y)R_A$. By assuming also that $t_y = 0$, we focus on the most favourable condition for renting.

Decisions are based on the expected returns on the alternative assets, whereas data are only available *ex post*. However, these data are relevant both as an illustration of historic experience and also because at the microeconomic level households are likely to use past experience as an input to decisions for the future.

The *Housing Statistics Bulletin* and its predecessors provide time-series of house prices. The series for new houses starts in the second calendar quarter of 1968, while the series for second-hand houses starts in 1975, and since those dates each annual series has recorded only one fall in the country-wide average, in 1986-87. The annual average rate of growth of new house prices,

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[17] It is assumed that a uniform marginal income tax rate applies to the relief of interest payments for the purchaser, and to the taxing of the renter's investment income. Currently, interest on bank deposits is subject to DIRT at 20 per cent, and not to higher-rate tax, and for certain other categories of investment income the total tax obligation is a withholding tax of 23 per cent. Mortgage interest payments are relieved at the 20 per cent rate, subject to certain restrictions. For simplicity these comparisons ignore the small tax credits that are available to private renters.
[18] See derivation in Appendix A, equation (A4).

1970-2005, was 10.9 per cent, with a standard deviation of 7.5 per cent.[19] We also need information on rent levels in the private sector, for which the sources are successive *Census* reports, the *Quarterly National Household Survey*, *Housing Module*, 2003-III, all of which contain data for weekly rents, and Watson and Williams (2003), which contains data for monthly rents.

Up to 1971, census data on rents did not discriminate between local authority and private lettings, and are therefore not usable here. Excluding local authority lettings, weighted average annual rents computed from 1981 census data were 2.6 per cent of average new house prices (entire country) for the second quarter of 1981, as set out in the *Housing Statistics Bulletin*, and the equivalent figures for April 1991 and April 2002 are 4.1 per cent and 4.2 per cent respectively. Data limitations in 1981 and 1991 only permit this calculation as an average for all let dwellings, but more extensive data for 2002 allow us to calculate a value of 4.3 per cent for *annual rent/capital value* for purpose-built flats. If we assume that the 1981 data applied as far back as 1969, then these data imply an average rental rate of about 3.5 per cent per annum since then.

Using the *Quarterly National Household Survey* for 2003-III, the figure for the average annual rate of rent relative to new house prices is 4.1 per cent, and relative to new apartment prices the rate is 3.8 per cent. Finally, the median value for monthly private-sector rents reported in Watson and Williams represents an annual return of 3.9 per cent on average new house prices in 2001-2002. In the following we shall assume that annual residential rents on privately-rented dwellings have stood at 4 per cent of house prices, so that the overall return is $(1 + c)(1.04) - 1$, where c is the growth rate of house prices. By doing no more than this we should in effect be taking the rental rate to be riskless, and the standard deviation of the overall return series would be that of the price-change series multipled by 1.04. We need to allow properly for the risk associated with rents, and a footnote to Table 3 explains how this is done, using a procedure based on the Privately Owned Rent Index. That index has been published by the Central Statistics Office from November 1975, and is a component of the Consumer Price Index.

Table 3 compares returns on property and other assets.[20] The latter are

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[19] The first full year of the price series for new houses was 1969, but 1970 is used as the initial year in this computation for consistency with data shown elsewhere in this paper.

[20] As elsewhere in this paper, no attempt is made to present estimates of expectations from these data. The price-change data has similar properties to those for user cost and reservation rents. We cannot reject the unit root hypothesis for the data in levels, but while we can reject it for the differenced series, it is not possible to find a significant autoregressive relationship in that series using various lag lengths. In contrast for the series for returns on equity, bonds and commercial property, the unit root hypothesis is rejected. For equity and bonds it is not possible to find significant autoregressive relationships. Only in the case of commercial property is there some evidence of an autoregressive relationship, at lag length one.

Table 3: *Annual Average Pre-tax Geometric Mean Return and Volatility of Return: Various Assets, 1970–2003*

	(a) Residential Property: Capital Appreciation Only	(b) Residential Property: Capital Appreciation Plus Imputed Rent	(c) Commercial Property	(d) Equities	(e) Long Gilts
	%	%	%	%	%
Geometric mean, nominal annual return:	10.9	15.3	16.1	14.9	11.5
Standard deviation, annual returns:	7.7	8.0 to 10.0*	12.7	34.5	16.5

Sources: quarterly and annual *Housing Statistics Bulletins* for new house prices; for other data: Whelan (undated, and personal communication).

Notes: (a) is based on annual average prices of new houses, all area. In (b) the rental rate is estimated at 4 per cent of the price, as discussed in the text, and the mean is the value in (a) adjusted appropriately. The data for commercial property are for 1970-2000. All the tabulated values are nominal and pre-tax.

* When the annual return on residential property is computed by compounding the growth in prices by a flat 4 per cent per annum rental return then the standard deviation rises from 7.7% to 8.0%. Alternatively, and to allow explicitly for the riskiness of the rental return, we derive a rental return series by using the Privately Owned Rent Index in combination with the average rent in 2003 from the *Quarterly National Household Survey*, along with house-price data. This is then combined with the series for the growth in house prices, and the standard deviation of this annual series, 1976-2005, is 10.0%. If average rents from the 1981 census replace the 2003 QNHS figure, the standard deviation is 8.5%.

drawn from Whelan (undated) and also from data supplied privately to the author by Dr Whelan. If we credit owner occupiers only with capital appreciation, then over the period 1970-2003 financial assets, in particular equities, have shown a greater return but with a correspondingly greater volatility and risk. However, when imputed rents are included, as they should be, we see in Table 3 that owner-occupied housing has delivered an annual average nominal return very close to that on equities but at less than one-third of the risk, that is, at a standard deviation of 8 per cent to 10 per cent, versus 34.5 per cent in the case of equities. Alternatively, the mean return has been close to that on long gilts, at less than two-thirds the risk. Moreover, the tabulated returns on equities, bonds and commercial property are all gross of income and capital gains taxes.

Some confirmation of our estimate of risk and return on residential property is furnished by their proximity to the estimates for commercial

property. Comparisons such as these suggest that, for any rational household, the risk-return profile of housing is likely to have been seen as far more attractive than that of financial assets, the more so in view of the fact that investment income and capital gains are exposed to taxation while owner occupation is not. Related considerations support this: for example, the prospect of exposure to market rents during retirement is likely to be seen as less attractive than ownership of a house, with any mortgage paid off earlier, particularly in view of the risks attached to equity markets and pension funds.

Alternative official data on rents paid to private landlords are contained in the monthly Privately Owned Rent Index. According to this, the growth of rents was considerably slower than is suggested by census data. In the intercensal periods 1981-1991 and 1991-2002, the census average rose by 261 per cent and 314 per cent, respectively, while the Rent Index rose by only 73 per cent and 74 per cent.[21] It is not entirely clear why there is such a disparity, but the main reason is likely to be the fact that during the early to mid 1990s there were significant methodological changes in the collection of rents data for the index.[22] However, if we assume that the most recent census and QNHS data are reasonably accurate, then the index suggests that rents may have been higher in the past than the census suggests, which in turn implies even higher returns on residential property: thus the conclusions drawn from Table 3 are reinforced.

All of these factors go some way to explaining Bacon's observation (1998, p. 9) that "the fact remains that there is a clear preference for home ownership as compared with other forms of tenure". Much commentary on the housing market has focused on public policy. However, as Bacon notes, the degree of fiscal privilege has narrowed recently, yet the preference for ownership remains.

2.7 Historical Factors

In exploring the allocation of a long-lived capital good such as housing, current choices at the margin are only part of the story. Of major relevance are two historical developments that predate the foundation of the state. First, there is the series of Land Acts, beginning in the 1880s and continuing into the 1920s, of which the most significant were perhaps the *Land Acts* of 1903[23] and

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[21] Rent data for 2003 in the *Quarterly National Household Survey* are consistent with the census for 2002.
[22] The disparity is not explained by the fact that the index relates only to furnished property. Neither is it likely to be explained by the variability between each successive census in the definition of the properties to which the rental data relate, i.e. housing units in 1981 and 1991, dwellings in 2002.
[23] I.e. the Wyndham Act. See Lyons (1979, pp. 218-219).

1909. Cumulatively, that legislation established owner occupation as the basis of land tenure in rural Ireland. Over time, landlords were bought out, and tenant farmers became owner occupiers. By 1961, the share of owner occupiers in the rural housing stock had reached 77 per cent, twice the urban figure of 38 per cent, and while by 2002 the gap had narrowed, rural owner occupation, at 87 per cent, remained significantly higher than the urban proportion of 72 per cent.

Second, the decline of the urban private-rented sector and the rise of urban owner occupation was in large part the unintended long-term consequence of the *Increase of Rent and Mortgage Interest (War Restrictions) Act*, 1915. This was passed in conditions of wartime emergency to protect urban tenants from the effect of housing shortages and inflation, but it established a system of rent control that, for a small number of tenants, has not yet completely disappeared. The original act placed very tight controls on rents, with a high degree of security of tenure. In consequence much of the affected property was subsequently allowed to decay, any expansion of private letting was discouraged, and when a landlord gained vacant possession of a rented property there was every incentive to transfer it to owner occupation.

In broad terms, the system established in 1915 remained in place until the early 1980s for unfurnished lettings of pre-1941 properties of low rateable value, by which time the primary statute was the *Rent Restrictions Act*, 1960. In 1981 certain provisions of the 1960 act were found to be unconstitutional. Pre-1982 tenants of rent-controlled properties, and their spouses, retain the protection of the *Housing (Private Rented Dwellings) Acts*, 1982 and 1983, and members of their families who succeeded to a controlled tenancy during 1982-2002 ("successor tenants") may retain some protection under the *Landlord and Tenant Act*, 1980.[24] However, the number of such tenancies is small and declining and is a subset of the 26,000 private unfurnished lettings (accounting for 18 per cent of all private lettings and 2 per cent of the stock of dwellings) that were recorded in the 2002 *Census*. According to Norris and Winston (2005, p. 66) about 1,700 formerly rent-controlled dwellings retain the protection of the 1982 Act.

The *Finance Act*, *1981* introduced the "Section 23" incentives for investors in residential property. This was the first example since 1922 of a government policy designed to stimulate the supply of residential property for renting, and according to Bacon *et al.* (1998 p.18). "Since 1991 there is evidence of some

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[24] For formerly rent-controlled dwellings, the *Housing (Private Rented Dwellings) Acts*, 1982 and 1983 confer security of tenure on pre-1982 tenants or their spouses, and rents are set by the Rent Tribunal. The position of a successor tenant is more complex. Protection under the Acts of 1982 and 1983 expired in 2002. A successor tenant may have the right to claim a 35-year (and in effect perpetual) tenancy through the courts under the *Landlord and Tenant Act*, (1980).

increase taking place in the private rented market, especially in Dublin." The 2002 census confirms this: in 1991-2002, while total dwellings increased by 25 per cent, privately-let dwellings rose by 75 per cent.

Because of the decline in private letting in the twentieth century, which began to turn in the 1980s but was not clearly reversed either absolutely or proportionately until after the 1991 census, the age structure of the rented and owner-occupied stocks are very different, as Figure 5 illustrates. The privately-let stock contains a larger proportion of pre-1941 dwellings; post war expansion and replacement up to 1980 was predominantly of owner-occupied dwellings, and within the owner-occupied stock over 40 per cent of the total dates from 1941-1979. Finally, the recent turnaround in the rental market is shown by the large fraction of total lettings, nearly 50 per cent, that have been built since 1980.

Figure 5: *Age Profiles of Owner Occupied and Privately Rented Dwelling Stocks, 2002*
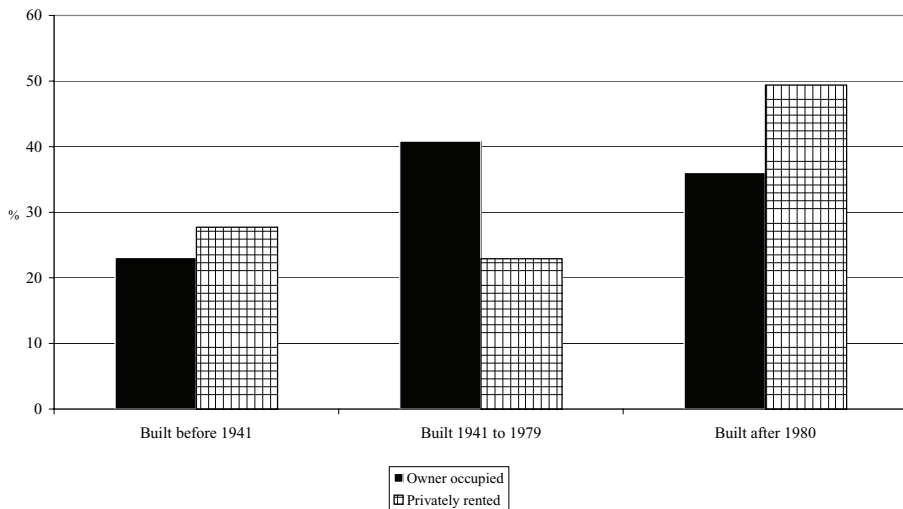
Source: Census of Population, 2002. Based on 97 per cent of households after excluding the "'not stated" category.

2.8 Owner Occupation and Affordability

We have seen that there have been powerful forces working to promote owner occupation, including historical, legal and institutional factors, and factors involving market forces interacting with the fiscal system. Despite all of that, the propensity to choose owner occupation could be thwarted if it was

not in some sense "affordable". A simple measure of affordability is given by a comparison of the cost of servicing a mortgage, versus the cost of renting. This may be seen as reflecting the viewpoint of a purchaser who, through financial pressure or myopia, discounts the potential capital gains from house-purchase and focuses only on immediate cash flows, disregarding any tax considerations.

We take as our standard the cost of servicing a 20-year variable-rate mortgage on an average new house, using the same house-price data as before. If we take the census data on average private rents for 1981, 1991 and 2002, and QNHS data for 2003, we find that average debt-servicing charges were about six times average rents in 1981, about three times in 1991, and about 1.8 times in 2002-3. Although house prices have risen dramatically since 1981, rents have increased as well, while nominal interest rates have tumbled, and the data for debt service/rents indicate a significant improvement in affordability.

According to our measure of affordability house purchase has been relatively more expensive than renting, although it has become less so over time, but this has not inhibited rising levels and (until very recently) rising rates of owner occupation. If we base "affordability" comparisons on QNHS rental data for 2003, with earlier and later years deduced from the CSO's Privately Owned Rent Index, then the picture is different, and in fact more stable, but still indicates that buying has been more expensive than renting. From 1976 to 2005, debt-servicing costs were on average 1.5 times rents, with a standard deviation of only 0.3 times. In only two years (1976-77) was buying cheaper; in four years the multiple reached 2.0 or more, but while two of these (2004-5) were during the current housing boom, the other two were the peak years for nominal interest rates, 1981 and 1982.

III TENURE CHOICES AND THE STOCK OF DWELLINGS

The composition of total savings and investment may be unduly affected by the prevalence of owner occupation, with some displacement of investment and economic activity from sectors other than housing. (NESC, forward to Blackwell 1988, p. 8.)

Does the tenure structure in fact affect the share of the capital stock accounted for by housing, as this passage speculates? Some households may see their options as being either to rent a small property (e.g. an apartment) or to buy a larger one (e.g. a house), in which case tenure choices may affect the level of capital formation in housing. However, in other cases households may contemplate obtaining a *given* residential requirement either from owner

occupation, or from a landlord, and the tenure decision in that context will not influence the size of the dwelling stock: in such cases, the only issue is the pattern of ownership of given assets. Before about 1990 there is no evidence that Ireland's exceptional tenure structure was associated with exceptional levels of dwelling stock. At least as long ago as 1980 Ireland had the smallest number of dwellings in the EU relative to population, and up to 1990 new completions relative to population were at or somewhat above the EU median. Investment in dwellings as a share of gross fixed capital formation began the 1980s below the EU median and ended the decade at the median value of 23 per cent. During the 1990s, housing investment in Ireland accelerated. From 1995, Ireland and Germany shared the first and second places when ranked by the ratio *gross investment in dwellings/gross capital formation*, but of course Germany's record was affected by the reconstruction of the former DDR. By 2003, this ratio reached 43 per cent for Ireland, and at 32 per cent Germany was the only other EU-15 country exceeding 30 per cent.[25]

In 1995, gross investment in dwellings stood at 5.4 per cent of GDP in Ireland, which was well within one standard deviation of the unweighted average figure for the EU-15. By 1997 it was above that threshold, and from 1999 Ireland has been above the range for the other fourteen countries in the EU-15.[26]

Clearly it is only since the mid-1990s that investment in housing has been particularly high, relative to GDP, by EU standards. This has been a process of catching-up with the rest of the EU-15, but it nevertheless remained the case in 2002-2003, as Figure 6 illustrates, that Ireland had the lowest level of dwelling provision in the EU-15 relative to population. This was not a consequence of relatively rapid population growth outflanking housing construction: in fact it reflects the low base from which growth of the dwelling stock has proceeded. Even if the Irish population had not grown *at all* during 1991-2002, then the existing dwelling stock in 2002-2003 would still have been among the lowest in the EU-15, relative to population. Moreover, despite recent reductions, Ireland has the largest average household size of all EU countries, with the possible exception of Spain; it has the smallest per centage of one-or two-person households, except for Greece, Portugal and Spain, and the largest proportion of households of five or more persons.

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[25] The summary figures presented here draw on *Housing Statistics in the European Union 2004*, Tables 3.2 and 3.9 and *2002*, Table 1.13, *National Income and Expenditure 2005*, Table 15, and World Bank online data.
[26] For reasons that are well-known, it would be preferable to use GNP rather than GDP as the basis of these comparisons, but EU data are based on GDP. In recent years the replacement of GDP with GNP, in any ratio such as *Investment/GDP,* will raise Ireland's relative position in any international ranking.

Figure 6: *Dwellings per 1,000 Population: EU-15, 2002-2003*
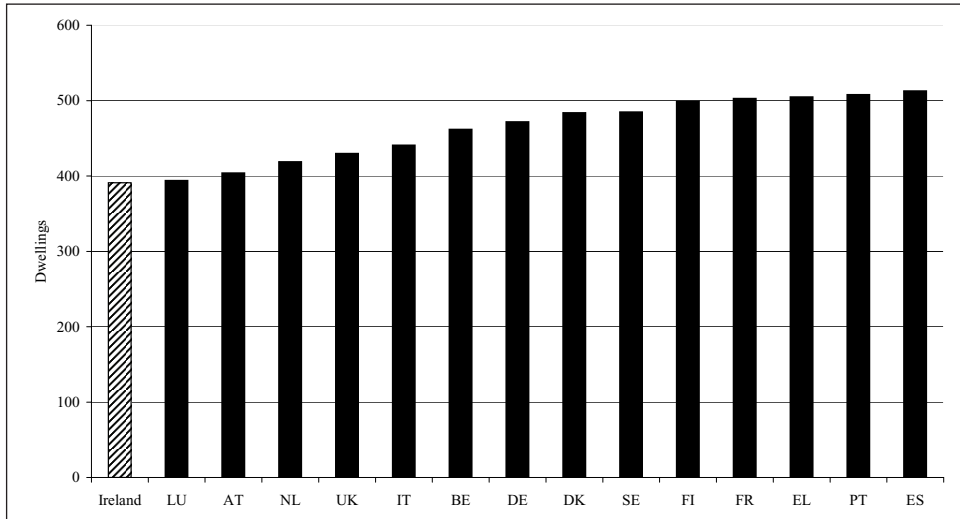
Source: Housing Statistics in the European Union 2004. Data for 2003 except: LU, FR 2002; FI, EL 2001; UK 2000; IT 1995.

IV CONCLUSIONS

The high incidence of owner occupation has a number of sources. The user cost of housing has been low and usually negative and the microeconomics of the tenure decision have tended to favour owner occupation. However the reasons for that go beyond considerations of fiscal incentives: portfolio considerations also make house-purchase an attractive choice. Historical factors relating to land tenure and to landlord and tenant legislation are a further part of the explanation of the level of owner occupation. Although the level of owner occupation is exceptional, the size of the housing stock relative to population is not, and in 2002-3 Ireland was still in last place in this respect within the EU-15.

Tenure patterns have a strong life-cycle dimension, with the proportion of owner occupiers rising with age across the age spectrum as age rises. As each cohort ages, the incidence of owner occupation rises, and renting is concentrated among the young, particularly those aged 20 to 34.

In a neutral tax regime user cost would equal reservation rent. The latter has frequently been negative, as we have seen, as indeed has the measure R – c, which is the appropriate expression for user cost and reservation rent in the absence of tax effects; in particular this is the appropriate measure of user cost at the margin for purchasers using debt finance who have exhausted the

allowable interest deduction. From all of this it might appear that user cost would be negative even under a neutral tax regime, or under one in which no mortgage interest was deductible. This would not be a valid conclusion, because such regime changes would affect the growth of property prices.

It is important not to extrapolate from the evidence presented here into the future, without considerable caution. Consider an intending purchaser in the 1990s who based his calculations on the then-current growth rates of property prices. As we have seen, such a purchaser would have perceived a significant incentive to buy rather than rent, and *ex post* that would have turned out to be a correct conclusion. However, it would be dangerous for policymakers or indeed for individual purchasers to base decisions for the future on current values of user cost, based on *ex post* capital appreciation. In the past, expectations based on *ex post* capital appreciation would have performed well, but under current uncertainties much more research is needed on how expectations are in fact formulated.

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APPENDIX A

Consider a property initially worth V_0, appreciating in value at the annual rate c. The rate of interest on property loans is R, and the rates of income tax and capital gains tax are t_y and t_c respectively. The property may be owned and let by a landlord, or alternatively it may be owner occupied. In either case assume that a portion E of the total value is held as equity. Assume that R is also the opportunity cost of equity in property.

For a landlord, the rate λ of reservation rent is determined by equalising the after-tax return from investing in property with the return from investing in an alternative asset.

Then $(1 - t_y)(\lambda V_0 - R(V_0 - E)) + (1 - t_c)cV_0 = (1 - t_y)RE$, so that the rate of reservation rent is

$$\lambda = R - (1 - t_c)c/(1 - t_y) \tag{A1}$$

Currently in Ireland, $t_c = 0.2$. For individual taxpayers who are chargeable at the lower rate of income tax, $t_y = 0.2$ also, so that $\lambda = R - c$. This is an upper bound for λ: for individual taxpayers who are liable to the higher rate of income tax, $t_y = 0.42$ in 2006 and $\lambda = R - 1.38c$ (or in 2007, $t_y = 0.41$ and $\lambda = R - 1.36c$), while for corporate landlords, $t_y = 0.25$ and $\lambda = R - 1.07c$.

If interest were not deductible for tax purposes, then $(1 - t_y)V_0\lambda' - R(V_0 - E) + (1 - t_c)cV_0 = (1 - t_y)RE$, so that the rate of reservation rent would be

$$\lambda' = R/(1 - t_y) - (1 - t_c)c/(1 - t_y) - t_yRE/V_0(1 - t_y) \tag{A2}$$

This was the position in Ireland from April 1998 until December 2001, and the impact of this policy may be seen as follows:

$\lambda' - \lambda = R/(1 - t_y) - t_yRE/V_0(1 - t_y) - R = [Rt_y/(1 - t_y)][1 - E/V_0]$, which is positive, assuming that $E < V_0$. Thus, as might be expected, the reservation rent rises when interest is disallowed as a deduction.

For a purchaser, we start with the most comprehensive definition of taxable income, where imputed rent at the rate $\mathcal{I}$ from owner occupation is subject to income tax, interest payments are deductible, and capital gains are taxed, so that user cost equals the (gross) interest cost plus taxation (which reflects interest deductibility), reduced by the net-of-tax rate of capital gain.

Thus $u = R + t_y(\mathcal{I} - R) - (1 - t_c)c$. If $\mathcal{I}$ is set equal to the rate of reservation rent λ, as in (A1) above, then

$$u_1 = R + t_y[R - (1 - t_c)c/(1 - t_y)) - R] - (1 - t_c)c$$
$$= R - (1 - t_c)c[t_y/(1 - t_y) + 1] = R - (1 - t_c)c/(1 - t_y) = \lambda \tag{A3}$$

When interest is deductible for tax purposes, but imputed rental income and capital gains are untaxed, which is the current position in Ireland for a principal private residence on a site of no more than one acre, then

$$u_2 = (1 - t_y)R - c. \tag{A4}$$

Finally, if capital gains tax were imposed on private residences, without taxation of imputed rents, then c should be replaced in (A4) by $(1 - t_c)c$.

Taking the expressions (A1) and (A4) for reservation rent and user cost, we may show that:

if $u_2 > 0$ then $\lambda > u_2$. This follows from the fact that multiplying u_2 by $1/(1 - t_y)$, which exceeds 1, we have $R - c/(1 - t_y)$ which must exceed u_2, given $u_2 > 0$, and then

$$\lambda = R - (1 - t_c)c/(1 - t_y) > R - c/(1-t_y) > u_2.$$

It is also the case that if $\lambda > 0$ then $\lambda > u_2$: multiplying λ by $(1 - t_y)$ gives us $(1 - t_y)R - (1 - t_c)c$, which must be less that λ, and then $u_2 = (1 - t_y)R - c < (1 - t_y)R - (1 - t_c)c < \lambda$. However, notice that while $u_2 > 0 \Rightarrow \lambda > 0$, the converse does not hold.

If λ equals $R - c$ exactly or approximately (e.g. if t_y is the standard rate of income tax or the rate of corporation tax, at current values), then $u_2 = (1 - t_y)R - c < R - c = \lambda$ always, i.e. whether λ is positive or negative.

We may extend this analysis formally to a multi-period context by equating the present value of rents (or imputed rents) plus capital gains to the initial value of a property, over a given time interval [0,T]. Holding constant the rate of interest, the tax structure and the time horizon, we assume that reservation rents vary in proportion to capital value so that for landlords we must find a scalar λ such that, where r is the discount rate,

$$- V_0 + V_0 e^{(c-r)T} - (V_0 e^{cT} - V_0)t_c e^{-rT} + (1 - t_y)\lambda V_0 \int_0^T e^{(c-r)t}\, dt = 0 \tag{A5}$$

The solution for λ is the rate of reservation rent. Alternatively, setting $t_y = 0$ (i.e. no tax on imputed rent) and replacing λ with u we have the corresponding expression for the owner occupier:

$$-V_0 + V_0 e^{(c-r)T} - (V_0 e^{cT} - V_0)t_c e^{-rT} + u V_0 \int_0^T e^{(c-r)t}\, dt = 0 \tag{A6}$$

If interest payments are deductible, we set the discount rate r equal to $R(1 - t_y)$; otherwise $r = R$.

Taking the definite integral and rearranging, we have:

$$\lambda = \frac{c - r}{1 - t_y} \; \frac{1 - e^{(c-r)T} + t_c(e^{cT} - 1)e^{-rT}}{e^{(c-r)T} - 1} \text{ (for the moment assuming that } c \neq r),$$

$$= \frac{r - c}{1 - t_y} + \frac{c - r}{1 - t_y} \, t_c \, \frac{e^{cT} - 1}{e^{cT} - e^{rT}} \, . \text{ By expanding the exponentials out to the}$$

linear terms, $\dfrac{e^{cT} - 1}{e^{cT} - e^{rT}}$ may be approximated by $c/(c-r)$ when T is small, in

which case we have as before:

$$\lambda = \frac{r - c}{1 - t_y} + \frac{ct_c}{1 - t_y} \;\; = \;\; \frac{r}{1 - t_y} - \frac{1 - t_c}{1 - t_y} \, c \text{ for landlords, or } u = r - (1 - t_c)c \text{ for}$$

owner occupiers, where in either case r equals $(1 - t_y)R$ if interest at the rate R is deductible for income tax purposes, and $r = R$ otherwise. In the case of deductibility, and with capital gains tax levied only on landlords we again have

$$\lambda = R - \frac{1 - t_c}{1 - t_y} \, c \text{ and } u_2 = (1 - t_y)R - c.$$

When T is large and the first-order approximations to the exponentials are invalid, we have to consider the term $\dfrac{e^{cT} - 1}{e^{cT} - e^{rT}}$. If $c > r$ it is clear from

inspecting the graph of e^x that $\dfrac{e^{cT} - 1}{e^{cT} - e^{rT}} > 1$. Alternatively if $c < r$, $\dfrac{e^{cT} - 1}{e^{cT} - e^{rT}} < 0$.

In either case $\dfrac{c - r}{1 - t_y} \, t_c \, \dfrac{e^{cT} - 1}{e^{cT} - e^{rT}} > 0$, and the existence of capital gains taxes

raises the reservation rent. The corresponding expression for owner occupiers is obtained by setting $t_y=0$, and this also is raised.

Finally, we must consider the case $c = r$. Equation (A5) reduces to

$$-1 + 1 - (1 - e^{-rT})t_c + (1 - t_y)\lambda \int_0^T dt = 0, \text{ from which } \lambda = \frac{(1 - e^{-rT})t_c}{(1 - t_y)T} > 0,$$

whereas in this case user cost is zero. The latter may be found by solving (A6) after setting $c = r$. Again, we have user cost less than the rate of reservation rent.