HOUSE PRICES, WEALTH EFFECTS AND LABOUR SUPPLY

by

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Abstract

We examine the impact of housing wealth on labour supply using exogenous local variations in house prices and household panel data for Britain. Our analysis controls for variations in local labour demand and income expectations which might co-determine house prices and labour supply. We find large housing wealth effects on labour supply consistent with leisure being a normal good. Labour supply is particularly sensitive to housing wealth among younger workers and older men. Our findings imply that housing wealth losses may have contributed to the unexpectedly high rates of labour market activity in Britain during the Great Recession.

Key words

Labour supply; Wealth effects; House prices

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Introduction

This paper estimates the size of housing wealth effects on labour supply for a sample of households in Britain. Recent studies have shown gains in housing wealth increase consumption spending[1]. Leisure, like consumption, is typically thought of as a normal good so we might expect housing wealth gains increase leisure and decrease labour supply. Existing studies based on exogenous wealth changes such as lottery wins (Imbens et al., 2001; Cesarini et al., 2013) and inheritances (Joulfaian and Wilhelm, 1994; Brown et al., 2010) in general find labour supply falls when wealth increases. Does labour supply also respond to housing wealth gains and losses? If so, how large are these effects and do some types of households respond more than others?

This topic is particularly relevant to the recent recession. Housing wealth losses have been cited as one reason why labour supply has been higher in recent years than in previous recessions[2]. Studies based on earlier episodes have shown asset prices movements can be important for labour supply. French and Cheng (2000) estimate labour market participation would have been 1.16 percentage points higher during the boom period absent increases in stock prices. Stock price movements have also been shown to be important for retirement decisions (Coronado and Perozek, 2003; Coile and Levine, 2011). Housing wealth is a large share of total wealth in the UK and US and prior studies suggest behaviour related to labour

[1] Studies on the impact of house prices on household consumption and saving include Campbell and Cocco, (2007); Disney, Gathergood and Henley, (2010); Attanasio, Leicester and Wakefield, (2011); Carroll, Otsuka and Slacalek (2011), Mian, Rao and Sufi (2013); on indebtedness Hurst and Stafford, (2004); Mian and Sufi (2011).

[2] French and Benson (2011) argue that labour supply of older workers in the US would have been 3% points lower, and for the population as a whole, 0.7% points lower, were it not for asset price declines during the recession. Daly, Kwok and Hobijn (2009) find the labour supply of students in the US fell by less during the recent recession compared with previous recessions and, unlike previous recessions, the labour supply of women actually increased. Blundell et al. (2013) propose house price falls as one reason why in the UK employment has proved remarkably robust despite a large decline in output.

supply such as childbirth and educational choices responds to housing wealth gains and losses, so the effect of house price movements may be important for labour supply[3].

We use United Kingdom (UK) data combining exogenous variation in house prices across geographic localities with household panel data to estimate housing wealth effects on labour supply at both the intensive and extensive margins. We control for variation in local labour demand, given the likely covariance of shocks to asset and labour markets, as well as for future income expectations which might co-determine local house prices and labour supply decisions. The results show large and significant labour supply responses to changes in housing wealth: on average, a 20% rise in house prices reduces the labour force participation rate of home owners by around 1.2 percentage points. Given the volatility of house prices (which doubled in the UK during the early 2000s before falling back 25% in the recent recession) our results show housing wealth movements play a significant role in explaining the business cycle dynamics of labour supply.

A particular advantage of our UK panel is that it includes individual-level income expectations data. This is important as income expectations may explain a negative correlation between housing wealth and labour supply. In inter-temporal models of labour supply and consumption higher expected future income (arising, for example, from higher expected future wages) induce workers to reduce current labour supply. Higher expected future income also increases (durable and non-durable) consumption and also raise current housing demand (to smooth housing consumption) and hence increase house prices.

[3] Other studies on US data have shown that housing wealth changes impact on decisions closely related to labour supply and suggest there is likely to be a labour supply response. Lovenheim (2011) shows increases in housing wealth raise college enrolments and Lovenheim and Reynolds (2013) find housing wealth gains also increase the likelihood of enrollment at public flagship universities. Lovenheim and Mumford (2013) show housing wealth gains also raise the likelihood of home owners choosing to have children. These results suggest housing wealth gains might lower labour market participation. Farnham and Sevak (2007) estimate the impact of changes in housing wealth on retirement decisions and retirement expectations using US data. For the UK Disney, Ratcliffe and Smith (2010) find little evidence that financial asset holdings had an effect on retirement behaviour in Britain over the past two decades; though Banks, Crawford, Crossley and Emmerson (2012) present evidence that they may have done so during the recent UK recession.

Elsewhere, we show that failing to control for income expectations causes upward bias in the estimated housing-consumption wealth effect (Disney et al., 2010). Attanasio et al. (2011) come to a similar conclusion using a calibrated model. Individual-level income expectations data is not available in US household panels covering the working age population[4].

Our results show much heterogeneity in labour supply responses across household types. For middle-aged households, there is no response of either employment or hours to housing wealth, but we find strong effects among both young households and those close to retirement. For example, holding other factors constant, a 20% rise in house prices reduces participation rates of older men aged 50 to 75 by around 1.2 percentage points, or 4.2%. Among young women a 20% house price rise lowers participation by 1.6 percentage points or 2.2%. Surprisingly, among young men participation falls by 2.0%. Hours of work on the intensive margin are also especially sensitive for younger workers. We show that among young women reduced participation in response to house price increases is associated with caring for children and among young men it is associated with additional full-time education or professional training.

In the context of the recent recession, we estimate that without the declines in house prices employment would have fallen by an additional 1.2 percentage points, or 40% of the total fall. This result is important for understanding the business cycle dynamics of labour supply. An important feature of house prices is that they are strongly pro-cyclical so housing wealth effects on labour supply are, in contrast to wages, a pro-cyclical driver of leisure[5]. Figure 1 shows the business cycle dynamics of housing and GDP for the UK. Moreover,

[4] The US Health and Retirement Study incorporates a growing module of questions on individual expectations but the sample is limited to older individuals.

[5]The correlation coefficient between the two series is 0.6. House prices are also more volatile than GDP. The percentage standard deviation from trend in house prices expressed as a percentage of the percentage standard deviation in trend in GDP is 376%.

housing wealth has become more liquid since the 1990s so wealth effects may be a relatively new driver of labour supply behaviour relevant to the 2000s onwards. There is also much regional variation in house prices over time across the business cycle which might in part explain regional variation in labour supply behaviour.

There are two additional implications of our findings on house price changes and labour supply. First our findings show one reason why studies on housing and consumption typically find small housing wealth effects on consumer spending may be that households choose to spend a part of their wealth gains (losses) on increased (reduced) leisure. Hence hours of work or participation fall and the effect of house price changes on consumption of goods and services is dampened. Second, our results show house price changes have distributional effects on labour supply (as well as consumption) which correlate with life-cycle characteristics but may also arise due to collateral effects on labour supply choices among younger workers. Hence there is a life-cycle as well as an overall effect of house price changes on labour supply.

The remainder of the paper proceeds as follows. We utilise the British Household Panel Survey described in Section 2 to estimate labour supply equations for both the extensive and intensive margins of labour supply. Section 3 describes our identification strategy and our use of controls for local demand conditions. Section 4 describes our main results concerning participation and hours. Where we find that house price gains (losses) lead to reduced (increased) labour market participation, we then estimate investigate the types of activities individuals undertake when they withdraw from the labour market. Section 5 discusses the implications of our results for labour market trends seen during the recent recession. Section 6 provides a brief summary and conclusions.

1. Data Sources

We use data from the British Household Panel Survey (BHPS). The BHPS is a high-quality source of panel data on work activity and is commonly used in studies on labour supply in the UK as in, for example, Blundell et al. (2008). The BHPS is an annual survey of each adult member (16 years of age and older) of a nationally representative sample of more than 5,000 households, comprising a total of approximately 10,000 individual interviews.

Major topics covered in the survey are household composition and demographics, participation in the labour market, income, wealth and housing. The same individuals have been re-interviewed in successive waves and, if they split-off from original households, all adult members of their new households have also been interviewed. Children are interviewed once they reach the age of 16. The sample is representative of the population of the United Kingdom. We use 18 waves of data that are available from 1991 to 2009.

The sample used here is the head of household and spouse or live-in partner only, aged 18-75. We limit the top age to 75 as 99% of BHPS respondents are retired by that age and our interest is in labour market participation and hours of work. We exclude the self-employed as we have elsewhere considered the relationship between house prices and self-employment and our focus is on participation in paid employment (for the self-employed housing may act as a collateral for a business loan, see Disney and Gathergood, 2009; also see Hurst and Lusardi, 2004).

The labour market status measure in the dataset is a question on the individual's current activity from which they choose one from the following menu of options: self-employed / in paid employment / unemployed / retired / family care / full time student / long-term sick or disabled / maternity leave / government training scheme / other status. Hours of

work are measured in the data set as the sum of hours normally worked per week plus overtime hours for first and second jobs[6].

The financial expectations measure included in the survey is an individual level answer to the question: 'Looking ahead, how do you think you yourself will be financially a year from now, will you be better than now / worse than now / about the same?' Although this question is asked only of a short time-frame, it captures something of changes in the household's income expectations which might cause changes in labour supply in the current period and is similar to those used in consumer confidence indices[7].

The key advantage of our measure it that it is available at the individual level. In our earlier study on house prices and consumption (Disney et al., 2010) we show positive responses to this question are shown to increase current consumption and omitting this variable biases the estimated coefficient on house prices upwards. We take answers to this question and code two 1/0 dummy variables for 'positive financial expectations' and 'negative financial expectation' which we include in our econometric specification, allowing the labour supply responses of individuals to positive and negative expectations to differ in sign and magnitude.

We use county-level house price data for two purposes: first, as a measure of exogenous variation in house prices and second, to allow us to assign a proxy measure of the cost of housing for renters as a test for whether the house price gains proxies for local economic conditions. This approach is similar to that used by Lovenheim and Reynolds (2013) and Farnham and Sevak (2007). We match into the survey data local level house price data derived from house price sales.

[6] Individuals who report they are suffering short-term sickness leave from work or are on vacation from work are classified by their regular labour market status (employed or self-employed).

[7] For example, the question about future income expectations in the Michigan Survey of Consumer sentiment is 'During the next 12 months, do you expect your (family) income to be higher or lower than during the past year?'

Our house price data is the the Halifax county-level house price index provided by Halifax Bank of Scotland (now part of the Lloyds banking group), the UK's largest mortgage lender[8]. The Halifax index comprises standardized house prices which reflect the sale price of a medium-sized family home in each county in each year. Throughout we adjust all financial variables to 2000 prices using the Retail Prices Index. We match into the BHPS two county level variables which capture local labour market conditions. First, registry unemployment data provided by the Office for National Statistics (ONS). Second, county level average earnings derived from the ONS Annual Survey of Hours and Earnings employer survey[9].

Summary statistics for key variables appear in Table 1. Our dataset comprises approximately 135,000 individual-year observations, 56% of which are for men and 77% of which are for married survey respondents. The average age of a respondent to the survey is 47.2 years. A little less than 60% of the individual-year observations are for workers in employment (this employment rate is lower than the 70% in the working age population as our sample includes individuals up to 75 years of age and in total 26% of our sample are retired at the point of interview). A little more than two-thirds of individual-year observations in our sample are for home owners with the average house value among owners at £133,000.

[8] On average the population of county in the UK in 2012 is 880,000 individuals comparable to the population of a US Metropolitan Statistical Areas which average 700,000 individuals in 2012.

[9] County level average earnings from the Annual Survey of Hours and Earnings (named the New Earnings Survey pre-1997) is calculated as average full-time monthly pay for all individuals participating in the survey which covers a 1% sample of employee jobs in the UK on an annual basis. Earnings data is derived from confidential workplace surveys in which employers report wages paid to employees.

2. Econometric Model

Our interest is in estimating the impact of housing wealth on individual labour supply decisions at the extensive and intensive margins using the panel dimension of our survey data. To do so we use changes in local level house prices as a proxy variable which represents an exogenous measure of changes in housing wealth for home owners. Our approach to identification is similar to Lovenheim and Reynolds (2013) and Farnham and Sevak (2007).

We incorporate local house prices into our estimation strategy because changes in self-reported housing wealth may be endogenous to individual labour supply decisions if individual work decisions cause changes in housing wealth, such as if a worker increases hours of work to purchase a larger house or, possibly, reduces hours of work to undertake home improvement. Changes in local level house prices are exogenous to individual preferences for leisure, housing and non-housing consumption, though moving activity may not be and we address this in our identification strategy.

The baseline econometric specification that we use to model the relationship between housing wealth, proxied by local house prices and the work decision at the extensive margin is:

$$N_{ict} = \alpha + \beta_1 H_{ct} + \beta_2 U_{ct} + \beta_3 E_{ct} + \beta_4 X_{ict} + \beta_5 F_{ict} + \varphi_i + \theta_c + \psi_t + \varepsilon_{ict} \quad (1)$$

Where i denotes an individual, c denotes county of residence and t denotes year. N_{ict} is a 1/0 dummy which takes a value of 1 if the individual is in employment and 0 otherwise. The variable H_{ct} is the (log) average house price at the county level in each year, U_{ct} is the local unemployment rate at the county level in each year, E_{ct} is (log) average earnings at the county level in each year, X_{ict} is a set of individual level socio-economic characteristics and control variables and F_{ict} is the individual's self-reported financial expectation.

The identifying assumption in Equation 1 therefore is that conditional on county fixed effects θ_c and year fixed effects ψ_t, plus the vector of time-varying control variables X_{ict}, the local unemployment rate $U_{ct,}$ local average earnings $E_{ct,}$ the individual's financial expectation $F_{ict,}$ and time-invariant individual characteristics captured by the individual fixed effects φ_i, house price variation across counties over time is exogenous to individual labour supply.

To interpret the coefficient β_1 as representing the causal impact of housing wealth on labour supply requires that the estimated impact of local house prices on labour supply is not attributable to omitted variable(s) which might drive both house prices and labour supply for which house prices might be a proxy.

Equation 1 includes individual fixed effects, county fixed effects and time fixed effects which in part capture individual, locality and time related heterogeneity. Local house price upturns may be correlated with local economic conditions e.g. if workers move to localities where labour demand is strong to take up work and in doing so increase housing demand. The controls U_{ct} and E_{ct} capture local labour market demand conditions which impact upon work decisions and housing demand.

The control for financial expectations, F_{ict}, is included because, in a dynamic model, labour supply decisions should incorporate expectations of future wealth or income and house prices may be endogenous to future expected income. If agents anticipate higher future productivity and hence higher future wages they may increase current non-housing consumption and housing consumption, which increases housing demand and local house prices. Hence labour supply dynamics and house price dynamics may be jointly determined by income expectations.

A further robustness check is to incorporate renters into the estimation strategy as in Farnham and Sevak (2007) and Lovenheim and Reynolds (2013). Renters experience the

same local economic conditions as home owners but do not experience direct wealth gains and losses from house prices. Thus, conditioning on controls, renters should respond differently to owners in respect to house price changes. Indeed, as suggested earlier, if renters intend to buy in future then indirect wealth gains and losses arising from local house price changes are in the opposite direction to those experienced by current owners. The difference between estimated coefficients for renters and owners then provides an additional test of the effect of housing wealth on labour supply.

Therefore, we modify Equation 1 as follows:

$$N_{ict} = \alpha + \beta_1 H_{ct} * O_{ict} + \beta_2 H_{ct} * R_{ict} + \beta_3 O_{ict} + \beta_4 U_{ct} + \beta_5 E_{ct} + \beta_6 X_{ict} + \beta_7 F_{ict} + \varphi_i + \theta_c + \psi_t + \varepsilon_{ict} \quad (2)$$

where O_{ict} is a 1/0 dummy variable indicating that the respondent is a home owner and R_{ict} is a 1/0 dummy variable indicating the respondent is a renter. In our (within) fixed effects estimation the coefficient on the O dummy which enters separately from the house price terms captures the differential likelihood of participation associated with home ownership.

If the coefficients β_1 and β_2 are both non-zero and equal (i.e. the estimated impact of county house prices on the labour supply of owners and renters is identical) then we would conclude that county house prices proxy for unobserved local conditions. If they are both zero, we would conclude that house prices have no impact on work decisions. If β_1 is negative and β_2 is either zero or positive, we have identified a negative wealth effect on labour supply arising from (changes in) housing wealth.

Two sources of selection bias might confound estimates of Equation (2). First, county-level house price changes are not exogenous for individuals who move county. Selection bias would occur if individuals moved to higher house price counties and

simultaneously changed their labour market participation. To eliminate any bias arising from moving behaviour we use two strategies.

First, we exclude cross-county movers (dropping approximately 5% of the individual-year observations in our sample) and show the omission of these households does not change our results. Second, we keep cross-county movers in the sample but calculate the counterfactual house price change (they would have received had they not moved county) and use this simulated change in house prices to estimate Equation (1) instead of their cross-county change and show similar results.

Second, selection bias would arise if house price changes caused individuals to change from renting to owning and the likelihood of changing tenure were related to labour supply. We address this by using the initial homeownership status of the individual in our estimations. In one specification we replace contemporaneous housing tenure with initial homeownership status (i.e. homeownership status in the first wave in which the individual is observed). This eliminates housing tenure changes which might cause selection bias.

In a second specification we use initial home ownership status as an instrument for contemporaneous housing tenure, assuming initial home ownership status is exogenous. We show both strategies yield estimates of β_1 and β_2 which are very similar to those using contemporaneous housing status.

We also estimate an hours of work equation (intensive margin) for the sample of all employed individuals with non-zero hours in the panel. The (log) of annual hours for each individual is denoted h_{ict}. Hence we estimate:

$$h_{ict} = \alpha + \beta_1 H_{ct} + \beta_2 U_{ct} + \beta_3 E_{ct} + \beta_4 X_{ict} + \beta_5 F_{ict} + \beta_6 W_{ict} + \varphi_i + \theta_c + \psi_t + \varepsilon_{ict} \qquad (3)$$

This equation includes the hourly wage W_{ict} as a control variable. Hourly wages are calculated by dividing gross monthly labor income by total monthly hours (we cannot

distinguish the normal-time wage from overtime wage). Since self-reported hourly wages may be endogenous to labor supply if individuals face downward sloping labor demand curves (i.e. reducing hours of work increases the hourly wage), we instrument hourly wages using a human capital regression as in MaCurdy (1981) and Altonji (1986). So our specification becomes:

$$h_{ict} = \alpha + \beta_1 H_{ct} + \beta_2 U_{ct} + \beta_3 E_{ct} + \beta_4 X_{ict} + \beta_5 F_{ict} + \beta_6 \hat{W}_{ict} + \varphi_i + \theta_c + \psi_t + \varepsilon_{ict}$$

$$\hat{W}_{ict} = \beta_1 Z_{ict} + \varepsilon_{ict} \qquad (4)$$

Where Z_{ict} is a vector of first-stage instruments in the wage equation. Following MacCurdy (1981) we use age and human capital measures as instruments. When we include renters in this modified specification the equation is:

$$h_{ict} = \alpha + \beta_1 H_{ct} * O_{ict} + \beta_2 H_{ct} * R_{ict} + \beta_3 O_{ict} + \beta_4 U_{ct} + \beta_5 E_{ct} + \beta_6 X_{ict}$$

$$+ \beta_7 F_{ict} + \beta_8 \hat{W}_{ict} + \varphi_i + \theta_c + \psi_t + \varepsilon_{ict}$$

$$\hat{W}_{ict} = \beta_1 Z_{ict} + \varepsilon_{ict} \qquad (5)$$

We estimate all the models using (within) fixed effects estimation and use a linear estimator throughout. As the house price variable and unemployment variable are both defined at the county level we calculate standard errors clustered at the county level.

3. Results

4.1 House Prices and Employment

We first present results for decision to work on the extensive margin. Table 2 contains our estimates of Equation 2 (including cross-locality movers in the sample) in which the dependent variable is a 1/0 dummy variable taking a value of 1 if the individual is employment and 0 otherwise. We include a rich set of covariates detailed in the notes below the table, which include employment status and (where applicable) hours of work for the partner or spouse of the respondent.

Estimates from the baseline specification in Column 1 show that for home owners the decision to work is negatively related to local level house prices. The coefficient on the house price term for home owners (*ln(hp) – owner*) of -0.0563 is statistically significant at the 1% level. This coefficient value implies a 10% increase in house prices leads to a 0.6 percentage point reduction in the likelihood of an individual working. Against a baseline employment rate (among the sample comprising men and women up to age 75) of 60% this equates to a 1% reduction in the likelihood of working.

In contrast, the coefficient on the house price term for renters (*ln(hp) - renter*) is positive, consistent with renters being more likely to work in response to a house price increase, but the implied elasticity is very small (a 10% increase in house prices leads less than a 0.01% increase in the likelihood of working) and the estimated coefficient is not statistically significantly different from zero. A test of the equivalence of means for the home owner house price and renter house price terms (*p_diff*) rejects the null at the 0.0001% level. We can thereby reject the hypothesis that the coefficients on owners and renters jointly reflect common local unobservables.

The coefficients on the local unemployment rate variable (*urate*) and financial expectation variable (*+ve finexp*) are both negative and statistically significant at the 1% level

meaning that an increase in the local unemployment rate lowers the likelihood of an individual working, as does a positive income expectation. A 1% increase in the unemployment rate lowers the likelihood of working by 0.6 percentage points and positive financial expectation lowers the likelihood of working by 0.8 percentage points.

These statistically significant estimates show the importance of controlling for local labour market conditions and income expectations in the econometric specification. The coefficient on the county average earnings variable derived from the ASHE survey (*cwage – ashe*) is positive and significant at the 5% level and implies a weak positive labour supply elasticity with respect to local average earnings.

Columns 2-4 present results from alternative specifications to ascertain whether baseline estimates are affected by selection bias. Column 2 excludes cross-county movers from the sample (5.2% of individual-year observations). In these estimates the coefficients on the house price terms for home owners and renters in the whole sample are very similar to those in Column 1.

Coefficients on other covariates are also very similar to those in Column 1. Column 3 shows results from retaining movers but simulating counterfactual house price changes as if moving individuals had not moved counties and again shows very similar estimates for the coefficients on the home owner and renter house price variables to those shown in Column 1.

Alternative estimates in the final two columns replace contemporaneous home ownership status (which may arise due to selection bias) initial or instrumented home ownership status. Column 4 shows results from replacing contemporaneous home ownership with initial ownership. The absolute value of the estimated coefficient on the home owner house price term increases in magnitude slightly, implying a stronger likelihood that house price increases decrease the likelihood of employment.

In this specification there is again no significant effect for renters. Column 5 results show that when we instrument contemporaneous home ownership status by initial homeownership status the coefficient estimates are again very similar to before. These estimates show selection bias is not driving the estimated size of the coefficients on the house price terms[10].

Results by age group in are shown in Table 3. There are heterogeneous responses between young, middle-age and older individuals. Columns 1-3 present results from Equation 2 estimated on sub-samples of young (aged under 40), middle-age (aged 40 to 54) and older (aged 55 and over) individuals. These results show house price changes decrease the likelihood of working only among young and old home owners with no effect for middle-age home owners and a stronger effect for young home owners compared to old home owners. The estimated coefficient on middle-age home owners is negative but not statistically significant.

Results show strong employment responses among the young and old. The coefficient on the home owner house price term from the younger sample implies a 10% increase in house prices results in a 0.8 percentage point decrease in the likelihood of working, which against a baseline employment rate of 75% implies a 1.1% decrease in likelihood of working.

The coefficient on the house price term for old owners is smaller, but evaluated against a low baseline employment rate for this group of only 35% (as the older sample includes individuals up to 75 years of age), implies a 1.3% decrease in the likelihood of working. The coefficients on the unemployment and income expectations variables are also

[10] As there is no evidence of selection bias using these specifications (or in specifications shown later in the results), we continue to show results from the baseline specification in subsequent tables. We provide code for estimating models in Column 2-4 for each of the other specification shown in subsequent tables in the data replication files accompanying this paper.

stronger among older workers consistent with larger effects of short-run labour market and income expectations on the shorter labour supply planning horizons of older workers.

Tables 4 and 5 present results for women and men separately as we might expect different results by gender, especially among married couples or partners. For female owners (Table 4), estimates by age show no impact of house price gains on employment of middle-aged or older women. For young women the implied effect of a 10% increase in house prices against a baseline employment rate of 67% is a decrease in the likelihood of employment by 1.1%. Although labour supply among older women is unresponsive to house prices the coefficient estimates show their labour supply is responsive to the local unemployment rate and income expectations variables.

For male owners (Table 5) house price increases lower the likelihood of participation for old and young men but, as among women, the labour supply of middle age men is unresponsive. A 10% increase in house prices lowers the likelihood of employment by 1% for young men and by 2.1% for older men (though the coefficient on the owner house price term for older men is significant only at the 5% level). In contrast for male renters the positive and significant coefficient implies house price increases raise employment of male renters but again the implied magnitude is very small with a 10% increase in prices causing less than a 0.1% increase in the likelihood of employment.

4.2 Destinations of Workers Who Leave Employment When House Prices Increase

These results for labour market participation show labour supply elasticities with respect to house prices are significant and large for young individuals and older individuals close to retirement age. Into what labour market states do individuals move who leave

participation when house prices rise? This is of interest in understanding why individuals leave employment and what types of activity they substitute into in response to wealth gains.

Recent studies based on U.S. data have also found that house price increases raise the likelihood of couples having children and students deciding to stay-on for college or enter a college with higher fees (Lovenheim, 2011; Lovenheim and Reynolds, 2013; Lovenheim and Mumford, 2013). By the same reasoning, the labour supply of middle-age men might be less responsive to house prices increases given their limited outside options. To investigate these options, we use respondent information from the question on their labour market status in the BHPS to construct indicator variables for non-employment labour market states reported by respondents when include being employed, retired, caring for family and being a full-time student.

We estimate models based on the specification of Equation 2 in which the dependent variables are 1/0 dummies for family care, full-time study and entering retirement. We have also estimated models with the other labour market states categorised in the BHPS data (unemployed, long-term sick, disabled, on maternity leave, on a government training scheme) but find no statistically significant impact of house prices on these outcomes for either home owners or renters.

Table 6 presents results from estimates in which the dependent variable is a 1/0 indicator variable for whether the respondent in engaged in family care. We show results only for all women and women by age category as we found no statistically significant impact of house prices on family care for men. (Family care is a very rare labour market state for men in our sample, with less than 1% of men reporting their main activity is family care).

Results show that house price gains increase the likelihood of women undertaking family care as a full-time activity but that this effect is strongest and statistically significant

only for young women. The coefficient value of 0.114 for young women implies a 10% increase in house prices raises the likelihood of them women undertaking family care by 1.1 percentage points. Against a baseline likelihood of 21% this represents a 5.2% increase.

Table 7 presents estimates in which the dependent variable is a 1/0 indicator for the respondent being in full-time study[11]. The table reports results for samples of young and middle-aged men and women (no statistically significant effects of house prices were found for older men or women). Results show that house price increases raise the likelihood of young men undertaking full-time study, but have no statistically significant impact for middle-aged men or for either young or middle-aged women. For young men the coefficient of 0.0428 implies that against a baseline likelihood of 4.2% that a 10% increase in house prices raises the likelihood of undertaking full time study by 9.5%.

Our survey data does not provide more detailed information on the specific type of full-time study respondents aged above 18 years of age undertake. We speculate that this result for full-time study among young men might involve further professional study, such as towards a Master of Business Administration (MBA) degree, a specialist Master's degree or a further professional qualification in, for example, accountancy, medicine or law.

Finally, we present estimates of the effect of house prices on retirement decisions. We again modify Equation 2 with the dependent variable of a 1/0 indicator for whether the individual is retired. We define retirement as permanent exit from working and check our data to exclude observations for individuals who report themselves as retired in (at least) one wave but subsequently re-enter the labour market.

[11] Our analysis differs from that of Lovenheim (2011) and Lovenheim and Reynolds (2013) as here we estimate the impact of house price increases on full-time study activity among home owners and renters, whereas their analysis examined the relationship between house price increases and college enrolment / choice among the children of home owners and renters.

In Table 8 we report estimates for a sample of older individuals (men and women, Column 1) plus old women and old men separately. Estimates for the sample of old men plus women reveal a positive coefficient on the house price term. However, these estimates also show a positive coefficient on the house price term for renters, though the test for the equivalence of these coefficients rejects the hypothesis at the 5% level.

Estimates for men and women separately show the positive effect of house prices on retirement of owners occurs only for men. The coefficient on the home owner house price term is positive for the sample of older women, but statistically insignificant. The coefficient value for men of 0.0967, statistically significant at the 1% level, evaluated against a baseline likelihood of 53% implies a 10% increase in house prices raises the likelihood of retirement for older men by 1.7%. Again, in Column 3 the coefficient on the house price term for renters is positive, though not statistically significant and a test for the equivalence of coefficient values on the house price term for owners and renters rejects the null at the 1% level.

4.3 House Prices and Hours of Work

We now turn to estimates of the impact of house price movements on hours of work. Estimates of the hours equation (Equation 5) are shown in Table 9. The dependent variable in each specification is the log of usual total hours of work and the sample comprises only individuals who report non-zero hours of work.

Coefficient estimates from the baseline specification in Column 1 show that home owners work longer hours (though the estimated coefficient on the home ownership dummy is statistically significant only for the young sample). The coefficient estimate on the local unemployment rate is also statistically significant at the 0.1% level and negative for the young sample, but not for the other groups, implying hours of work are shorter among the

young group in localities where unemployment is higher. Finally, positive income expectations for the future are associated with lower hours of work, which may reflect a degree of inter-temporal substitution on this labour supply margin.

The coefficient estimate for the home owner house price variable in the baseline model is -0.0270, statistically significant at the 5% level. The magnitude of the coefficient in this log-log model implies a 10% increase in house prices in the locality reduces hours of work by 0.2%. Evaluated against average annual hours for the whole sample of 1720, this equates to a reduction in annual hours of approximately only 3 ½ hours.

We also show estimates from the additional specifications which control for potential selection bias used earlier in Table 3. In results shown in Column 2 we exclude movers and in Column 3 we simulate counterfactual house price changes for movers. Results show estimated coefficients from these specifications are slightly larger in absolute magnitude compared with the baseline specification. Hence the magnitude of the house price effect on leisure is larger when adjusting the specification to control for selection into cross-county moving on the basis of hours of work.

Column 4 shows results from the specification in which initial home ownership status is used instead of contemporaneous status and Column 5 shows results using initial home ownership status in an instrumental variable regression. The estimated coefficient on the home owner house price term is slightly larger in absolute value in both cases compared with the baseline specification. These results suggest selection bias lowers the estimated effect of house price gains on leisure in the baseline specification.

Estimates by age group are shown in Table 10. They show a significant effect occurs only for the younger group, with the stronger coefficient of -0.109 evaluated against slightly higher average hours of 1750 implying a 10% increase in prices reduces annual hours by

close to 17 ½ hours – or approximately two working days per year. Coefficient estimates also show that house price increases raise the working hours of renters, though the implied magnitudes of the estimated coefficient are very small, with a 10% increase in prices raising hours of work per annum for renters by less than one full hour.

Estimates for sub-samples of men and women are shown in Tables 11 and 12. These reveal a contrast between the effects of house price increases for women, which lower hours of work for young women, whereas for men there is no decrease in hours of work and weak evidence that hours of work might actually increase among older men. In estimates for women shown in Table 10 there is no statistically significant impact of house price movements on working hours for middle-aged or old women.

Among young women the coefficient on the home owner house price term of -0.176 is statistically significant at the 1% level and implies a 10% increase in house prices evaluated at average hours for young women in the sample (31.7 hours per week) reduces hours of work by 26 hours per annum. The positive coefficient on the house price term for renters is very small in magnitude (implying annual hours increase by less than one hour) and significant only at the 5% level (though is statistically significant from the house price term for owners at the 0.01% level).

Our findings that the responsiveness of hours of work to housing wealth gains and losses is relatively weak compared with the responsiveness of participation may indicate inflexibility in hours adjustment within jobs and fixed costs to moving between jobs such that hours responses are low.

4. Discussion

Our results reveal much heterogeneity in participation and hours responses to changes in house prices. There is little evidence that participation or hours of work among middle-aged individuals are responsive to house price movements, but strong effects for younger individuals (both men and women) and for older men.

The estimated elasticities allow us to perform some illustrative calculations of how movements in house prices may have contributed to the dynamics of employment and hours in the UK during the recent deep downturn in output from 2008 which has persisted until present (as of the second quarter of 2013 UK GDP is still 2.5 percentage points below its pre-recession peak).

From the first quarter of 2008 to the first quarter of 2010 the proportion of working age (16 to 64) individuals in either full-time or part-time employment fell from 73.0% to 70.0% before recovering to 71.2% by the first quarter of 2013 (the most recent quarter for which data is available). Between the first quarter of 2008 and first quarter of 2010 average house prices fell in the UK in real terms by 21%.

Our whole-sample estimated labour supply elasticity with response to house prices implies the 21% fall in house prices increased employment by 1.2 percentage points, in other words employment would have fallen by 4.2 percentage points instead of 3.0 percentage points (a difference of 40%) had house prices not declined over the same period.

However, heterogeneous labour supply elasticities for different groups imply a more accurate exercise is to examine the possible effect of house price falls on aggregate employment by gender - age groups. Among young men employment fell from 90.1% in the first quarter of 2008 to 89.4% and for young women from 72.9% to 71.1% over the same period.

Assuming the relevant measure of house prices for this group is the average price of a home purchased by first-time buyers, this group faced falls in house prices by on average 27% (derived from first-time purchaser sales prices in the Halifax house price indexed used in our analysis). The estimated elasticities imply that without wealth effect on labour supply of this 27% fall in house prices employment would have fallen by 3.1 percentage points for men (to 87.0%) and by 4 percentage points for women (to 88.9%).

Our estimates also suggest that house price falls have substantially contributed to keeping the employment rate high among older men during the recession. The employment rate among older men (using the same definition of age 55 to 75 as we use in our microdata analysis) fell from 40.7% in the first quarter of 2008 to 38.7% by the first quarter of 2010. With house prices assumed to fall by 21% for this group, employment would have fallen by a further 4.2% if house prices had not have fallen, more than double the actual decline in employment.

5. Conclusion

This paper has presented empirical estimates of the impact of housing wealth on labor supply behavior among working-age individuals in the United Kingdom using individual level panel data. Results show large responses to housing gains and losses and certain groups which are unequally distributed among individuals by housing tenure and age. Changes in housing wealth have no significant impact on participation or hours decisions among middle-aged homeowners or renters, but decrease the likelihood of working among young men and women in particular and also among older men close to retirement age.

These results show the impact of housing wealth on household behavior and welfare is seen in labor supply behavior alongside consumption and that consumers partially spend housing wealth gains on both leisure and consumption. These results are consistent with

standard models in which consumption and labor supply are jointly determined income or wealth changes affect both dimensions of household activity as households evaluate the marginal utility of consumption alongside the marginal utility of leisure. However, our results show labor supply responses across groups are not attributable to pure life-cycle wealth effects whereby older individuals ‘win’ and younger individuals ‘lose’ but instead down payment or liquidity constraint effects which drive labor supply responses of younger individuals.

Our findings also imply that the pro-cyclical labor supply patterns driven by pro-cyclical wage dynamics are in part dampened by the wealth effect of housing asset price increases. Economic downturns involving asset price falls generate housing wealth effects which act to sustain labor supply when economic activity and house prices are low. This last aspect is particularly relevant in the context of the recent downturn in economic activity across many countries.

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Figure 1: Business Cycle Dynamics of House Prices and GDP in the UK, 1975-2012

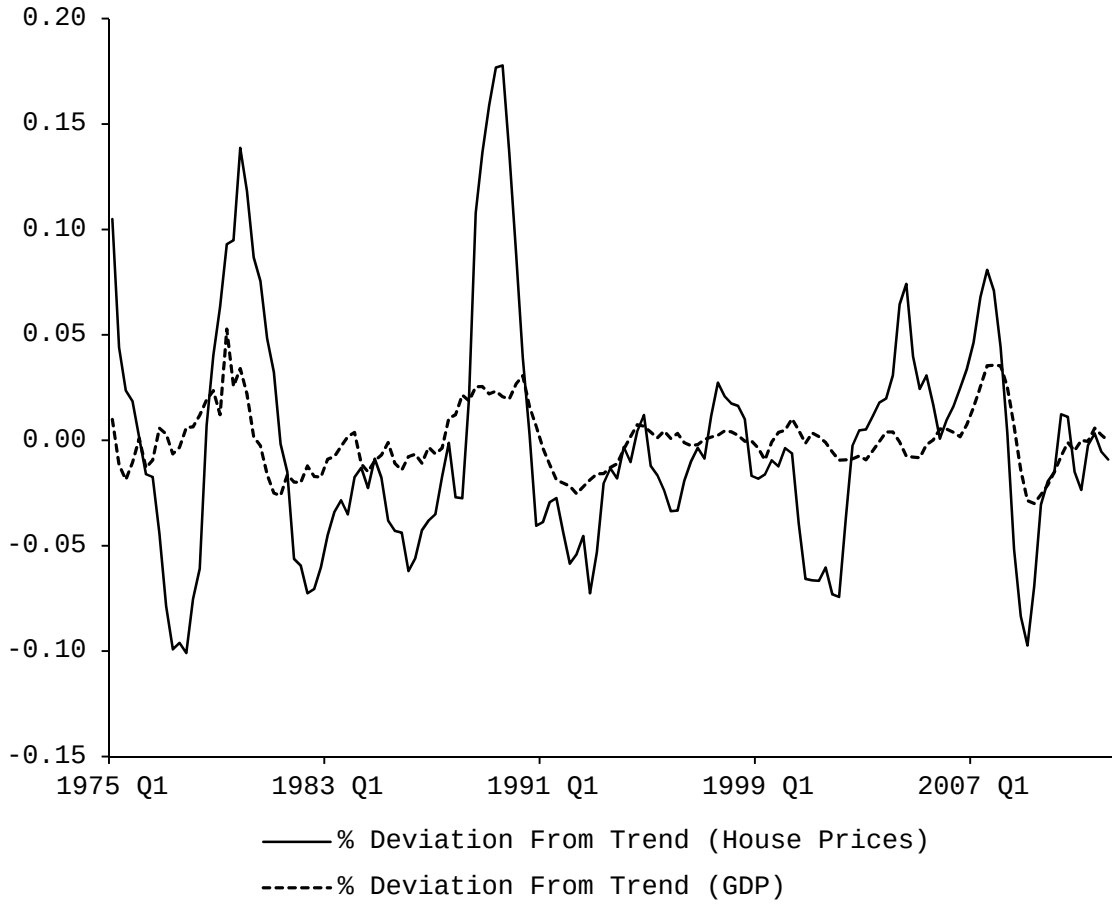

Figure shows percentage deviation from trend for UK house prices (Halifax quarterly standardised house price index, seasonally adjusted, Q1 1975 – Q2 2012) and Real Gross Domestic Product (chain weighted measure, ONS coded ABMI, Q1 1975 – Q2 2012). Deviations from trend are calculated by applying the Hodrick-Prescott filter.

Table 1
Summary Statistics for Demographics and Socio-Economic Characteristics

Demographics	
N	135,380
Age (years)	47.2
Male	0.56
Ethnic Minority	0.13
Married	0.77
Divorced	0.08
Children 0-6	0.12
Children 7-16	0.22
Highest Educational Qualification	
Degree	0.13
A-levels	0.16
O-levels	0.29
HND	0.07
Current Employment Status	
Employed	0.59
Unemployed	0.03
Retired	0.26
Spouse / Partner Employed	0.41
Household annual income	£33,500
Housing Status and House Value	
Owner	0.78
Renter	0.22
House Value (£, owners,)	£133,000
Mortgage Value (£, if value > 0)	£53,900

Table 2 House Prices and Employment –
Baseline and Instrumental Variable Specifications

	(1) Baseline	(2) Excluding Movers	(3) Simulated House Price	(4) Initial Ownership	(5) IV Ownership
ln(hp) - owner	-0.0563***	-0.0539***	-0.0571***	-0.0604***	-0.0624***
	(0.0103)	(0.0111)	(0.0108)	(0.0115)	(0.0124)
ln(hp) - renter	0.00193	0.00160	0.00184	0.00194	0.00193
	(0.00104)	(0.00112)	(0.00146)	(0.00147)	(0.00140)
owner = 1	0.686***	0.648***	0.654***	-	-
	(0.120)	(0.128)	(0.124)		
cwage - ashe	0.0448*	0.0373	0.0346	0.0341	0.0351
	(0.0175)	(0.0189)	(0.0176)	(0.0184)	(0.0196)
urate	-0.00622*	-0.00546*	-0.00465*	-0.00541*	-0.00543*
	(0.00238)	(0.00246)	(0.00241)	(0.00237)	(0.00246)
+ve finexp	-0.00875***	-0.00932**	-0.00871***	-0.00880***	-0.00934***
	(0.00253)	(0.00252)	(0.00250)	(0.00248)	(0.00246)
r2	0.147	0.143	0.148	0.142	0.143
p_diff	0.0000	0.0000	0.0000	0.0000	0.0000
N	121835	116436	121835	121835	121835

Standard errors in parentheses. Sample: head of household plus spouse/partner BHPS 1991-2009. Individual fixed effects estimates. Additional control variables: age (in years), age squared (in years), marital status dummies (married, divorced, widowed), highed educational achievement dummies (hnd, gcse, a-level, degree (or equivalents)), ethnic minority group dummy variable, number of children, health status (self-reported on 1-5 scale), spouse employment dummies (employed, unemployed, retired), natural log of annual non-labour income, homeowner dummy, county dummies, year dummies. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3 House Prices and Employment – Age Groups

	(2) Young	(3) Middle-Aged	(4) Old
ln(hp) - owner	-0.0862***	-0.0261	-0.0455**
	(0.0173)	(0.0235)	(0.0149)
ln(hp) - renter	0.00188	0.000897	0.00361
	(0.00129)	(0.00200)	(0.00204)
owner = 1	1.059***	0.296	0.522**
	(0.198)	(0.277)	(0.173)
cwage - ashe	0.132***	0.0474	0.0552
	(0.0347)	(0.0294)	(0.0291)
urate	-0.00876*	-0.00128	-0.0141***
	(0.00345)	(0.00378)	(0.00340)
+ve finexp	0.000652	-0.0182***	-0.0253***
	(0.00375)	(0.00426)	(0.00508)
r2	0.117	0.040	0.241
p_diff	0.0000	0.2574	0.0017
N	41520	27351	51392

Notes: As Table 2

Table 4 House Prices and Employment - Women Only

	(1) Whole Sample	(2) Young	(3) Middle-Aged	(4) Old
ln(hp) - owner	-0.0442***	-0.0784***	-0.0123	-0.0343
	(0.0126)	(0.0207)	(0.0335)	(0.0230)
ln(hp) - renter	0.000474	0.000288	-0.000984	0.00419
	(0.00142)	(0.00179)	(0.00259)	(0.00266)
owner = 1	0.549***	0.966***	0.0961	0.413
	(0.145)	(0.235)	(0.390)	(0.267)
cwage - ashe	0.116***	0.204***	0.00619	0.105**
	(0.0278)	(0.0571)	(0.0404)	(0.0316)
urate	-0.00616	-0.00535	-0.000150	-0.0187***
	(0.00334)	(0.00485)	(0.00545)	(0.00366)
+ve finexp	-0.00609	0.00268	-0.0182**	-0.0234**
	(0.00332)	(0.00621)	(0.00562)	(0.00712)
r2	0.138	0.121	0.051	0.228
p_diff	0.0009	0.0004	0.7365	0.0991
N	68913	23822	15372	28832

Notes: As Table 2

Table 5 House Prices and Employment - Men Only

	(1) Whole Sample	(2) Young	(3) Middle-Aged	(4) Old
ln(hp) - owner	-0.0671***	-0.0914***	-0.0365	-0.0616*
	(0.0135)	(0.0204)	(0.0263)	(0.0254)
ln(hp) - renter	0.00399**	0.00420**	0.00415	0.00341
	(0.00128)	(0.00158)	(0.00315)	(0.00238)
owner = 1	0.802***	1.121***	0.490	0.675*
	(0.159)	(0.242)	(0.306)	(0.301)
cwage - ashe	0.0468	0.0257	0.0943*	0.00179
	(0.0243)	(0.0262)	(0.0422)	(0.0495)
urate	-0.00663*	-0.0147***	-0.00181	-0.00842
	(0.00267)	(0.00353)	(0.00432)	(0.00550)
+ve finexp	-0.0131***	-0.00435	-0.0171**	-0.0275**
	(0.00332)	(0.00367)	(0.00561)	(0.00803)
r2	0.192	0.173	0.063	0.278
p_diff	0.0000	0.0000	0.1318	0.0147
N	52922	17698	11979	22560

Notes: As Table 2

Table 6 House Prices and Family Care - Women Only

	(1) Whole Sample	(2) Young	(3) Middle-Aged	(4) Old
ln(hp) - owner	0.0563***	0.114***	0.0441	-0.00880
	(0.0106)	(0.0229)	(0.0288)	(0.0145)
ln(hp) - renter	-0.00131	-0.00160	0.00395	-0.00151
	(0.00126)	(0.00177)	(0.00279)	(0.00131)
owner = 1	-0.684***	-1.365***	-0.466	0.101
	(0.118)	(0.250)	(0.337)	(0.169)
cwage - ashe	0.0800**	0.165**	0.0393	0.0339
	(0.0270)	(0.0610)	(0.0365)	(0.0309)
urate	0.00253	0.00336	0.00412	0.00362
	(0.00271)	(0.00549)	(0.00482)	(0.00363)
+ve finexp	-0.00377	-0.00407	0.00180	-0.00378
	(0.00266)	(0.00469)	(0.00452)	(0.00657)
r2	0.057	0.086	0.030	0.039
p_diff	0.0000	0.0000	0.1775	0.6246
N	68913	23822	15372	28832

Notes: As Table 2

Table 7 House Prices and Full Time Study

	(1) Young Women	(2) Middle-Aged Women	(3) Young Men	(4) Middle-Aged Men
ln(hp) - owner	-0.00170	0.0109	0.0428***	0.000553
	(0.0125)	(0.00640)	(0.0119)	(0.00442)
ln(hp) - renter	0.000901	-0.000592	-0.00110	0.000349
	(0.000778)	(0.00121)	(0.000872)	(0.000706)
owner = 1	0.00241	-0.115	-0.518***	-0.0150
	(0.143)	(0.0707)	(0.139)	(0.0514)
cwage - ashe	0.00885	0.000913	0.0112	0.0152
	(0.0162)	(0.0107)	(0.0175)	(0.00817)
urate	0.00324	0.000409	0.00461	0.00244
	(0.00217)	(0.00172)	(0.00257)	(0.00202)
+ve finexp	-0.00606**	0.00477*	-0.0132***	-0.00108
	(0.00198)	(0.00200)	(0.00246)	(0.00162)
r2	0.240	0.065	0.338	0.058
p_diff	0.8388	0.0658	0.0004	0.9627
N	23822	15372	17698	11979

Notes: As Table 2

Table 8 House Prices and Retirement

	(1) Whole Sample	(2) Old Women	(3) Old Men
ln(hp) - owner	0.0267**	0.00729	0.0967**
	(0.00872)	(0.0233)	(0.0299)
ln(hp) - renter	0.00116*	0.00277	0.00246
	(0.000538)	(0.00265)	(0.00266)
owner = 1	-0.329**	-0.0979	-1.126**
	(0.0986)	(0.267)	(0.347)
cwage - ashe	0.0144	0.0280	0.0312
	(0.0147)	(0.0423)	(0.0514)
urate	0.000472	-0.00602	0.00384
	(0.00172)	(0.00446)	(0.00681)
+ve finexp	-0.000614	-0.00568	-0.00790
	(0.00124)	(0.00547)	(0.00711)
r2	0.222	0.275	0.299
p_diff	0.0041	0.8467	0.0024
N	121835	28832	22560

Notes: As Table 2

Table 9 House Prices and Hours of Work - Whole Sample

	(1) Baseline	(2) Excluding Movers	(3) Simulated House Price	(4) Initial Ownership	(5) IV Ownership
Hpay	0.704***	0.877***	0.813***	0.716***	0.716***
	(0.0410)	(0.0817)	(0.0785)	(0.846)	(0.834)
ln(hp) – owner	-0.0270*	-0.0365***	-0.0347***	-0.0341*	-0.0367*
	(0.0110)	(0.0184)	(0.0146)	(0.0146)	(0.0194)
ln(hp) – renter	0.00525***	0.00731***	0.00623***	0.00216***	0.00211***
	(0.00111)	(0.00191)	(0.00184)	(0.00146)	(0.00157)
owner = 1	0.348**	0.812***	0.746***	-	-
	(0.127)	(0.212)	(0.216)		
cwage – ashe	0.000201	0.00861	0.00764	0.00648	0.00627
	(0.0249)	(0.0416)	(0.0486)	(0.0451)	(0.0434)
urate	-0.00613*	-0.00507	-0.00547	-0.00516	-0.00501
	(0.00246)	(0.00416)	(0.00468)	(0.00498)	(0.00464)
+ve finexp	0.0175***	0.0173**	0.0176**	0.0186**	0.0180**
	(0.00381)	(0.00646)	(0.00746)	(0.00738)	(0.00743)
p_diff	0.0033	0.0001	0.0000	0.0000	0.0000
N	65727	58876	65727	65727	65727

Standard errors in parentheses. Sample: head of household plus spouse/partner BHPS 1991-2009. Individual fixed effects estimates. Additional control variables: age (in years), age squared (in years), marital status dummies (married, divorced, widowed), highed educational achievement dummies (hnd, gcse, a-level, degree (or equivalents)), ethnic minority group dummy variable, number of children, health status (self-reported on 1-5 scale), spouse employment dummies (employed, unemployed, retired), natural log of annual non-labour income, homeowner dummy, county dummies, year dummies. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 10 House Prices and Hours of Work – Age Groups

	(1) Young	(2) Middle-Aged	(3) Old
Hpay	0.274***	0.269	4.179**
	(0.0591)	(0.275)	(1.444)
ln(hp) - owner	-0.109***	-0.0251	0.132
	(0.0148)	(0.0245)	(0.101)
ln(hp) - renter	0.00328**	0.00454*	0.00818
	(0.00127)	(0.00220)	(0.0109)
owner = 1	1.320***	0.356	-1.459
	(0.170)	(0.281)	(1.159)
cwage – ashe	0.0506	0.0307	-0.139
	(0.0353)	(0.0464)	(0.215)
urate	-0.0145***	-0.00747	-0.00262
	(0.00354)	(0.00498)	(0.0220)
+ve finexp	0.0106*	-0.000430	0.0706
	(0.00471)	(0.00634)	(0.0405)
p_diff	0.0000	0.2136	0.2193
N	29435	19580	16712

Notes: As Table 9

Table 11 House Prices and Hours of Work - Women Only

	(1) Whole Sample	(2) Young	(3) Middle-Aged	(4) Old
Hpay	0.877***	0.258**	0.384	-3.761*
	(0.0817)	(0.0901)	(0.311)	(1.499)
ln(hp) - owner	-0.0665***	-0.176***	-0.0482	-0.0616
	(0.0184)	(0.0238)	(0.0337)	(0.107)
ln(hp) - renter	0.00731***	0.00439*	0.00204	-0.00800
	(0.00191)	(0.00210)	(0.00367)	(0.0138)
owner = 1	0.812***	2.115***	0.624	0.541
	(0.212)	(0.273)	(0.385)	(1.233)
cwage – ashe	0.00861	0.0647	0.0693	0.312
	(0.0416)	(0.0542)	(0.0637)	(0.216)
urate	-0.00507	-0.0220***	-0.00842	-0.0411
	(0.00416)	(0.00586)	(0.00709)	(0.0263)
+ve finexp	0.0173**	0.0165*	-0.00861	-0.0334
	(0.00646)	(0.00764)	(0.00849)	(0.0389)
p_diff	0.0001	0.0000	0.1259	0.6161
N	34876	15504	10587	8785

Notes: As Table 9

Table 12 House Prices and Hours of Work - Men Only

	(1) Whole Sample	(2) Young	(3) Middle-Aged	(4) Old
Hpay	0.569***	0.402***	-0.362	1.675***
	(0.0354)	(0.0658)	(0.240)	(0.340)
ln(hp) – owner	0.0256*	-0.0187	-0.0272	0.135*
	(0.0118)	(0.0166)	(0.0218)	(0.0571)
ln(hp) – renter	0.00328**	0.00150	0.00361*	0.00506
	(0.00117)	(0.00138)	(0.00184)	(0.00649)
owner = 1	-0.277*	0.237	0.357	-1.531*
	(0.135)	(0.190)	(0.257)	(0.657)
cwage – ashe	0.00986	-.0172	0.0758	-0.0943
	(0.0263)	(0.0422)	(0.0420)	(0.118)
urate	-0.00725**	-0.00903*	-0.00296	-0.0116
	(0.00259)	(0.00384)	(0.00413)	(0.0125)
+ve finexp	0.0162***	0.00834	-0.00594	0.0411*
	(0.00397)	(0.00514)	(0.00710)	(0.0203)
p_diff	0.0566	0.2216	0.1593	0.0224
N	30851	13931	8993	7927

Notes: As Table 9