Demographics, Human Capital, and the Demand for Housing

Piet Eichholtz

Maastricht University, PO Box 616, 6200 MD Maastricht, The Netherlands

Thies Lindenthal

Maastricht University, PO Box 616, 6200 MD Maastricht, The Netherlands

Abstract

This paper aims to investigate how demographics determine the amount and the quality of housing services demanded, based on a very detailed 2001 cross-section of English households. It refines the existing methodology by distinguishing between life cycle variables that are expected to change with age for each household, and cohort variables that are determined by the household's birth-cohort and not by age. The paper's key results are that housing demand is mainly driven by human capital and that is does not decline with age. A scenario analysis with different population projections shows that in case of stagnating household numbers total demand can still increase as the population grows older. These findings are relevant to other European countries that already experience population shrinkage at an unprecedented magnitude.

Key words: housing demand, demographics

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Email addresses: p.eichholtz@maastrichtuniversity.nl (Piet Eichholtz), t.lindenthal@maastrichtuniversity.nl (Thies Lindenthal)

1. Introduction

18 years after Mankiw and Weil started a short-lived but intense debate on how demographics drive the demand for housing, empirical evidence is still not conclusive, especially in an international context. Demographic change, however, is one of the key challenges many industrialized countries will face in the future. To give a brief example, the United Nations Population Division (2007) estimates that Russia will lose 24% of its current population by the year 2050. For Bulgaria, the expected decline in total population is 35% in the same period, while neighboring Turkey will experience an impressive population growth of 29%. On a regional level, population changes are even more pronounced. The German federal state of Thuringia, for example, is already losing 1% of its population annually (Thüringer Landesamt für Statistik, 2008). Beside the rapid changes in total populations numbers, societies will age dramatically. In South Korea, for instance, the median age is increasing three years every five years and the share of inhabitants older than 60 years will increase from 14% now to 42% in 2050. International demographic dynamics dwarf the so-called baby bust in the United States.

Given the fundamental demographic change currently underway, it is surprising how few studies have researched the effect of demographics on housing markets in Europe and Asia. For Japan, Ohtake and Shintani (1996) find that demographic change has a significant effect on housing prices through the short-run adjustment process in the housing market. Ermisch (1996) establishes a link between age (among other demographic variables) and the level of housing services demanded in six British agglomerations. Lindh and Malmberg (1999) show that the population's age structure is related to residential construction in Sweden and other OECD countries. Lee et al. (2001) find evidence that demographics do explain the amount of housing services demanded in Austria. Neuteboom and Brounen (2007) predict Dutch housing demand to increase with household age.

In their controversial work, Mankiw and Weil (1989) modeled the per-capita quantity of housing demanded as a function of age. Analyzing 1970 census data for the US, they found demand for housing to be very low for residents younger than 20 years, to shoot up for 20-35 years-olds, and to decline constantly thereafter. Furthermore, they created a time series of housing demand by combining the cross-sectional results on the age-specific quantity of housing demand with time series data on the age composition of the population. Regressing this demand time series against the aggregated housing quantity (represented by the net stock of residential capital) revealed no significant dependency. Real house prices, however, were found to depend on demand as defined by their model. Mankiw and Weil concluded that the ageing baby-boom generation's move out of the high-demand age-classes would drive total demand down and result in a sharp drop in house prices.

Criticism of this paper came from many directions: Peek and Wilcox (1991) investigated the movements of house price indices and found that real after-tax interest rates and construction costs were the main determinants of price swings. Demographic variables like income and age were still significant but not as pronounced as suggested by Mankiw and Weil. Hendershott's (1991) main point of criticism was the lack of predictive power of the Mankiw and Weil models for the 1970s and 1980s, making predictions for the 1990s impossible. In addition, he criticized the negative time trend in their basic equation which accounts for most of the predicted decline Mankiw and Weil had explained by demographics.

Engelhardt and Poterba (1991) applied the Mankiw and Weil approach to new data. For Canada, they observed an age-housing demand relationship similar to the one Mankiw and Weil found for the US. Canadian house prices, however, were not determined by the derived demand variable.

Green and Hendershott's (1996) paper was the next cornerstone of the debate. They followed Mankiw and Weil in linking per capita housing expenditures and demographic information based on cross-sectional data from the 1980 census. The methodology, however,

advanced in two aspects: first, they estimated the real contribution each hedonic characteristic of a dwelling makes to the household's housing expenditures. This made it possible to control for the quantity *and* quality of housing services consumed. Second, they regressed the marginal prices of each of these hedonic characteristics against the demographic variables of the household. These innovations allowed the quantity of housing services consumed (by defining a constant quality house) *and* all demographic characteristics but age to be kept constant. They found that demand for housing does not decline with age, but rather that education and income determine the quantity services of housing consumed. This implies that Mankiw and Weil underestimated the housing services the baby-boom generation would demand in the future by not controlling for the fact that younger generations enjoyed a better education than their predecessors.

This paper extends the work of Green and Hendershott (1996) in three directions: first, we refine the existing methodology and model the demographic dynamics more carefully. We separate *life cycle variables*, that change their values according to the household's state in the life cycle, from *cohort variables*, which do not change with age. Instead of allowing every demographic variable to vary (like Mankiw and Weil, 1989), or keeping all demographics constant (like Green and Hendershott, 1996) we explicitly consider the change in the life cycle variables like income or household size over time. This leads to a more robust projection of housing demand.

Second, a very detailed micro-dataset provides information on the hedonic attributes of a representative share of English residential real estate in combination with extensive demographic information on the respective households. The majority of earlier studies was based on publicly available census cross-sections. These are easy to analyze, allow for very large samples, and are very representative. On the downside, however, census data offers

only very basic information on the physical attributes of the dwellings[1]. Fortunately, our data set offers rich information on the physical characteristics of individual homes, their interior and exterior condition, energy efficiency, the local environment, and the attitudes of the inhabiting households towards their residence as well as similarly detailed information on the household's demographic profile. Overall, more than 900 variables are coded in the data set, of which approximately two thirds are relating to the dwelling, and one third to the household.

Third, using English data gives us the opportunity to analyze an environment different from the Unites States. This international perspective is crucial since demographic changes in the US are, although important, dwarfed by the developments in Europe and Asia. The United States are projected to experience further population growth (albeit at a lower rate than before) combined with a younger age distribution than most European countries.

Britain is not expected to have a demographic contraction like continental European countries, especially in Central and Eastern Europe, but the situation is very distinct from the US and Canada. The British population growth is leveling off more rapidly and the population's age structure is already older than the American. Until 2050, the projected growth rate in British population numbers is less than half the American equivalent[2]. This makes the UK housing market a very interesting environment to investigate demographic implications.

The remainder of the study is organized as follows. In the first sections, we present the method and data we use. Section 4 discusses the results and establishes a link between demographics and housing demand. Continuing in Section 5, we combine our results with demographic projections, allowing for demand forecasts for the next 20 years. A summary

[1]Green and Hendershott (1996), for instance, had to restrict their analysis to 18 hedonic variables of housing quality, including 8 regional dummies.

[2]The United Nations project the population growth from 2010 to 2050 to be 11 %, while the United States will enjoy a total population increase of 27 %.

and discussion of the main results finishes the paper.

2. Method

We follow the method first proposed by Rosen (1974) and subsequently refined by Green and Hendershott (1996). The first step is to estimate the relationship between the flow of housing services and the hedonic characteristics of the dwelling:

$$q = f(Z), \tag{1}$$

where q is the flow of housing services from the dwelling (rent paid or user costs of housing – for a discussion see the next section), and Z is a vector of the hedonic characteristics of the house. Then, we take the derivative of f and obtain the real marginal contribution q_i of each hedonic characteristic to housing demand:

$$q_i = \frac{\partial f}{\partial z_i}(Z). \tag{2}$$

In the last step, the marginal contributions obtained from (2) are regressed against the demographic characteristics of the household:

$$q_i = g_i(Z, A, X, Y), \tag{3}$$

where X is a vector of the demographic characteristics of the household. The household's age A and income Y are excluded from X and controlled for separately (Green and Hendershott, 1996).

Again following Green and Hendershott (1996) in selecting functional forms for (1) and

(3), we use the translog function by Christensen et al. (1975) to estimate equation 1:

$$ln(q) = \alpha_0 + \sum_{i=1}^{n} \alpha_i ln(z_i) + 0.5 \sum_{i=1}^{n} \sum_{j=1}^{n} \beta_{ij} ln(z_i) ln(z_j) + \epsilon; \tag{1'}$$

α_0 being the intercept, α_i the coefficient of characteristic i, and β_{ij} is the coefficient of the characteristics i and j interacting. ϵ is independently and normally distributed (1′) and is estimated subject to the following restrictions:

$$\sum_{i=1}^{n} \alpha_i = 1, \tag{4}$$

$$\sum_{i=1}^{n} \beta_{ij} = 0, \tag{5}$$

$$\beta_{ij} = \beta_{ji}. \tag{6}$$

We restrict (1) to be homogeneous of degree one, therefore the aggregated housing service of a house can be computed (based on Euler's theorem) as:

$$q = \sum_{i=1}^{n} q_i z_i, \tag{7}$$

where z_i is the amount of characteristic i included in the house. Taking partial derivatives of (1′) with respect to z_i gives us the hedonic prices q_i:

$$q_i = \frac{\partial q}{\partial z_i} = \left(\alpha_i + \sum_{j=1}^{n} \beta_{ij} ln(z_i) \right) \frac{q}{z_i}. \tag{2'}$$

Considering the case when markets are perfect and housing suppliers have identical cost functions, all variation in q_i is caused by nonlinearities in the hedonic model (1). Residents, however, have heterogeneous utility functions depending on tastes and demographics. In the

last step, we regress q_i on the demographic variables and on the level of z_i:

$$q_i = \gamma_0 + \gamma_z z_i + \sum_{a=1}^{14} \gamma_a A_a + \psi X + \gamma_y Y + \sum_{a=1}^{14} \gamma_{ya} Y A_a + \mu, \tag{3'}$$

where the γ's are individual coefficients, A_a are dummies for 14 five-year age cohorts (starting at age 15), and μ is independently and normally distributed. Y is the household's income net of housing expenditures, while the vector ψ contains the coefficients for the other demographic variables in X.

The service flow provided by the ith hedonic characteristic varies with age-class j:

$$q_{ij} = \gamma_0 + \gamma_z z_i + \sum_{a=1}^{14} \gamma_a A_{ja} + \psi X_j + \gamma_y Y + \sum_{a=1}^{14} \gamma_{ya} Y_j A_{ja}, \tag{3''}$$

where X_j and Y_j contain the demographic profile of the household and its income.

Life-cycle variables like the household's size, employment status, physical fitness, and, most importantly, household income are unlikely to stay constant when households age. Cohort variables like educational level, gender, and ethnicity will not change in age. Instead of allowing every demographic variable to vary (like Mankiw and Weil, 1989), or keeping all demographics constant (like Green and Hendershott, 1996) we explicitly model the change in the life cycle variables like income[3] over time, while keeping the cohort variables constant.

Like Campbell et al. (2001), we use income dynamics estimates derived from a household panel to calibrate the model. For the 1991-2001 waves from the British Household Panel Survey, we estimate a fixed effect model:

$$ln(income)_{i,t} = \mu_i + \sum_{a=21}^{75} \delta_a DA_{a,i,t} + \sum_{a=21}^{75} \sum_{edu=1}^{3} \eta_{a,edu} DA\_Educ_{a,edu,i,t} + \nu_{i,t} \tag{8}$$

[3]Hwang and Quigley (2006), in establishing a causality between income and housing services consumed, find that exogenous increases in aggregated income drive house prices up.

where μ_i is capturing household fixed effects, DA_a is a dummy variable equal to 1 for households with a head aged a (and 0 otherwise), DA_Educ are age-education interaction dummies, δ and η are coefficients, and ν is independently and normally distributed.

Furthermore, we assume household size, employment, and physical fitness to change as people reach age 60 and above. Ermisch (1996) argues that household types change in the household life cycle, and we let this variable adjust to representative values for each age-class.

Finally, total demand for housing q can be obtained by summing over the age classes and then the housing characteristics:

$$q = \sum_{a=1}^{14} \sum_{i=1}^{n} w_a q_{ia}, \tag{9}$$

where w_a is the share of households in age-class a.

3. Data

This paper builds on data collected for the English Housing Condition Survey (EHCS). The EHCS is a study undertaken by the Office of the Deputy Prime Minister to assess the condition of the English[4] housing stock and to evaluate the effect of housing market policies. A representative cross-section of households is interviewed about their views on their home and neighbourhood, their income, and housing costs, and about demographic details of the household's members. Additional information on the interior and exterior condition of the dwelling, its energy efficiency, and the local environment is obtained by a subsequent professional inspection. Each dwelling's market value is estimated by two professional appraisors independently (Office of the Deputy Prime Minister, 2003). From 1971 until 2001, the EHCS was conducted every five years. Since April 2002 the EHCS has

[4]Similar studies have been undertaken for Wales and Scotland, but unfortunately these surveys are not entirely equivalent to the EHCS. We will therefore use English data only.

been running on a continuous basis[5].

For 17,500 dwellings a full interview, physical survey, and market valuation is obtained. Excluding vacant dwellings leaves us with a sample of 16,749 households covering all tenures and regions. The EHCS is based on a stratified sample with over-sampling of the rented tenures, which otherwise would be too small a sample to allow for reliable results. As a consequence of this sampling technique, each observation must later be weighted with a grossing factor when calculating aggregated national figures from this sample (ODPM, 2002).

The rental market for housing is subject to two strong sources of governmental intervention: first, Local Authorities (LA) and Registered Social Landlords (RSL) offer relatively inexpensive housing to low- and middle-income households. Affordability is important, since the median of the income[6] of tenants from RSL or LA dwellings is only two thirds of the median of income renters in the unregulated market. Second, a substantial share of low-income households are eligible for direct housing subsidies, especially the very young and the old households. Where housing benefits are paid, they amount to 85% of all rent paid on average.

For this study, both forms of state intervention cause severe distortions, since we assume

[5]The English Housing Condition Survey gradually evolved over time which makes it difficult to combine the data from different years in quasi-panels. Multiple demographic key variables like the education of the household's members or their attitudes towards the dwelling they live in were only introduced in 2001. Our later analysis shows that especially the educational achievement is crucial in explaining the willingness to pay for housing, thus we do not consider the pre-2001 cross-sections, which lack this information.

We have access to the continuous survey data for 2002, 2003, and 2004. Again, the number of variables is lower than in 2001. Pooling these years does not create additional information, since interesting details will be lost. In addition, the number of observations per year is roughly half the number of 2001, making an analysis based on single years with a large number of explanatory variables impossible.

Overall, demographic changes between 2001 and 2004 are not very pronounced since the period is relatively short. Possible changes in demand patterns over time will be mainly caused by other factors like the expected changes in house prices, risk premia, or the cost of housing financing. In sum, we prefer the richness of the 2001 data set over the intersection of more years.

[6]Income is the annual net income of the household reference person and any partner from wages, pensions, savings and social benefits. It does not include housing related benefits such as council tax benefit, housing benefit, Income Support Mortgage Interest or any payments made under a Mortgage Payment Protection Insurance policy (ODPM, 2002).

that subsidies will shift demand upwards, and the choice of dwelling characteristics will no longer be solely determined by the household's housing preferences and budget. We therefore exclude all dwellings rented from Local Authorities and Registered Social Landlords, which further reduces our sample to 9,453 observations. After grossing the remaining observations still represent 80% of the English housing stock, according to the Office of the Deputy Prime Minister (ODPM, 2002).

Single cross-sections can obviously provide information for one moment in time only. Disentangling age effects common to all households from cohort effects is impossible. When one generation has a relatively strong willingness to pay for housing services (after controlling for income etc.), studies based on one cross-section necessarily have to assume that the following generations will have the same preference when reaching this age. Forecasts can be inaccurate in case there are inter-generational differences in tastes (Myers, 1999). The data this paper is based on allow us to analyze one cross-section only, thus our findings are subject to this limitation.

The EHCS classifies dwellings into the following categories: small terraced houses, large terraced houses, (semi-)detached houses, bungalows, and flats[7]. Dwelling types are relatively similarly distributed in 8 out of 10 regions. (Semi-)detached houses and bungalows make up the largest share (54%), followed by terraced houses (29%) and flats (18%). Inner and Outer London, however, have a different structure, with less houses (67%/35%) and a higher share of apartments (34%/65%)[8].

With respect to the year of construction, all dwellings are clustered into 9 cohorts[9]. Large

[7]A *small terraced house* is a house forming part of a block where at least one house is attached to two or more other houses. It has a floor space up to $70\,m^2$, in contrast to the *medium/large terraced house*, which is bigger than $70\,m^2$. *Semi-detached houses* are houses that are attached to one other house, whereas a for a *detached house* none of the habitable structure is joined to another residential building. *Bungalows* are houses with all of the habitable accommodation on one floor. We do not further classify *flats* into possible sub-categories like flats in high-rise vs. low-rise buildings or converted flats vs. purpose-built flats.

[8]Table 1 provides additional summary statistics.

[9]The EHCS construction-classifications are: pre 1850, 1850-1899, 1900-1918, the (inter-)war period 1919-

regional differences with respect to the construction time distribution can be observed. In general, the least attractive construction cohorts ranging from 1850 until 1964 are more often observed in the northern regions and London. The South-West has the highest share of pre-1850 buildings. Our data suggest a natural selection process in favor of quality: Buildings erected before 1850 are on average twice as valuable today as the average value of a house built after 1850 (Table 2). High quality dwellings or houses at unique locations are more likely to survive, which will be reflected in relatively higher values for the very old cohorts.

A similar north-south difference can be observed in our sample with regard to age. Prices of dwellings in the northern regions are less than half the prices of those in the southern regions (not correcting for quality). London has a special role again, with private residential property values being twice as high as the national average (Table 2).

The northern regions display a lower share of owner-occupied dwellings and a higher share of residential property provided by Local Authorities when compared to the south of the country (London being an exception again).

3.8% of all households in our sample live in dwellings that fail to meet minimal quality standards and are regarded 'unfit' for housing according to the law[10]. Again, Inner London has a special position with twice the national percentage of unfit dwellings, which might be caused by the relatively old housing stock and low home-ownership rates.

// insert Table 1 and Table 2 here //

When analyzing the demographic characteristics of households in our sample, we follow the EHCS definition for *Household Reference Persons (HRP)*, representing the household's social and economic position. The HRP is the person in whose name the dwelling is owned

1944, 1945-1964, 1965-1974, 1975-1980, 1981-1990, and 1991-2001.

[10]For a dwelling to be fit under Section 604 of the 1989 Local Government and Housing Act it must satisfy criteria related to: disrepair; structural stability; dampness; lighting, heating and ventilation; water supply; drainage; facilities for food preparation; and the presence, location and functioning of essential utilities (WC, bath/shower, and sink).

or rented or who is otherwise responsible for the accommodation. When two or more people jointly own or rent the dwelling, the person with the highest income is taken as HRP (ODPM, 2002).

Educational levels differ significantly across age groups in the sample. More than 50% of all residents aged 65 and above do not reach the GCSE-level (or comparable), as opposed to merely 12% for the 25-29-year-olds. Of the 25-29-year-olds 38% are holding a university degree, as compared to less than 15% for people older than 65. Since education is the most prominent determinant of human capital, one obviously needs to control for it.

// insert Table 3 here //

We regard tenure as a typical example of a life cycle driven variable. Our data suggests that tenure is determined by the household's current position in the life cycle. The largest share of students and young professionals heading a household first lives in privately let dwellings. The share of privately rented houses decreases by half between age 20 and 30, as people leave school or university and start working, start families, and buy their own homes. From age 30 until 40, the share drops again by half and stays low thereafter. The very low home-ownership rate among residents aged 70 and older, however, could be caused by a negative cohort effect for this generation.

4. Results

The user cost of housing q for renters is the sum of rent, energy, and service costs (if not included in the rent already), and the local council tax[11], if applicable. For owner-occupied housing, the cost of housing q_{owner} can be understood as the opportunity cost of not investing

[11] In our sample, 20% of dwellings are subject to council tax, which is the only residential property tax in the UK. Council tax is paid by the resident and not necessarily by the owner. We account for council tax support granted to economically weak households.

in an asset class similar to residential real estate:

$$q_{owner} = V \cdot (r_f + \rho - g) + K, \tag{10}$$

where V is the value of the dwelling, r_f the risk-free interest rate in 2001, ρ a risk premium for residential real estate, g the expected capital gain, and K is the sum of all direct costs for maintenance, energy, and council tax. We set r_f to 4.78% which is the yield for 20-year British government bonds in 2001. g is set to 2.5%, which is the average real annual growth rate of the Halifax housing index for 1983-2001. For the risk premium ρ we take one half of the UK equity premium of 4.2%, as estimated by Dimson et al. (2003). Figures for the direct costs are provided in the EHCS data set. We subsequently try a number of specifications for the interest rate, the equity premium and the expected price appreciation, which scales the vector of marginal prices. The relative magnitude of the marginal prices compared to each other is stable, however.

We estimate (1′) by ordinary least squares, subject to constraints (4)-(6). Table 4 presents the coefficients and the partial derivatives q_i for each of the 47 hedonics, which can be understood as the premium (or discount) households are willing to pay for one more unit of this characteristic. The signs of the partial derivatives are all as expected: positive for normal goods and negative for inferior goods. As an example, residents are willing to pay an additional £1,793 a year for living in a detached house, when compared to an apartment, which is the reference house type. Not surprisingly, a residence in London comes at a hefty premium when compared to the North East.

Houses constructed in the 19th century are preferred over more recently erected structures. Houses built before 1850 are most attractive, while the least attractive construction periods are 1945-1974 and 1991-2001. Older houses apparently have features like architecture or neighborhood attractiveness that are not captured in our control variables but accounted

for in the time dummy.

Other normal goods like parking space or a garage, a second living room or bathroom, central heating, more floor space, or a larger plot size all have positive derivatives.

Living in a city center (as opposed to a rural environment) is attractive when compared to a suburban residential or an urban area. Neighbors are not valued much: isolated locations or places with only a few dwellings are more expensive than places with many houses surrounding. As expected, areas experiencing high demand are more expensive; areas with many vacancies, on the other hand, come at a discount. The EHCS provides two measures of the level of crime in an area. In the interviews, respondents are asked about their perceptions with regard to crime. We find a positive coefficient for the dummy indicating that no crime is perceived. Second, we interpret the presences of secured windows and doors as an indicator for a threat of burglary, and we find negative coefficients for it. Links to public transport close to the house make a place more attractive[12].

// insert Table 4 here //

Having established hedonic prices, we link the prices to the demographic characteristics of the inhabitants by equation (3′). We use 52 variables[13] to estimate how the portfolio of

[12]The explanatory power of the regression improves quite substantially when estimating (1′) including dwellings rented out by social landlords and local authorities into the sample as well, with the R^2 nearing 0.76. Apparently, rents are easier to explain by the underlying hedonics, since they are heavily regulated. In many cases regulation prescribes a clear relation between hedonics like floor space or number of rooms and the rent asked. In addition, buildings in the social housing sector are more standardized than owner-occupied houses, which makes them easier to model in a linear way.

[13]We regress the marginal prices q_i against the following demographic variables: age-group dummies (15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 55-59, 60-64, 65-69, 70-74, 75-79, 80+), education dummies (up to GCSE/O level/CSE Equivalent; up to A level or equivalent; up to degree, or degree equivalent; higher degree/postgraduate qualification), employment status dummies (full time work, part-time work, retired, unemployed, full time education), gender, dummy for persons with long-term illness in household, ethnicity dummies (black, Asian, other non-white), dummy for disabled person living in the household, dummy for households with children, dummies for personal motives of the residents (always lived in the dwelling, have familiy and friends close by, live close to work, regard the dwelling as the "right kind of property", affordability, wishing to move), the usage (weekend and evenings only), the household's income, the interactions of income with age, and the household's size.

housing services demanded varies with age, household composition, household type, economic situation of the household, income, employment status, educational level, ethnicity, and attitudes of the inhabitants regarding the dwelling they live in.

Equation (2′) states that imputed prices for each hedonic characteristic are in fact marginal prices: the level of the hedonic characteristic z_i influences the marginal price q_i. For example, the willingness to pay for one additional bedroom depends on the number of bedrooms already present in the house. A household's unobservable taste will impact both the price and the quantity – someone with a strong preference for a garden will not only be willing to pay more for the garden but is more likely to have a large garden as well. In order to avoid the error term μ being correlated to the lefthand side q_i, we use two-stage least squares (2SLS), as suggested by Bartik (1987). In contrast to Green and Hendershott (1996), however, we employ 2SLS for the logarithmic variables only (floor space, plot size, # bedrooms). Income net of housing, regional dummies, dummies on the tenure, and dwelling type are used as instruments. Prices for characteristics measured by dummy variables are estimated by OLS omitting z_i, since the values of the respective dummies are difficult to be replaced by instruments not already included in our direct regressors.

The demand for most housing components increases with household size. Especially detached houses and bungalows are more in demand. As expected, the demand for more (bath) rooms is positively related to the number of people living in the dwelling. Singles do not have demand patterns very different from multi-person households after controlling for household size.

Higher levels of income shift the reservation prices for almost all housing components upwards (or downwards for inferior housing services). As an example, we estimate the premium a household is willing to pay for living in a detached house (vs. living in a small terraced house) to increase by 3.3% when income doubles.

Beside this direct income effect, we believe that a household's human capital is driving its

current housing consumption decision. The optimal level of housing consumption does not depend on current income solely, but to a large extent on the present value of future streams of income. The more income a household can expect, the more housing services it can (and wishes to) consume over its lifetime. Borrowing on mortgage allows young households to smooth their consumption inter-temporally, as higher levels of housing consumption are possible in earlier years already. Assuming a concave housing utility curve, the smoothing of housing consumption increases a household's lifetime utility. In addition, transaction costs are reduced, as the level of housing services does not necessarily need to be readjusted each time current income changes. The household will only move to a larger (smaller) home in case the expected value of human capital changes significantly.

Unfortunately, human capital is not easily measurable. We therefore have to rely upon education as a proxy for human capital, assuming higher levels of education to be related to higher future income. As an illustration, a well-educated young professional can expect that her income will increase more in subsequent years than the income of a less educated household with the same level of current income. Our results show that, after controlling for income, households headed by university graduates are willing to pay more (less) for all normal (inferior) goods when compared to households with lower educational achievements. This holds true for less advanced educational levels as well: having passed GCSE lets the household demand more housing than households without any conventional education (our reference group)[14].

Similarly, health plays an important role in housing demand. In our sample, households with members suffering from long-term illnesses or including people with disabilities consume less housing services. This does not imply that housing has a lower priority for the ill or disabled. Health problems, however, impair human wealth as future incomes are expected

[14]Relaxed borrowing constraints could be an alternative explanation, since banks could be more willing to provide mortgages to better educated customers.

to be lower, which in turn depresses overall housing consumption.

We do not find a direct impact of age on housing demand. Most coefficients for the cohort dummies are insignificant. Still, older households are more willing to pay for housing than younger households. The higher income-age interaction coefficients for older age groups do not indicate that older people spend more on housing in absolute terms. Given the lower income for retirees, it is rather the relative share of the income devoted to housing that drives up the coefficients. People simply stay in their houses after retiring, consuming the same amount of housing as before. This inter-temporal smoothing of housing consumption makes sense from an investor's life cycle perspective as well: owner-occupiers build up housing wealth during their working years and consume more than otherwise possible when retiring. For aging owner-occupiers, housing services are often as big as income. People apparently do not account for the opportunity costs of not renting out or selling the paid-off house they are living in. However, this line of reasoning cannot explain why elderly renters pay relatively more as well, since they have to make rent payments in cash. We believe that moving is costly for older people, both financially, since they have to rely on professional help more than younger households, and emotionally and socially, since they are leaving a place they lived in for years. In the same line of reasoning, it is not surprising that most of the coefficients for the variable indicating retirement are positive and significant, indicating a constant willingness to pay for housing even when income decreases.

Only few black and Asian households are included in the sample, and they are not evenly distributed geographically. After controlling for age, income, education, household type and size, we find Asian and black households to attach a discount on being owner, having a parking lot, or a suburban residential location. Dwellings constructed between 1850 and 1914 or located in highly demanded neighborhoods carry a premium. These results do not necessarily imply different tastes with regard to these characteristics directly, but we interpret them as a preference for traditional migrant neighborhoods in the historic city centers.

Households that are at home on weekends and in evenings only are less inclined to spend on housing services than households that use the space during workdays as well. The premium for owning the property, for instance, is decreased by £250 a year.

Those households that indicated that the place they live in is "the right kind of property" for them are willing to pay more for many housing services. Households that are intending to move soon, on the other hand, consume less housing than expected, given their level of income, education, and other demographic factors. We read this as another indicator for transaction costs letting households wait until the desired and the current level of housing strongly deviate before upgrading to a better home.

// insert Table 5 here //

Having established the link between demographics and the determinants of a house, we can now asses how demand for a constant-quality house will change in age. National averages are taken to define a representative constant quality dwelling. We calculate the demand for this dwelling in three alternative ways:

First, we calculate a total age derivative, in which all demographic characteristics of an age-group are changing in age (life cycle variables). Age groups are assumed to have the same demographic characteristics their predecessors had earlier. This is, roughly, the Mankiw and Weil (1989) approach.

Second, we calculate a partial age derivative based on cohorts, keeping all demographics beside age constant, which is in line with the approach used by Green and Hendershott (1996). For variables like the highest educational achievement or attitudes of the residents, this assumption is reasonable. But for variables like income, it certainly is not.

Third, the results from the demographic regression (Table 5) suggest that changes in household size, income, employment status, and health significantly influence housing de-

mand. We therefore define *life cycle variables*[15], which change with age, and estimate demand taking account of likely changes in these life cycle variables.

// insert Figure 1 here //

Changes in income are estimated using (8). In general, a household's income first increases with age, peaks around age 52, declines until age 65 and stabilizes subsequently. The better a household is educated, the more pronounced dynamics can be observed. For instance, income first quadruples for households headed by university graduates from age 25-52, and decreases again by one third as the members of the household retire, before it stabilizes. For lower educational levels, both the increase and the decline are less steep. Households who's head has enjoyed no formal education start at very low income levels, experience robust income growth until age 55, but do not suffer from income losses as they reach retirement. This surprising result could be linked to state transfers to the elderly and, more likely, to cohort effects in disguise: 62% of all household heads born between 1925 and 1930 received basic schooling only, while for the cohort born between 1975 and 1980, the share drops to as low as 11% (please see Table 3).

After age 65, we assume all households to retire, the household size to go down to an average of 1.5, the share of households with at least one disabled member to rise to 15%, and the share of households with long-term ill persons to rise to 35%[16], and calculate an adjusted partial derivative. We acknowledge that this is still a rough way of modelling which could be refined in the future. The age group of 50-54 is our reference group for both partial derivatives.

[15]Life-cycle variables are income, household size, household type, health of household members, or employment status.

[16]These assumptions are based on the averages for older age groups in our sample (controlled for income and education). We run robustness tests, using different parameters for income dynamics, health and household size. We do not observe qualitative changes in the results.

// insert Figure 2 here //

Figure 2 shows that demand for housing increases from age 20-24 until age 50-54 for all three derivatives by ca 50%. The total age derivative increases faster than the partial derivatives, which can be explained by younger cohorts having enjoyed a better education, earning more and having overall a higher expected worth of human capital. After 50-54[17], the total age derivative declines again, indicating that older households were consuming less housing services than younger ones. The partial derivatives, however, do not decrease, indicating that today's 50-year-olds will not reduce housing consumption – on the contrary, housing will be a more important part of their overall consumption. After age 55, the adjusted demand stabilizes, although the household's disposable income decreases. The unadjusted partial age derivative keeps increasing in age, even for the very old.

The total age derivative can be regarded as the lower bound of future housing demand for aging households, whereas the unadjusted partial age derivative is the higher bound. Or put differently: Mankiw and Weil were too pessimistic, while Hendershott and Green probably overestimated future demand. The adjusted partial age derivative's demand projections will be located in between the two extreme positions.

The pattern of the graph is very robust. Using different reference groups, alternative regression models, or different assumptions for the user-cost of housing q does not alter the overall shape qualitatively. Choosing younger reference groups makes the difference between the total age derivative and the partial age derivatives more pronounced as younger age cohorts are better educated and demand more housing. Using a semi-logarithmic functional form for $(1')$ does not change the results significantly. The level of the total demand, however, is quite sensitive to higher (lower) user cost of housing assumed, which will shift all three

[17]Please note that the age indicated in the graph is the age of the household reference person. By definition, this is not the average age of the household members, which is usually lower. Thus, the demand graphs for individuals instead of households is shifted to the left.

graphs upwards (downwards) in comparable ways.

The relative change of demand for housing services in age is similar for all dwelling types, as Figure 3 shows. Only the levels differ: the willingness to pay is highest for detached houses followed by terraced houses, bungalows and apartments. Demand for bungalows and detached houses rises faster in age than demand for apartments and terraced houses.

// insert Figure 3 here //

5. Future Demand for Housing

Our results allow for a discussion of the future development of housing demand in England with regard to changing demographics. We will focus on the two determinants of housing demand: the number of households and the level of housing services demanded per household.

The number of households in England is expected to grow further. The Government Actuary's Department (GAD) projects England's population to increase by 10% to 56 million in the period between 2007 and 2027 (GAD, 2007). In addition, household size is expected to decrease, leading to even more growth in household numbers suggesting higher future demand for housing. This robust future outlook is very different from the projections for many other European countries. Especially in many Central and Southern European countries, population growth has already turned into shrinkage and the population structure is older already (United Nations Population Division, 2007).

Combining projections for the population numbers and the age structure with the earlier established willingness to pay for a constant-quality house, gives a forecast for aggregate housing demand. Assuming the average household size to stay constant, we derive the number of households per age group and calculate aggregated demand based on Equation (9) for each year until 2027.

Our calculations suggest that housing demand will continue to grow, with an average

growth of 0.9% in the next 20 years. Demand growth will peak in the period from 2012 until 2017 and slow down afterwards.

Based on alternative assumptions regarding fertility rates and migration dynamics, the GAD offers so-called 'variant scenarios' in addition to the most likely scenario. Assuming higher fertility rates and higher net-migration into the UK leads to a scenario with a younger population, while lower fertility rates and low influx of (mostly) young immigrants results in projections of a relatively old population.

The graphs in Figure 4 show that the overall housing demand development is very similar across the three scenarios. Again, annual demand growth is positive for all years in all scenarios with a peak in 2012-2017. For the younger population scenario, changes are mainly driven by shifts in the total number of households. In the case of an older population, however, almost the entire growth can be attributed to higher per-household demand. Due to the robust outlook under all scenarios covered, we expect English housing demand to increase in the next years[18].

// insert Figure 4 here //

6. Conclusion

This paper aims to investigate how demographics determine the amount and the quality of housing services demanded. It contributes to the current debate in three ways: First, based on a very detailed 2001 cross-section of English households, we find that human capital is a key driver for housing demand. Variables that are positively related to human capital increase the demand for housing. For instance, each additional level of education a household has

[18]To convert our demand forecasts into house price predictions, we need information on supply elasticities in England. Malpezzi and Maclennan (2001) investigate the supply elasticity for residential property in the US and the UK. First, they find that the supply elasticity is lower in the UK than in the US. Second, for the post-war UK they estimate supply elasticities between 0 and 1, depending on the parameter values chosen in the models. This suggests that increased demand will further drive up house prices.

achieved, drives up its reservation prices for the housing services consumed. On the other hand, factors like chronic illnesses that impair human capital have a negative impact on housing consumption. Since each generation is better educated than the generations before, an aging society will demand more housing on an aggregated level, even if the total number of households stops growing. A scenario analysis with different population projections shows that the upward sloping partial age derivative is supporting demand in an aging society.

Second, we refine the existing methodology by distinguishing between life cycle variables that are expected to change with age for each household, and cohort variables, that are determined by the household's birth-cohort and not by age. Earlier studies either let all demographics change with age, or kept all variables constant during the entire household life cycle.

Third, we believe that our findings are very relevant for other European countries beside England. Despite the cultural and economic heterogeneity within Europe, the upward-sloping age-demand-relationship observed in England should be a reasonable proxy for other European nations, even in case of different demographic profiles. Today, Europe is facing an unprecedented demographic change: The entire area reaching from Germany in the west, to Russia in the east, and to the Balkans in the south is losing population already today – and this development is expected to gain momentum in the next decades (United Nations Population Division, 2007).

A regional housing market with unattractive economic perspectives and living conditions faces a double challenge: not only does the total number of households decline, but households having enjoyed a better education are more likely than the less educated to move away to more prosperous regions. Without the younger generation being better educated and more wealthy than the generations before, the pressure on housing demand caused by population shrinkage cannot be off-set.

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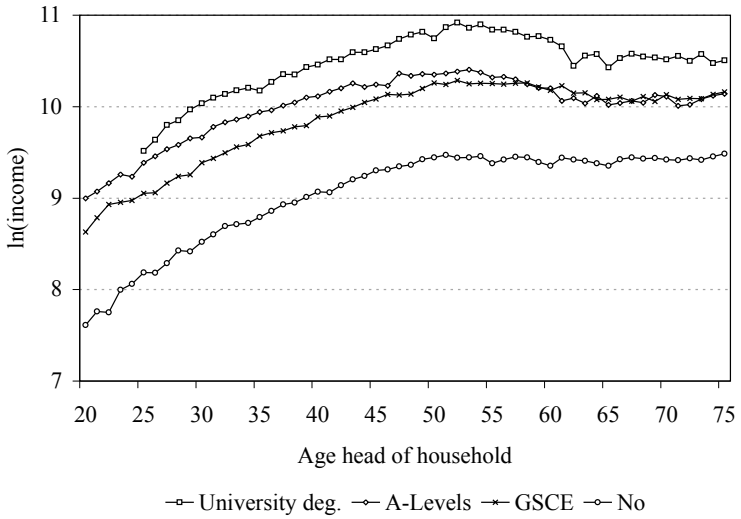
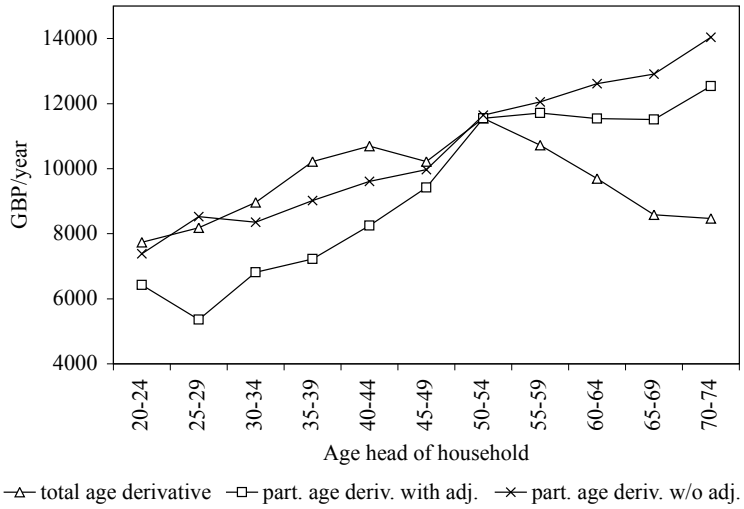
Figure 1: Income dynamics for British households



All values in £/year. A household's income first increases with age, peaks around age 52, declines until age 65 and stabilizes subsequently. The better a household is educated, the more pronounced dynamics can be observed. For instance, income quadruples for households headed by university graduates from age 25-52, and decreases again by one third as the members of the household retire, before it stabilizes. For lower educational levels, both the increase and the decline are less steep. Households who's head has enjoyed no formal education start at very low income levels, experience robust income growth until age 55, but do not suffer from income losses as they reach retirement.

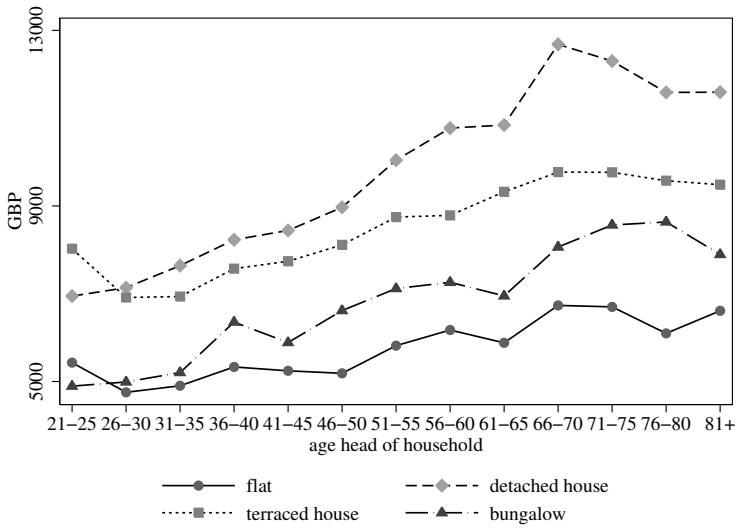
Data source: British Household Panel Survey, 1991-2001.

Figure 2: Demand for an average dwelling as a function of age



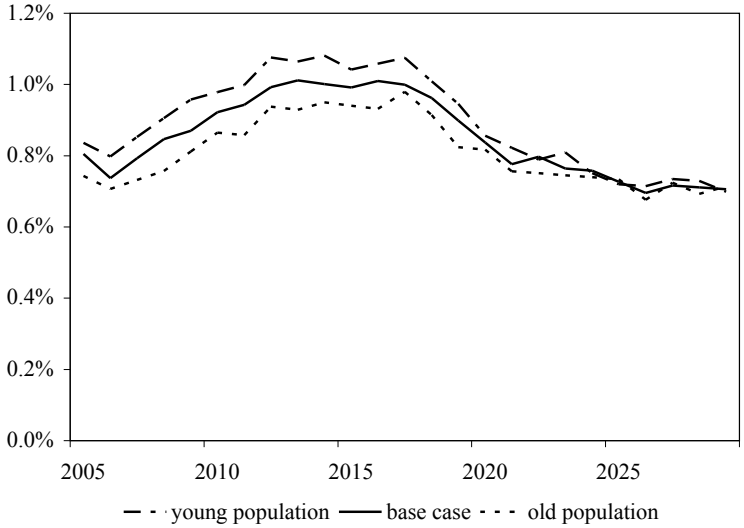
We define a constant quality house based on national averages and calculate the age-cohort specific demand for this house in three alternative ways:
1) Total age derivative, where all demographic characteristics vary with age
2) Partial age derivative, where the demographic profile is kept constant over all age-groups
3) Partial age derivatives with adjustments, which allows for changes in the selected demographic characteristics of a cohort – relative income or household size are expected to change as a household moves through the housing life cycle.

Figure 3: Demand disaggregated for dwelling types



The relative change of demand for housing services in age is similar for all dwelling types. Only the levels differ: the willingness to pay is highest for detached houses followed by terraced houses, bungalows and apartments. Demand for bungalows and detached houses rises faster in age than demand for apartments and terraced houses.

Figure 4: Aggregate housing demand growth projections, England 2005-2030



The Government Actuary's Department offers two alternative population scenarios in addition to the base case: Assuming higher fertility rates and higher net-migration into the UK leads to a scenario with a younger population, while lower fertility rates and low migration results in projections of a relatively old population.

Combining projections for the population numbers and the age structure with the earlier established willingness to pay for housing services, gives a forecast for aggregated housing demand.

Table 1: Regional distributions of housing type and age of dwelling

	dwelling type (in %)					*dwelling age cohort (in %)*								
region	*small terraced*	*large terraced*	*(semi-)detached*	*bungalow*	*flat*	*pre 1850*	*1850-1899*	*1900-1918*	*1919-1944*	*1945-1964*	*1965-1974*	*1975-1980*	*1981-1990*	*1990-2001*
North East	12	17	47	10	13	1	4	10	18	26	17	6	11	7
Yorkshire & Humber	14	16	45	12	12	3	11	9	18	22	14	6	11	5
N. West & Mersey	16	18	45	8	13	2	11	12	20	20	13	5	11	6
E. Midlands	10	12	55	14	8	4	7	7	14	22	16	8	13	8
W. Midlands	15	16	49	7	14	2	7	8	19	25	16	6	11	6
South West	12	15	45	14	13	7	8	7	12	20	15	8	15	7
Eastern	12	12	46	15	15	4	5	5	12	22	19	9	14	9
South East	10	14	48	10	18	3	8	7	13	23	17	8	14	7
Outer London	13	20	32	2	34	0	8	10	39	15	11	4	7	5
Inner London	7	22	5	1	65	1	21	14	15	17	12	5	9	6
England total	13	16	44	10	18	3	9	9	17	22	15	7	12	7

Dwelling types are relatively similarly distributed in 8 out of 10 regions. (Semi-)detached houses and bungalows make up the largest share, followed by terraced houses and flats. Inner and Outer London, however, have a different structure, with less houses and a higher share of apartments. Large regional differences with respect to the age structure of houses can be observed. In general, the least attractive age cohorts ranging from 1850 until 1964 are more often observed in the northern regions and London. The South-West has the highest share of pre-1850 buildings.
Source: own calculations based on EHCS data.

Table 2: Total number of dwellings, tenure, average dwelling price

		Tenure (in %)				*avg. price (in £)*			
	# (in mio)	*owner occ.*	*priv. rent*	*Local Authorities*	*Reg. Soc. Landl.*	*terraced*	*detached*	*bungalow*	*flat*
North East	1.04	67	7	21	5	42,774	75,285	79,332	40,079
Yorkshire & Humber	2.11	68	10	18	4	48,417	85,245	76,334	58,836
N. West & Mersey	2.79	70	9	14	8	43,952	94,270	84,649	53,722
E. Midlands	1.78	74	9	14	4	52,883	102,856	93,336	38,154
W. Midlands	2.08	71	6	14	8	54,454	105,750	111,789	56,894
South West	2.07	76	10	7	7	84,107	145,635	125,584	72,046
Eastern	2.28	74	9	12	5	96,356	153,136	117,680	76,201
South East	3.33	76	11	7	7	111,728	215,237	159,019	83,024
Outer London	1.83	70	12	11	7	152,590	242,808	211,440	112,374
Inner London	1.15	43	17	28	13	295,674	491,748	217,515	173,685
England (total)	20.46	71	10	13	6	90,996	161,360	125,771	73,640

The northern regions display a lower share of owner-occupied dwellings and a higher share of residential property provided by Local Authorities when compared to the south of the country (London being an exception).
With regard to value, a similar north-south difference can be observed. Prices of dwellings in the northern regions are less than half the prices of those in the southern regions (not correcting for quality). London has a special role again, with private residential property values being twice as high as the national average.
Source: EHCS

Table 3: Education and income by birth cohort

Age	*Education (%)*					*Median income (£)*					
	none	*GCSE*	*A-levels*	*university*	*higher*	*all*	*none*	*GCSE*	*A-levels*	*university*	*higher*
20-24	5	25	37	24	9	10,658	6,165	13,693	10,687	11,443	13,985
25-29	14	30	18	26	12	19,102	13,966	18,104	20,692	23,299	23,145
30-34	14	34	20	19	13	22,733	15,365	21,014	21,736	29,203	30,391
35-39	15	34	20	19	12	24,136	17,780	21,545	25,117	29,789	30,831
40-44	22	28	17	20	13	24,229	18,726	20,648	24,664	30,819	34,761
45-49	30	25	16	19	10	22,892	18,400	22,379	24,340	28,303	35,739
50-54	36	20	14	18	12	22,635	18,038	20,694	26,330	29,263	36,002
55-59	43	20	13	14	10	18,748	15,424	17,220	21,067	25,197	31,205
60-64	48	18	9	16	9	14,488	12,690	15,194	16,315	20,086	20,429
65-69	58	18	7	13	4	11,649	9,528	12,353	12,733	17,687	18,955
70-74	63	13	8	11	5	9,860	7,941	11,482	13,129	14,089	17,666
75-79	68	11	10	8	3	8,648	7,223	9,587	13,160	13,008	17,296
80+	71	9	9	7	4	7,581	6,688	8,890	9,413	11,885	16,754

Income is the median annual net income at the household level, including income from savings, pensions and housing benefits.
Source: EHCS, 2001 cross-section.

Table 4: Marginal prices q_i for hedonic characteristics

Variables describing dwelling				*Variables describing location*			
Variable	*Mean*	*SD*	*N*	*Variable*	*Mean*	*SD*	*N*
Dwelling type (vs. apartment)				*Region (vs. North East)*			
Terraced small	296	714	1213	Yorkshire and Humber	109	640	970
Terraced large	433	1026	1798	North West and Mersey	619	1156	1057
Detached	1793	1577	4617	E Midlands	729	994	1044
Bungalow	1956	1650	882	W Midlands	888	998	905
tenure (vs. renting)				S West	2326	1734	1138
Owner Occupied	1421	2890	8225	Eastern	2269	1559	994
Year of construction (vs. 1991-2001)				S East	3237	2057	1010
pre 1850	1724	2214	387	O/London	7929	3579	779
1850-1899	1240	2437	1046	I/London	10422	6040	549
1900-1918	1039	1583	1127	*Neighborhood type (vs. rural)*			
1919-1944	807	1272	1982	City centre	197	3586	248
1945-1964	288	952	1811	Urban	-924	2383	2026
1965-1974	285	880	1329	Suburban residential	-399	1910	5152
1975-1980	429	1184	545	Rural residential	-263	1890	1301
1981-1990	444	1111	781	Village centre	-348	1881	392
Misc.				*# houses in community (vs. 500+)*			
Parking lot	722	740	6412	isolated	1599	2478	190
2nd living room	427	787	4439	Under 100	781	1256	1329
2nd bathroom	818	1432	1001	100-299	364	670	2413
2nd WC	536	899	3592	300-499	224	647	1491
ln(bedrooms)	1223	1315	9014	*Demand*			
ln(plot)	11	20	7585	High demand area	1918	1585	2349
ln(floorspace)	536	411	9453	No vacancies around	771	1171	8175
				Misc.			
				No crime perceived	287	688	936
				Good public transport	173	644	1061
				No secure windows	72	383	4404

Mean and standard deviation in £/year. The average values of q_i can be interpreted as the average annual premium (or discount) residents pay for an additional unit of i. For example, living in a detached house (in contrast to a apartment) is worth on average £1,793, after controlling for size etc. A second bathroom's price is £818.

Table 5: Demographic regression – selected results

price of	*Household*		*Income*		*Education*				*Health*			*Ethnicity*		*Perceptions*		*Usage*		
	size	*income*	*20-24*	*60-64*	*GCSE*	*A-lev.*	*Univ.*	*higher*	*lt ill*	*disab.*	*retired*	*black*	*Asian*	*right kind*	*want move*	*WE & ev.*	z_i	R^2
Terraced small	87			0.028		167		262			229							0.14
Terraced large		0.013	-0.039				215	392				278	167					0.09
Detached	147	0.033			148	376	661	894		-235	235			279	-241	-122		0.21
Bungalow	223	0.045					306	492		-371	476		-1427					0.16
Yorkshire & Humber		-0.018			-101		-196	-250										0.11
N West & Mersey	135			0.032		254	501	905					-570					0.17
E Midlands	80	0.021					298	333			307							0.15
W Midlands	122	0.027					343	828								-178		0.20
S West	210	0.053	-0.107	-0.046			378	555			626			604				0.15
Eastern	174	0.049				386	385	416			667				-311			0.24
S East	409	0.048	-0.079			332	985	1060					-973		-503	-260		0.23
O/London	777					1184	1118	2183		-1586		-1644	-934		-757			0.27
I/London	734					1597	2654	3362		-3369	4119	-1643		3770	-1040			0.24
Owner occupied	130	0.053		0.043	278	544	1016	1240	-230	-360		-1055	-887	368	-575	-254		0.16
pre 1850		0.047				858									648			0.16
1850-1899		0.081		-0.087		519	806	906	-403		1358	1229	862	491	-329			0.17
1900-1918	114					524	568	877				597	388	624				0.19
1919-1944				0.023		316	534	1112				402				-112		0.13
1945-1964			-0.066				320	457										0.10
1965-1974	75	0.012		-0.021			200	238		-252					-158			0.09
1975-1980							294		-284		837							0.22
1981-1990	129							386						-262		226		0.09
City centre																		0.21
Urban	-328	-0.053	0.125			-359	-434	-775			-941			-1404				0.17
Suburban res.	-251	-0.018		0.022				-431				-415	-531	-226				0.07
Rural residential		-0.050						-358	-329					-486				0.09
Village centre														-964				0.10
Under 100		0.028		-0.033	206	216	408	774										0.13
100-299				0.017	133	164	233	300										0.05
300-499	50		0.019					287	-108									0.09
isolated																		0.26
Prking lot		0.013				53	117	104		-88	178	-292	-245	81	-99	-66		0.09
2nd liv.		0.015	-0.034		97	125	242	379			204			141	-69	-83		0.18
2nd bath	302		0.247					236				668	-821		271	164		0.31
2nd WC	39	0.026	-0.034		145	189	312	378		-138	205			280	-96	-78		0.20
No crime							140	161					219					0.06
Good pub. trans.	108		0.041	0.019	-86													0.33
No sec. windows	-23	0.007		-0.007					-41			179	100	86				0.03
High demand area	75	0.025	-0.071	0.026			369	686			380	466	338	410				0.17
No vacancies			-0.025				152	306	-73			244			-69			0.02
ln(bedrooms)		0.014	0.020	0.036		157	234	440	-76	-141	-255	640	216				344	0.10
ln(plot size)		0.000		0.000	2	4	2	2			3	-3				-1	-7	0.03
ln(area)	-17	0.008		0.005	33	69	62	83			59				-29	-16	562	0.32

Only significant coefficients (p-value < 0.1) are displayed. All others are omitted for the sake of readability.

Due to space constraints, results for only selected regressors are presented above. Prices for plot size, floor space, number of bedrooms, and repaircosts (all in logs) are estimated in a 2SLS, following Bartik (1987). We use income net of housing, regional dummies, tenure dummies and house type dummies as instruments. R^2 for 2SLS have no statistical meaning and are therefore not stated. All other equations are estimated by ordinary least squares.

Household size increases the willingness to pay for housing, as households pay more for normal goods and less for inferior goods (like unattractive construction periods). Income is positively related as well. The more a household earns, the more it is willing to spend on housing. This effect is stronger with older households (age 65-69) and less explicit with younger households (20-24).

Households headed by university graduates are willing to pay more (less) for all normal (inferior) goods when compared to households with lower educational achievements. This holds true for less advanced educational levels as well: having passed GCSE lets the household demand more housing than households without any conventional education (our reference group).
Only few black and Asian households are included in the sample, and they are not evenly distributed geographically. Therefore, we do not know in how far the results presented are really representative for non-white households in England.
Households with long-term ill or disabled members consume less housing services.

The perceived match of housing preferences and the physical characteristics of a dwelling makes a home more attractive. Respondents who indicated that they perceive their dwelling to be "the right kind of property" stand ready to pay a premium.