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MORTGAGES AND FINANCIAL EXPECTATIONS: A HOUSEHOLD LEVEL ANALYSIS

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Abstract: We contribute to the literature on household mortgage debt by exploring one particular influence on mortgage debt at the household level, namely the financial expectations of the individuals within the household. Our theoretical model predicts a positive association between the quantity of mortgage debt and optimistic financial expectations. Our empirical findings based on household level data provide convincing support for our theoretical priors in that optimistic financial expectations are positively associated with the level of outstanding mortgage debt.

Key Words: Financial Expectations; Housing Tenure; Inter-temporal Consumption; and Mortgage Debt.

JEL Classification: D18; D84; D91

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I Introduction and Background

Arguably, the purchase of property is one of the most important investment and consumption decisions an individual or household will make over their lifetime. Furthermore, such purchases are frequently financed by mortgages. There has been a phenomenal rise in mortgage debt over recent years. For example, the growth rate in mortgage debt as a proportion of GDP in the UK between 1992 and 2002 is estimated at 21%.[1] Similarly, the secured debt to income ratio has increased by 42% between 1995 and 2005.[2] Household mortgage debt far outweighs household unsecured debt: in the UK average household mortgage debt in 2000 was estimated at £48,300 and at £73,788 for new mortgages, as compared to £3,281 for unsecured debt. Unsurprisingly, the extent of household mortgage debt has been of much concern to policy makers.[3] This is especially problematic as financial assets are typically low: average annual savings in the UK in 2000 were estimated at £934.[4] It is apparent therefore that savings typically provide insufficient cover for mortgage debt. Hence, the analysis of mortgage debt is important in determining the potential financial stress at the household level. As argued by Hamilton (2003), increases in household borrowing may make households vulnerable to reductions in their income or to changes in the interest rate. Consequently, understanding what factors drive the decision to acquire increasing amounts of mortgage debt and whether or not such indebtedness is sustainable are important issues for policy-makers.

We contribute to the literature on household mortgage debt by exploring one particular influence on mortgage debt, namely the financial expectations of the individuals within the

[1] European Mortgage Federation, OECD Economic Outlook.
[2] Bank of England, National Statistics.
[3] For example, the accumulation of debt has been noted by the European Central Bank (ECB), which has reported that falling interest rates have allowed households to borrow more and accumulate more debt. Consequently, household debt in the euro area has increased significantly in recent years. In 2004, it was estimated at 54% of GDP. See http://www.ecb.int/press/key/date/2004/html/sp041111.en.html, for the speech by Lucas Papademos, Vice-President of the ECB, delivered at the Nomura Annual Euro Conference "*A Challenging Future for Europe*", Tokyo, 11th November 2004. In the U.S., remarks on the amount of household debt relative to assets were made by the Chairman of the Federal Reserve Broad Alan Greenspan "*Understanding Household Debt Obligations*" at the Credit Union National Association, Governmental Affairs Conference, Washington, D.C. February 23, 2004.
[4] The figures for average household mortgage debt, unsecured debt and savings are calculated from the *British Household Panel Survey*, 2000.

household. At the macroeconomic level, a number of studies have found that consumer expectations influence household consumption patterns (e.g. Acemoglu and Scott, 1994, for the UK and Carroll *et al.,* 1994, for the U.S.). Surprisingly, empirical analysis into how expectations influence consumption decisions using individual or household level data has, however, been somewhat scarce. One reason for this may be that scepticism about the use of information derived from subjective survey data may still prevail in the economics literature (Dominitz and Manski, 1997). There are, however, a number of recent studies, which do exploit subjective information on income expectations such as Brown *et al.* (2005) and Guiso *et al*. (1992, 1996).

We explore the relationship between mortgage debt and financial expectations from a theoretical and an empirical perspective. Our theoretical framework predicts a positive association between the expectations of individuals who are optimistic about their future financial situation and the level of mortgage debt. Our empirical analysis based on the *British Household Panel Surveys*, 1993-2001, supports our theoretical priors.

The *British Household Panel Surveys* enable us to explore the level of mortgage debt at the household level by tracking a sample of households over a nine-year period, 1993-2001. Such an approach allows us to control for changes experienced by households due to events such as marriage and childbirth, which may influence the level of mortgage debt. In addition, the time period of our empirical study is particularly interesting from a macroeconomic perspective, since by 1993 the growth in annual UK GDP at constant prices had recovered to around 2.5% (*Office for National Statistics*) after the depths of recession in 1991, fuelled by inflation and high interest rates, where growth was negative at -1.4%. Over the period 1993 to 2001, GDP growth averaged approximately 2.9% per annum, peaking at 4.7% in 1994, and falling to 2% by 2001.

Our use of household level data is particularly appropriate since, as argued by Leece (1995), the use of aggregate time series data may mask household responses to changes in the economic environment. Leece (1995) explores mortgage demand at the household level using cross-section

data from the British *Family Expenditure Survey* (*FES*) and finds that the financial deregulation, which occurred during the 1980s, affected mortgage demand during this period. Leece (2000) expands his earlier work and finds that mortgage demand is influenced by the type of mortgage undertaken. Cocco and Campbell (2006), who also use the *FES*, show that rising house prices may stimulate consumption by increasing the household's perceived wealth or by relaxing borrowing constraints. In a US study on household level data, Crook (2001) identifies the factors that explain U.S. household debt, incorporating unsecured and mortgage debt, over the period 1990-95 using data from the *Survey of Consumer Finances*. Income, home ownership and family size all impact positively upon the level of household debt. Interestingly, expectations of future changes in interest rates do not influence the level of household debt.

From the theoretical point of view, there exists a large literature that analyses consumption and housing finance choice based mostly on life cycle models with income risk and borrowing constraints. For example, in Flavin and Yamashita (2002) households maximise a function of the mean and variance of returns to their asset portfolio (inclusive of housing) conditional on the current value of a state variable represented by the ratio of the house value to net worth. In Cocco (2004), agents living for T periods maximise lifetime expected utility over housing size and non-durable consumption, with a mortgage amongst available financial instruments and labour income risk. Numerical solutions are provided as generally closed form solutions cannot be obtained. Both papers point to an effect of the portfolio constraint imposed by housing demand and indicate that younger and less well off investors have limited financial wealth to invest in stocks: their net worth will be used to pay off the mortgage or buy bonds instead. Expectations are not explicitly modelled, although their action is implicitly embodied in labour income risk.

II Theoretical Underpinnings

Assumptions

Our stylised life cycle model is the simplest possible and serves to illustrate our subsequent empirical analysis. We assume two discrete time periods $t = 1, 2$ and demonstrate a positive relationship between the level of mortgage debt undertaken by consumers and optimistic financial expectations, represented by a two point joint distribution of incomes and house prices. At the start of period 1, risk-averse consumers earn certain income y_1 and choose optimally a mortgage deposit, D, towards the purchase of one durable and indivisible unit of housing, h, priced p_1. To minimise the algebra, and without loss of generality, consumption prices (of the non-durable numeraire) in each period are normalised to 1, the safe interest rate is set to zero and there is no housing depreciation. The utility function, $U(c_t, h)$, defined over consumption at time *t* and housing, is twice differentiable and strictly concave. Consumption in period 1 is given by $c_1 = y_1 - D$, yielding utility $U(y_1 - D, 1)$.

There is second period uncertainty of both consumer incomes and house prices, which are jointly distributed with two possible realisations of each variable, y_{2i} and p_{2j}, where $i, j = H, L$ denote the high and low income and house price realisations respectively; and where $y_{2H} > y_{2L}$ and $p_{2H} > p_{2L}$. So, in period 2, there are four possible states of nature (*HH*, *HL*, *LH*, *LL*) that occur with exogenous probabilities $q_{HH}, q_{HL}, q_{LH}, q_{LL}$ respectively, that sum to 1. In period 1, a competitive risk neutral lender provides a mortgage of size $(p_1 - D)$. The mortgage repayment in period 2 is therefore $R(p_1 - D)$ where, as mentioned, D is saved by the borrower, at an interest factor $R \geq 1$ which includes a risk premium (see equation 2 below – implying that consumers will

always save in D rather than in the safe interest yielding asset). The distributions of second period incomes and house prices are common knowledge to both the consumer and the lender.[5]

In order to take up the mortgage in the first period the consumer expects, on average, to be able to repay it in the second period,[6] i.e. $E(y_2 + p_2) \geq R(p_1 - D)$, where $E(y_2 + p_2) = q_{LL}(y_{2L} + p_{2L}) + q_{LH}(y_{2L} + p_{2H}) + q_{HL}(y_{2H} + p_{2L}) + q_{HH}(y_{2H} + p_{2H})$ and R is defined by the lender's equilibrium condition (see equation 1 below). However, when both income and house price realisations are low (in state *LL*) consumers are unable to repay their debt, i.e. $y_{2L} + p_{2L} < R(p_1 - D)$. In this case, the lender seizes all of the consumer's resources except an exogenous small amount $e > 0$, yielding utility $U(e, 0)$ to the consumer. Conversely, when second period income is high (in states *HH* and *HL*), consumers can repay their debt irrespective of the house price realisation, i.e. $y_{2H} > R(p_1 - D)$. In this case, consumption is either $c_{2H} = y_{2H} - R(p_1 - D)$ yielding utility $U(y_{2H} - R(p_1 - D), 1)$ if the consumer keeps the house in the second period; or $c_{2Hj} = y_{2H} + p_{2j} - R(p_1 - D)$ yielding utility $U(y_{2H} + p_{2j} - R(p_1 - D), 0)$ if the consumer sells the house in the second period for a financial gain, i.e. if $p_{2j} > p_1$, $j = H, L$. Finally, when second period income is low but the house price is high (in state *LH*), consumers cannot repay the debt and keep the house since $y_{2L} < R(p_1 - D)$. However, they can repay the debt by selling the house, with consumption $c_{2LH} = y_{2L} + p_{2H} - R(p_1 - D)$ yielding utility $U(y_{2L} + p_{2H} - R(p_1 - D), 0)$, so long as $y_{2L} + p_{2H} > R(p_1 - D)$. It is straightforward to verify that these *ex-post* state dependent conditions are compatible with the *ex-ante* requirement that expected incomes and house prices should be above the debt repayment.

[5] Exploring cases in which the lender is not informed about the realisation of the consumer's resources is beyond the scope of this paper, as it requires the incorporation of the appropriate incentive constraints into a 'mortgage contract' between consumer and lender. There is a large and established theoretical literature on loan contracts with costly state verification; see for example Townsend (1979), Gale and Hellwig (1985), Mookherjee and Png (1989), Jost (1996) and Krasa and Villamil (2000).

[6] We are grateful to an anonymous referee for highlighting this point.

The Model

In equilibrium, the interest factor R is obtained from the lender's zero expected profit condition:

$$p_1 - D = q_{LL}(y_{2L} + p_{2L} - e) + (1 - q_{LL})R(p_1 - D) \tag{1}$$

From our assumptions it is straightforward to verify that:

$$R = \frac{1}{1 - q_{LL}} - \frac{q_{LL}(y_{2L} + p_{2L} - e)}{(1 - q_{LL})(p_1 - D)} \geq 1 \tag{2}$$

By substituting R from equation (2), we can write the reduced form of the inequality $y_{2L} + p_{2L} < R(p_1 - D)$ (holding in state *LL*), which gives $D < p_1 - (y_{2L} + p_{2L}) + q_{LL}e$; that is, the upper bound to D. Similarly, the inequality $y_{2H} > R(p_1 - D)$ (holding in states *HH* and *HL*) becomes $D > p_1 - q_{LL}(y_{2L} + p_{2L} - e) - (1 - q_{LL})y_{2H}$; the inequality $y_{2L} + p_{2H} > R(p_1 - D)$ (holding in state *LH*) becomes $D > p_1 - q_{LL}(y_{2L} + p_{2L} - e) - (1 - q_{LL})(p_{2H} + y_{2L})$, and the inequality $E(y_2 + p_2) > R(p_1 - D)$ becomes $D > p_1 - q_{LL}(y_{2L} + p_{2L} - e) - (1 - q_{LL})E(y_2 + p_2)$. The greater RHS to these last three reduced form inequalities gives the lower bound to D. The domain of the definition of D, the chosen mortgage deposit, is therefore:

$$\begin{aligned} &\max \begin{bmatrix} p_1 - q_{LL}(y_{2L} + p_{2L} - e) - (1 - q_{LL})E(y_2 + p_2), p_1 - q_{LL}(y_{2L} + p_{2L} - e) - (1 - q_{LL})y_{2H}, \\ p_1 - q_{LL}(y_{2L} + p_{2L} - e) - (1 - q_{LL})(p_{2H} + y_{2L}) \end{bmatrix} \\ &< D < p_1 - q_{LL}(y_{2L} + p_{2L} - e) - (1 - q_{LL})(p_{2H} + y_{2L}) \end{aligned} \tag{3}$$

where both the LHS and RHS are expressed solely in terms of exogenous variables and parameters. In this framework, equation (3) can be interpreted as the borrowing constraint on the mortgage size $(p_1 - D)$ and $(1 - q_{LL})$ as the overall probability of being able to repay the loan; that is, the 'optimistic' financial expectation of both parties. It is then straightforward to show that the effect of $(1 - q_{LL})$ on the total amount of mortgage undertaken, $(p_1 - D)$, is positive (or, equivalently, that the effect of q_{LL} on $(p_1 - D)$ is negative). Again without loss of generality, we consider the case in

which consumer preferences are such that high-income consumers always prefer to keep the house in the second period rather than sell it, i.e. $U(y_{2H} - R(p_1 - D), 1) > U(y_{2H} + p_{2j} - R(p_1 - D), 0)$.

The consumer chooses the mortgage deposit, *D*, optimally to maximise expected lifetime utility subject to equation (3) and the lender's zero expected profit condition:

$$\max_{D} \; U(c_1, 1) + \delta q_{LL} U(e, 0) + \delta q_{LH} U(c_{2LH}, 0) + \delta(1 - q_{LL} - q_{LH}) U(c_{2H}, 1) \tag{4}$$

where the expressions for consumption are defined above, δ is a subjective discount factor and the interest factor is defined by equation (1) and $(1 - q_{LL} - q_{LH} = q_{HH} + q_{HL})$.

At an interior solution, which, given equation (3), is ensured by strict concavity, the first order condition is:

$$(1 - q_{LL}) U'(c_1, 1) = \delta q_{LH} U'(c_{2LH}, 0) + \delta(1 - q_{LL} - q_{LH}) U'(c_{2H}, 1) \tag{5}$$

Comparative statics then give:

$$\frac{dD}{dq_{LL}} = \frac{q_{LH}\left[U'(c_{2H}, 1) - U'(c_{2LH}, 0)\right]}{\left[(1 - q_{LL})^2 U''(c_1, 1) + q_{LH} U''(c_{2LH}, 0) + (1 - q_{LL} - q_{LH}) U''(c_{2H}, 1)\right]} > 0 \tag{6}$$

which is positive since both the numerator and the denominator are negative by concavity. This implies that $\frac{d(p_1 - D)}{dq_{LL}} < 0$. Hence, a higher level of $(1 - q_{LL})$ has a positive effect on mortgage debt. That is, optimistic financial expectations increase mortgage debt.

In sum, the above is a stylised model provided to inform our empirical analysis. In particular, the result encapsulated by equation (6) is intuitive. Moreover, it is straightforward to verify that it holds also with non-zero safe interest rate and depreciation parameters, with different consumption prices in periods 1 and 2 and with consumer preferences such that the high-income consumer prefers to sell the house in period 2.[7] Our simplifying assumptions are made purely to

[7] Algebraic proofs of these results are available from the authors on request.

minimise notation and illustrate the intuition in the clearest possible way in order to motivate our subsequent empirical analysis.

III Data and Methodology

In the remainder of the paper, we explore the empirical determinants of the amount of outstanding mortgage debt at the household level in Great Britain focusing on the role of financial expectations. For the purposes of our empirical study, we exploit information contained in nine waves of the *British Household Panel Survey* (*BHPS*), 1993-2001. Prior to 1993, households were not asked to disclose the amount of their mortgage in the *BHPS*. The *BHPS* is a random sample survey, carried out by the *Institute for Social and Economic Research*, of each adult member from a nationally representative sample of more than 5,000 private households (yielding approximately 10,000 individual interviews).

In the 1993-2001 surveys, households were asked: *How much is the total amount of your outstanding loans on all the property you (or your household) own, including your current home?* The answers thus provide information on the amount of outstanding mortgage debt. The defining feature of the *BHPS*, for the purpose of our study, is that it contains information on the total amount of mortgage debt over a relatively long time horizon, 1993-2001, at the household level as well as information relating to the expectations of household members about their future financial situation. Our sample includes households with a head of household aged between 18 and 65. We analyse an unbalanced panel of data such that the average number of observations per household is 3.7, with the minimum (maximum) being 1 (9). Our sample comprises 11,478 households, over a maximum of nine years, yielding a total of 42,894 observations.

To explore the relationship between the expectations of household members regarding their future financial situation and the extent of outstanding mortgage debt, we exploit responses to the following question: *Looking ahead, how do you think you will be financially a year from now, will you be: Better off; Worse off; Or about the same?* Answers to this question implicitly incorporate a

synthesis of a household member's own financial outlook (e.g. pay and job security) with their expectations about the general economic environment (e.g. future interest rates, tax changes, inflation and unemployment rates).

<<TABLES 1A , 1B AND 1C HERE>>

Response rates for heads of households are shown in Table 1A above. From the responses to this question, we create a Financial Expectations Index (*FEI*), as in Brown *et al.* (2005), where individuals who answer 'Worse off' to the above question are coded as '0', those who answer neither 'Worse off or Better off' are coded '1', whilst individuals who answer 'Better off' are coded as '2'. Thus, the index ranks individuals according to their financial expectations from having a bleak outlook to being optimistic about their financial future. From Table 1A, it is apparent that over the period heads of households tend to be financially optimistic rather than pessimistic, which may reflect the start of the economic recovery following the recession of the early 1990s.

We also explore whether financial expectations vary over time since it is possible that any correlation between financial expectations and mortgage debt might simply be capturing a household fixed effect rather than predictions about future income. Table 1B shows the number of times household heads are optimistic, pessimistic or expect no income change over the time period, including the proportion of households who are always optimistic and always pessimistic. Clearly, there is variation in households' financial expectations over time, with only a small proportion of individuals always in the same category for all years and more than 50 per cent of respondents only reporting two years (out of nine) where financial expectations do not change.

In order to explore the relationship between mortgage debt and financial expectations, we proceed in two stages. Firstly, we estimate a housing tenure model, since it is apparent that the housing tenure of households will influence the level of mortgage debt. The housing tenure variable is defined as follows:

$$htc_{ht} = \begin{cases} 0 = Owner\ Occupier\ (No\ Mortgage) \\ 1 = Owner\ Occupier\ (Mortgage) \\ 2 = Rent\ (Council) \\ 3 = Rent\ (Private) \end{cases}$$

The responses to this variable over time are shown in Table 1C. The percentage of households owning a home with a mortgage has fallen over time whilst, conversely, the percentage renting privately has risen. We model housing tenure by specifying a multinomial logit (MNL) model where the unit of observation is the head of household *h* at time *t*. In the set of explanatory variables, we include labour market status, a quadratic in age, gender, ethnicity, number of children, household size, household income, educational attainment, household savings and investments. We also include the financial expectations of the head of household, FEI_{ht}, to control for differences in financial optimism across tenure types. We then use the predicted values from the MNL framework to calculate an inverse mills ratio term relating to selection into category 1, i.e. owner occupiers with a mortgage, $htc_{ht} = 1$, which is then included in our mortgage debt equation.[8]

Given that our focus is on the relationship between financial expectations and the level of mortgage debt, we select those households where $htc_{ht} = 1$ and, in the second stage of our analysis, we explore the determinants of the logarithm of the amount of outstanding mortgage debt.[9] Figure 1 below illustrates the distribution of the logarithm of the amount of outstanding mortgage debt across the sample of owner occupiers with a mortgage. We estimate the following reduced form mortgage equation:

$$\ln(m_{ht}) = \beta_1' X_{ht} + \beta_2' FEI_{ht} + v_{ht} \tag{7}$$

where:

[8] Our over-identifying instruments are labour market status dummy variables: employed; self employed; unemployed; not in the labour market and being a full-time student. These are intuitively appealing instruments given that obtaining a mortgage is conditional on labour market status. Since the choice of over-identifying instruments is always a contentious issue, we have explored changes to the set of instruments as well as validity tests for our choice of instruments and different approaches to allowing for sample selection. We discuss these issues further in Section IV.

$$v_{ht} = \alpha_h + \eta_{ht} \tag{8}$$

Our notation is defined as follows. The mortgage debt of household *h* at time *t* is given by m_{ht} such that *t=1,…,9*, where $h=1,\ldots,n_h$, X_{ht} denotes a vector of head of household and household characteristics including the inverse mill ratio term derived from the housing tenure model to control for potential sample selection into category $htc_{ht} = 1$, α_h represents the 'household' specific unobservable effect and η_{ht} is a random error term, $\eta_{ht} \sim \text{IN}(0, \sigma_h^2)$. Our theoretical framework (i.e. equation 6) predicts $\beta_2 > 0$. We assume that α_h is $IN\left(0, \sigma_\alpha^2\right)$ and independent of η_{ht} and X_{ht}. Hence, the correlation between the error terms of households over time is a constant given by:

$$\rho = corr(v_{tl}, v_{tk}) = \frac{\sigma_\alpha^2}{\sigma_\alpha^2 + \sigma_\eta^2} \qquad l \neq k \tag{9}$$

where ρ represents the proportion of the total unexplained variance in the dependent variable contributed by the panel level variance component. Thus, the magnitude of ρ yields information pertaining to the intra household correlation of mortgage debt over time. Due to issues pertaining to identification restrictions, we regard our mortgage debt equation as a reduced form specification potentially capturing demand and supply influences.

In waves 1993 to 2001 of the *BHPS*, homeowners are asked "*About how much would you expect to get for your home if you sold it today?*" We use the responses to this question to derive a measure of house value, which is used to weight the level of mortgage debt. Figure 2 represents the distribution of mortgage debt as a proportion of the house value. Unsurprisingly, the majority of households with a mortgage do not have a mortgage value greater than the value of the house, only 1.5 per cent of mortgagees fall into this latter group. We repeat the analysis represented by

[9] Zero reported mortgage debt is included as zero in our dependent variable as there is no reported mortgage debt between zero and unity.

equations (7) and (8) with the weighted level of mortgage debt as the dependent variable in order to explore the robustness of our findings.

<<FIGURES 1 AND 2 HERE>>

In addition to exploring the influence of the head of household's financial expectations, we also investigate the role played by the expectations of other household members. Hence, we repeat the analysis described above and replace FEI_{ht} with the sum of the financial expectations index across all household members, $HFEI = \sum_{i \in h} FEI$.

Although the focus of our paper lies in the role of financial expectations, we include a number of additional controls in our econometric analysis for personal and demographic characteristics in the vector, X_{ht}. We control for household income, highest educational qualification of the head of household and the logarithm of total savings and investments to proxy household wealth. Demographic controls include the marital status of the head of household, the number of children (aged less than 18), region of residence and household size. We also control for whether the household has an endowment or repayment mortgage and whether the household has a mortgage protection plan, structural or contents insurance. Reasons for having an additional mortgage are also included, which include an extension to the house, home improvements, car purchase or another unspecified reason. Table 2 below presents summary statistics for the variables used in our empirical analysis.

<<TABLE 2 HERE>>

IV Results

Housing Tenure and Financial Expectations

Before focusing on the determinants of the level of mortgage debt, we will briefly comment on the characteristics that influence housing tenure. Tables 3A and 3B report the determinants of housing tenure, where we consider the influence of individual (i.e. the head of household) and household

expectations respectively. The findings presented in Table 3A indicate that the head of household's expectations are important in influencing housing tenure. For example, a one point move up the financial expectations index, i.e. becoming more financially optimistic, yields just under a 1 per cent increase in the probability that the head of household will be an owner occupier with a mortgage rather than own the property outright (the reference category), *ceteris paribus*. Other factors of interest are that younger heads of household are more likely to rent property as are students, the unemployed and those not in the labour market. For example, for heads of household not in the labour market, there is a 21.6 per cent higher probability of renting from the council rather than owning a property outright. Higher income, savings and investment are all associated with a lower probability of renting relative to owning a property without a mortgage. Married or cohabiting individuals and those with some education (relative to those with no educational qualifications) also have a lower probability of renting.[10]

<<TABLES 3A AND 3B HERE>>

Mortgage Debt and Financial Expectations

Turning our focus to the determinants of the level of mortgage debt, our aim is to verify whether the empirical evidence corresponds with our theoretical priors. Since, we focus solely on mortgagees, i.e. $htc_{ht} = 1$, we include an inverse mills ratio term in our set of explanatory variables to control for potential sample selection bias.[11] The determinants of the level of mortgage debt and the determinants of the proportion of mortgage debt relative to the estimated house value are shown in

[10] Both individual and household financial expectations are positively associated with renting a property from the council. We have explored this further and find that a possible explanation relates to the fact that council renting is concentrated amongst younger individuals who tend to be more financially optimistic. If the financial expectations index is interacted with age, the marginal effect on the interaction term is negative and significant.

[11] The inverse mills ratio term has a positive estimated coefficient indicating that its exclusion would bias our results downwards. In general, the sample selection equation is well specified, with the chi-squared statistic being significant at the 1% level. We have also explored the robustness of our findings by omitting the inverse mills ratio term. Our findings with respect to the relationship between financial expectations and the level of mortgage debt are largely unchanged. To test for the validity of the instruments we test the joint significance of the labour market status variables in the sample selection equation. We find that these variables are jointly significant in all models supporting the use of these instruments. Secondly, we regress the residual from the mortgage equation on the over-identifying instruments.

Table 4A, based upon individual financial expectations and Table 4B, based upon household financial expectations. Throughout the results, ρ is large, indicating relatively high intra household correlation of mortgage debt over time.

<<TABLES 4A AND 4B HERE>>

Our empirical findings accord with our theoretical priors in that the head of household's financial expectations index is characterised by a positive and significant estimated coefficient suggesting that the more optimistic the head of household is about their financial situation in the following year, the greater is the amount of mortgage debt as shown in Table 4A, column 1.

Turning to the other explanatory variables, the level of outstanding mortgage debt is positively associated with the head of household's age albeit at a decreasing rate. Other factors that have a positive and significant influence on the level of mortgage debt are household income, whether the head of household is married or cohabiting and the educational attainment of the head of household. For example, heads of household with a degree have around a 31 per cent higher level of mortgage debt than those with no education, *ceteris paribus*. Household size and having structural insurance, on the other hand, are associated with lower levels of mortgage debt. For those mortgagees with an endowment or repayment mortgage, the level of mortgage debt is significantly higher at around 6 per cent and 7 per cent, respectively. Having contents insurance or other types of insurance are also associated with higher levels of mortgage debt.

The second column of Table 4A reports consistent findings with the alternative dependent variable – mortgage debt as a proportion of house value. Clearly, the head of household's financial expectations index is characterised by a significant positive estimated coefficient and, hence, supports the previous findings – although the size of the estimated coefficient is marginally smaller than that for the previous dependent variable. Mortgage debt as a proportion of house value is also

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Our findings suggest an insignificant relationship between the residuals and the labour market status variables in all models thereby further endorsing the validity of this set of over-identifying instruments.

positively related to household income, being a male head of household, having an endowment mortgage and contents insurance. Conversely older heads of household, household size, the number of children, higher levels of savings and investments, having an additional mortgage for home improvements or an extension are all negatively associated with the amount of mortgage debt relative to house value.

Table 4B presents the results from estimating equation (7) including the sum of financial expectations of all individuals within the household. Our findings indicate that the summation of expectations within the household is characterised by a positive and significant estimated coefficient for both the amount of mortgage debt and mortgage debt as a proportion of house value. Thus, our results suggest that, even when controlling for household size, households with higher levels of financial optimism amongst their members are associated with greater levels of mortgage debt.

The coefficients on the regional dummy variables reported in Tables 4A and 4B show that the two areas, which have the lowest mortgage debt relative to London, the reference category, are the North East and Wales. Such a finding is not surprising given the relatively low house prices in these two regions. With respect to mortgage debt as a proportion of house value, all regions have a mortgage amount that is closer to the estimated value of the house than that in the London region. Although all monetary figures have been deflated, as compared to the reference category, 2001, mortgage debt relative to house value was significantly lower in the earlier years.[12,13]

[12] To explore the robustness of our findings, we replicated the analysis of Tables 4A and 4B replacing regional dummy variables with regional average house prices in each year and replacing the year dummy variables with the Bank of England base interest rate. The significant estimated coefficient of financial expectations remains across each specification with the magnitude of the impact being largely unaffected in comparison to those reported in Tables 4A and 4B. For example, for individual financial expectations, the estimated coefficients were 0.0242 and 0.0249 for LMORT and PMORT respectively. For household financial expectations, the corresponding estimated coefficients were 0.0138 and 0.0094. The full results are omitted for brevity, but are available upon request.

[13] We have also investigated how well the financial expectations index predicts future income. The summary statistics presented in Table 1B suggest that household expectations vary over time. When we regress future household income on lagged income, the financial expectations index and the demographic variables used in Table 4A, the coefficient on the financial expectations index is positive and statistically significant, although it is outweighed by the coefficient on lagged household income. This result is confirmed regardless of housing tenure and for mortgagees only, the respective

Robustness Checks

We explore the robustness of our empirical findings in three ways. Firstly, we replace the financial expectations index with dummy variables denoting financial optimism and pessimism. Secondly, we control for the truncation of the sample using a tobit model rather than a sample selection correction. Finally, we distinguish between household expectations and aggregate expectations in order to further explore the issue of household fixed effects.

We replace the financial expectations index with two dummy variables for whether the head of household is financially optimistic or financially pessimistic to see how robust the results are to an alternative definition of our key variable of interest.[14] The results are shown in Table 5 Panel A where the same set of control variables is employed as in Table 4A. Both financial optimism and financial pessimism are statistically significant in influencing the level of mortgage debt and mortgage debt as a proportion of house value. A financially optimistic head of household has 2.1 (5) per cent higher mortgage debt (mortgage debt as a proportion of house value) than those who predict that their financial situation will stay the same, i.e. the reference category, *ceteris paribus*. Similarly, financial pessimism works in the opposite direction with a financially pessimistic head of household having 3.1 (3.4) per cent lower mortgage debt (mortgage debt as a proportion of house value) than those who predict that their financial situation will stay the same, *ceteris paribus*.[15] For household financial expectations, we replace the index with four dummy variables capturing: whether one individual within the household is optimistic; whether one individual within the household is pessimistic; whether two or more individuals within the household are optimistic; and whether two or more individuals within the household are pessimistic. The results, which are

coefficients (t-statistics) are 0.0333 (3.64) and 0.0166 (2.45). We also regress household income growth on the financial expectations index. Once again expectations about future income have predictive power with estimated coefficients (t-statistics) of 0.0286 (2.79) and 0.0253 (2.02). Such findings suggest that financial expectations are not capturing a household fixed effect and that the index does help predict future income and income growth at the household level.

[14] We are grateful to an anonymous referee for suggesting this robustness check.
[15] The effect of financial optimism remains if the omitted category is financial pessimism.

presented in Table 5 Panel B, reiterate the finding that financial optimism is associated with a higher level and proportion of mortgage debt.

<<TABLE 5 HERE>>

We explore the robustness of our findings further by dealing with the truncation of the sample in an alternative way by specifically a tobit model where mortgage debt is truncated at zero:

$$\ln\left(m_{ht}^{*}\right)=\beta_{1}^{'}X_{ht}+\beta_{2}^{'}FEI_{ht}+v_{ht} \tag{10}$$

$$\ln\left(m_{ht}\right)=\begin{cases}0 & if \quad \ln\left(m_{ht}^{*}\right)\leq 0\\ \ln\left(m_{ht}^{*}\right) & if \quad \ln\left(m_{ht}^{*}\right)>0 \quad (mortgagee)\end{cases}$$

The results of estimating equation (10) are presented in Table 6 Panel A, based upon individual financial expectations and Table 6 Panel B, based upon household financial expectations. In Table 6 Panel A, the financial expectations index is positively related to mortgage debt and mortgage debt as a proportion of house value suggesting that the more financially optimistic individuals are, the higher is the level of mortgage debt. This result also holds when we consider the aggregate expectations of individuals within the household, see Table 6 Panel B.

<<TABLES 6 AND 7 HERE>>

Finally, one could argue that the positive correlation found between financial expectations and mortgage debt stems from optimistic aggregate expectations about future income rather than household specific effects. To separate the aggregate effects from the household specific effects, we explore household financial expectations relative to the average level of aggregate household expectations in each year.[16] Thus, we create an index FEI_{rt}, which represents the head of household's expectations relative to aggregate expectations (calculated at the mean for each year) and we also define $HFEI_{rt}$ for sum of the financial expectations index across all household

[16] We are grateful to an anonymous referee for suggesting this approach.

members relative to the aggregate mean expectations.[17] The mean values for FEI_{rt} and $HFEI_{rt}$ are given by 1.0227 and 0.9949 respectively. Table 7 presents the results from weighting the financial expectations index by aggregate expectations for heads of household (Panel A) and for all individuals within the household (Panel B). The results indicate that higher household financial expectations relative to the yearly average are positively associated with higher mortgage debt.

Mortgage Debt and Income

Finally, we compare the relative magnitude of the mortgage level as a proportion of household income across optimistic and pessimistic heads of households over the period 1993-2001. Figures 3 and 4 below show the annual median actual and predicted mortgage level as a proportion of income, respectively, for both financially optimistic and pessimistic heads of households. The percentage growth in GDP year-on-year is also plotted on the right hand vertical axis in each figure (source: *UK Office for National Statistics*).

<<FIGURES 3 AND 4 HERE>>

The predicted mortgage level is derived by estimating separate mortgage debt equations for financially optimistic and financially pessimistic heads of households. We then use these results to calculate predicted mortgage debt for each group and year. Overall the model accurately predicts the trend in mortgage level as a proportion of income over time, although it does over-predict actual year-on-year values. Clearly, growth in GDP peaked in 1994 at 4.7% and started to fall after 1997. Correspondingly, there is also evidence of the actual and predicted mortgage levels relative to income falling after 1998 for optimistic heads of households. It appears that the proportion of outstanding mortgage debt relative to household income for optimistic individuals lags the business cycle by one year, based on actual and predicted values. This is despite the Bank of England's base interest rate being at its peak in 1998, averaging 6.94%, and falling thereafter to an average of

[17] A ratio equal to unity implies that the financial expectations of the household are equal to the yearly average. If the ratio is greater than unity, financial expectations of the household are higher than the mean, conversely a ratio less than

4.96% in 2001. As such, the trends depicted in Figures 3 and 4 suggest that the level of mortgage debt may not be inversely related to the price of debt. In general, it is apparent that the mortgage debt series of optimistic heads of households lies clearly above that of pessimistic heads of households providing further evidence suggesting that financial optimism is associated with higher levels of mortgage debt at the household level.

V Concluding Remarks

In this paper we have explored an issue which is extremely topical amongst both economists and policy makers – namely, mortgage debt at the household level. Given that the U.K. (along with a number of other countries) currently has high, and arguably unsustainable, rates of house price inflation and growing household debt, gaining an insight into what factors influence mortgage debt is a very important issue (Nickell, 2002). Our main focus has been on the influence of financial expectations on the level of mortgage debt. To be specific, our theoretical framework predicts an intuitively positive association between optimistic financial expectations and mortgage debt. In order to test our theoretical predictions we have explored the determinants of the level of outstanding mortgage debt, using data derived from nine waves of the *British Household Panel Survey*, 1993-2001. Our findings suggest that the expectations of household members regarding their future financial situation are an important determinant of mortgage debt.

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unity implies that household financial expectations are lower than the mean.

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Figure 1: The Distribution of Log Total Mortgage (LMORT)

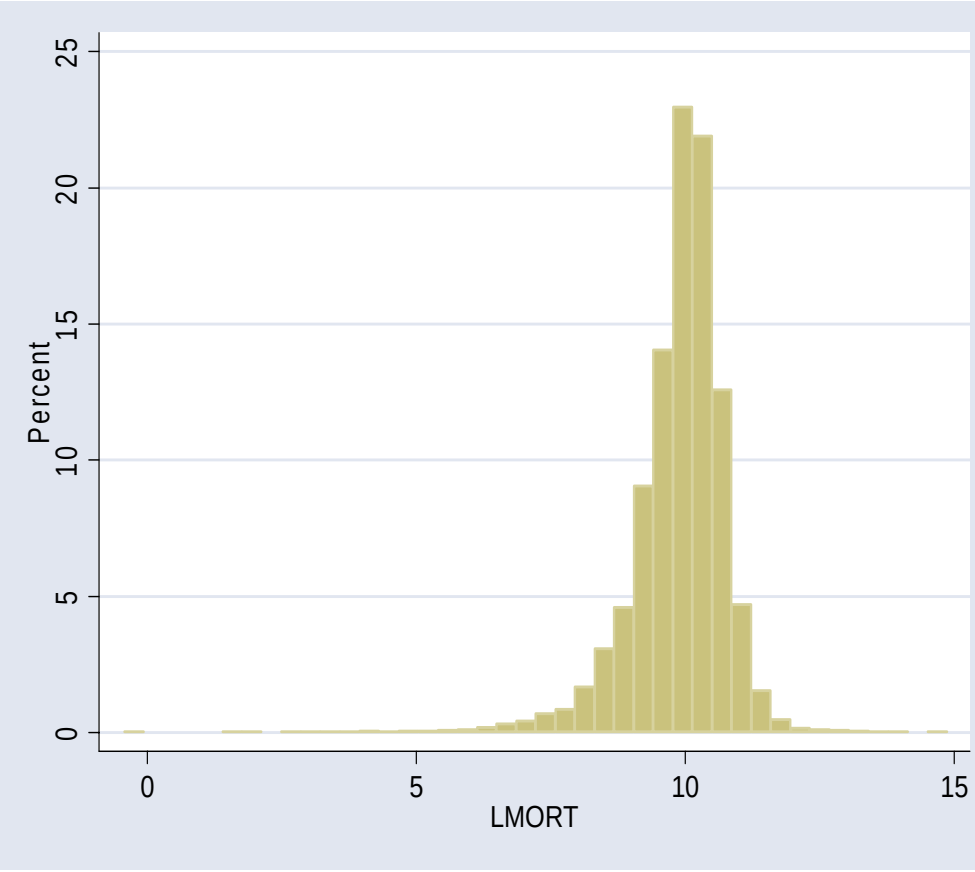

Figure 2: The Distribution of Mortgage as a Proportion of House Value (PMORT)

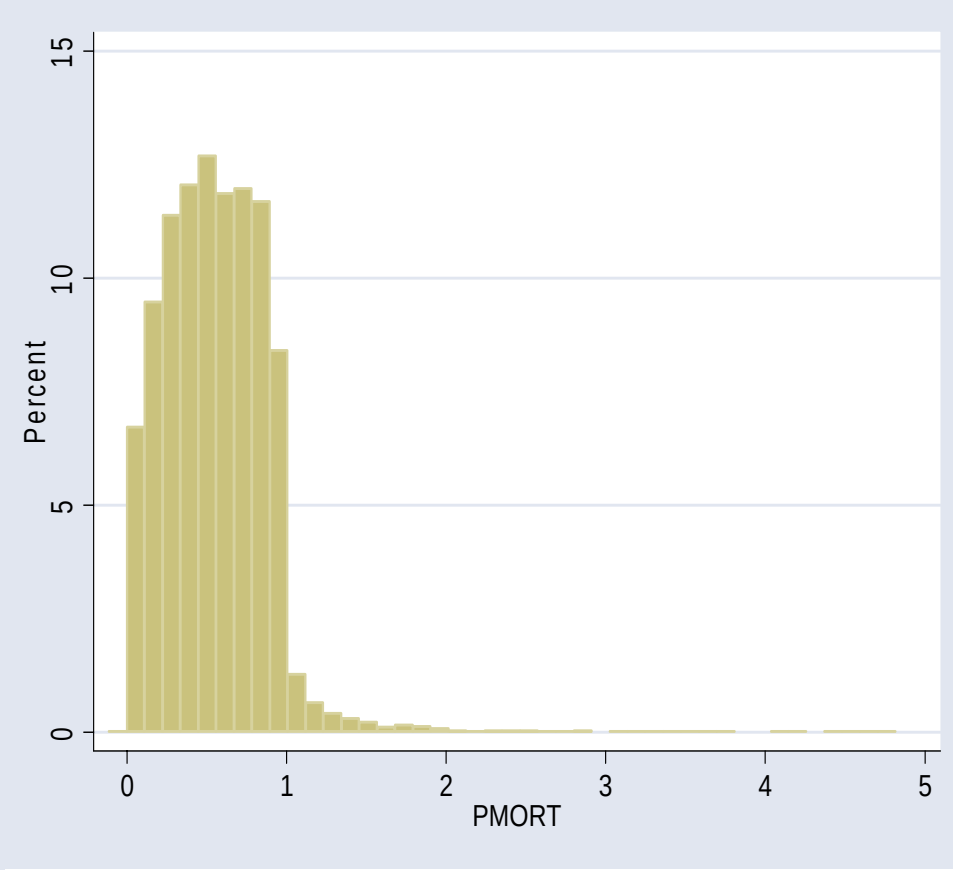

Figure 3: Actual Mortgage as Percentage of Household Income

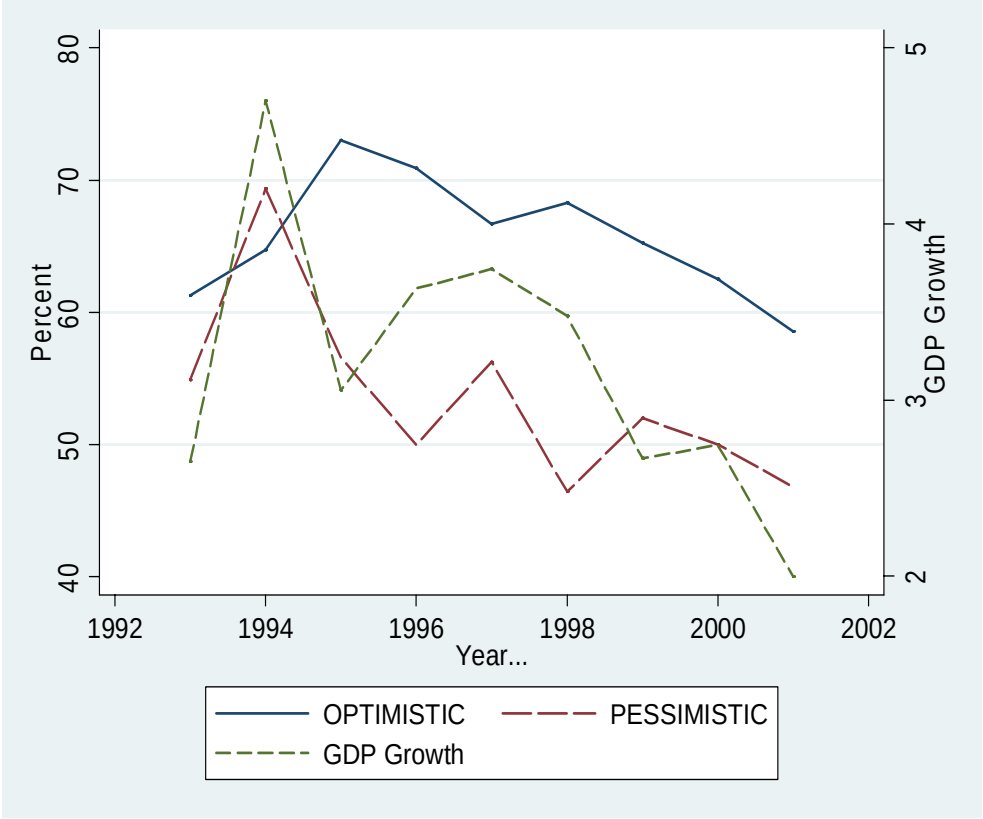

Figure 4: Predicted Mortgage as Percentage of Household Income

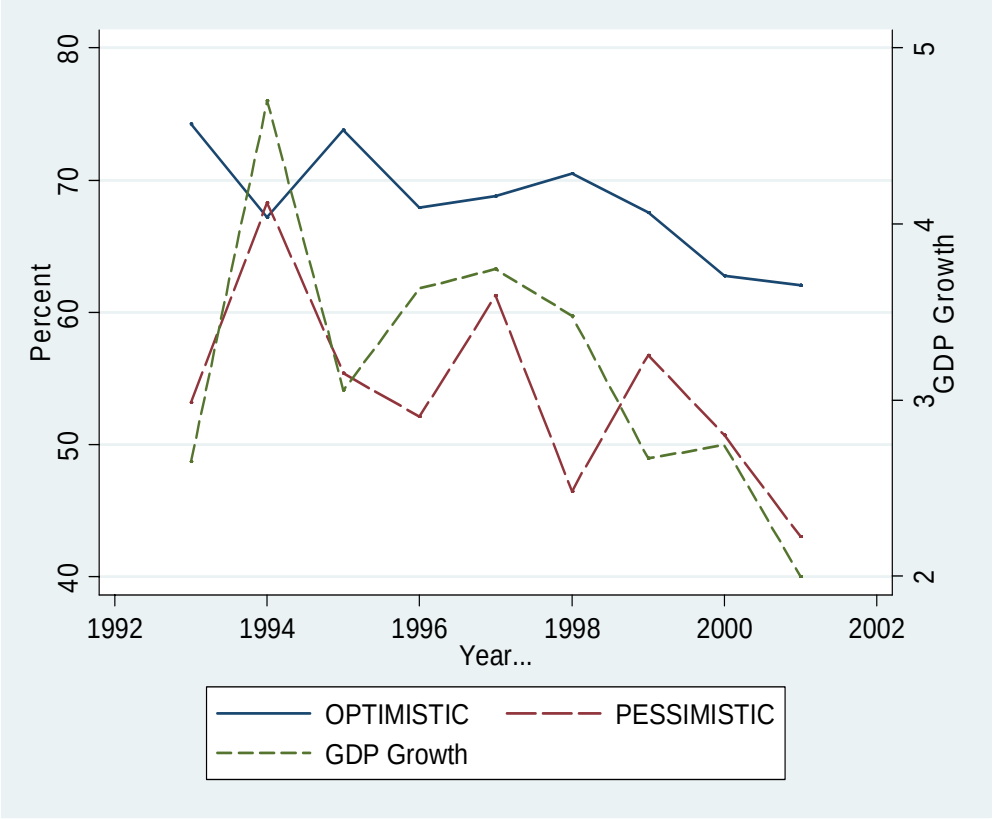

Table 1A: Financial Expectations Over Time

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Better off	26.53%	28.14%	29.70%	31.38%	31.04%	32.65%	31.70%	32.49%	29.41%
Worse off	22.36%	19.36%	16.17%	14.23%	13.21%	11.77%	12.37%	11.83%	10.57%
Or about the same?	51.11%	52.50%	54.13%	54.39%	55.75%	55.58%	55.93%	55.68%	60.02%

Table 1B: Persistence of Financial Expectations Over Time

	WORSE OFF		ABOUT THE SAME		BETTER OFF	
1 years/9 years	62.24%	*(2,645)*	35.69%	*(9,121)*	46.27%	*(6,054)*
2 years/9 years	21.53%	*(915)*	21.51%	*(5,499)*	23.60%	*(3,088)*
3 years/9 years	8.85%	*(376)*	14.82%	*(3,788)*	13.21%	*(1,729)*
4 years/9 years	4.05%	*(172)*	10.11%	*(2,583)*	7.67%	*(1,003)*
5 years/9 years	1.91%	*(81)*	7.25%	*(1,852)*	4.62%	*(605)*
6 years/9 years	0.89%	*(38)*	4.89%	*(1,250)*	2.63%	*(344)*
7 years/9 years	0.42%	*(18)*	3.27%	*(837)*	1.31%	*(171)*
8 years/9 years	0.09%	*(4)*	1.74%	*(444)*	0.51%	*(67)*
9 years/9 years	0.02%	*(1)*	0.72%	*(185)*	0.18%	*(24)*

Table 1C: Housing Tenure Over Time

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Owned outright	23.03%	22.04%	19.84%	20.47%	18.26%	19.67%	23.01%	22.84%	24.01%
Owned Mortgage	47.45%	48.97%	50.94%	49.62%	46.63%	46.73%	43.75%	44.79%	44.40%
Rented Council	10.81%	11.05%	11.91%	12.33%	12.57%	11.89%	10.80%	10.79%	10.98%
Rented Private	18.41%	17.94%	17.32%	17.58%	22.54%	21.70%	22.43%	21.58%	20.61%

Table 2: Summary Statistics

	FULL SAMPLE 1993-2001				MORTGAGEES ONLY 1993-2001			
	MEAN	**STD**	**MAX**	**MIN**	**MEAN**	**STD**	**MAX**	**MIN**
LMORT	4.714	4.977	14.876	-0.423	9.889	0.884	14.876	-0.423
PMORT	0.207	0.456	46.154	0	0.574	0.586	46.154	0
FEI	1.206	0.601	2	0	1.244	0.608	2	0
HFEI	1.505	0.879	4	0	1.592	0.909	4	0
Age	42.186	12.186	65	18	40.608	9.993	65	18
Age^2	1928.171	1050.790	4225	324	1748.890	844.259	4225	324
Male	0.714	0.452	1	0	0.825	0.380	1	0
White	0.919	0.273	1	0	0.928	0.259	1	0
Married	0.545	0.498	1	0	0.660	0.474	1	0
Cohabiting	0.119	0.325	1	0	0.129	0.335	1	0
Number of Children	0.721	1.049	8	0	0.797	1.025	7	0
Household size	1.972	0.835	9	1	2.079	0.768	8	1
Employed	0.682	0.466	1	0	0.800	0.400	1	0
Self Employed	0.112	0.316	1	0	0.129	0.335	1	0
Unemployed	0.052	0.222	1	0	0.023	0.150	1	0
Not in Labour Market	0.028	0.164	1	0	0.010	0.097	1	0
Student	0.056	0.231	1	0	0.015	0.123	1	0
L(Savings+Investments)	1.431	2.030	8.722	-0.550	1.824	2.149	8.722	-0.550
L(Household Income)	6.896	0.959	10.709	-3.017	7.229	0.722	10.709	-2.852
Degree	0.154	0.361	1	0	0.196	0.397	1	0
Further Education	0.230	0.421	1	0	0.280	0.449	1	0
A Level	0.117	0.321	1	0	0.130	0.337	1	0
GCSE (Grades ≥ C)	0.176	0.381	1	0	0.176	0.381	1	0
GCSE (Grades < C)	0.036	0.187	1	0	0.037	0.189	1	0
Other Education	0.045	0.208	1	0	0.034	0.180	1	0
Mortgage Type								
Endowment Mortgage		–			0.424	0.494	1	0
Repayment Mortgage		–			0.189	0.391	1	0
Type of Insurance								
Mortgage Protection Plan		–			0.313	0.463	1	0
Structural Insurance		–			0.402	0.490	1	0
Contents Insurance		–			0.208	0.406	1	0
Other Insurance		–			0.034	0.180	1	0
Reason for Extra Mortgage Payments								
Building Extension		–			0.068	0.252	1	0
Home Improvements		–			0.156	0.362	1	0
Car Purchase		–			0.016	0.124	1	0
Other Reason		–			0.062	0.242	1	0
	42,894				*19,941*			

Note*:* For brevity, we have omitted summary statistics for year and region.

Table 3A: Housing Tenure and Head of Household's Financial Expectations

	Owner Occupier (Mortgage)		Rent (Council)		Rent (Private)	
	M.E.	TSTAT	M.E.	TSTAT	M.E.	TSTAT
FEI	0.0096	*(2.96)*	0.0121	*(4.58)*	-0.0019	*(0.55)*
Age	0.0477	*(22.02)*	-0.0239	*(21.92)*	-0.0219	*(16.55)*
Age^2	-0.0007	*(25.53)*	0.0002	*(17.55)*	0.0003	*(16.53)*
Male	0.1170	*(14.91)*	0.0103	*(2.80)*	-0.0936	*(15.85)*
White	0.0694	*(6.72)*	-0.0072	*(1.23)*	0.0329	*(5.24)*
Married	0.1593	*(17.68)*	-0.1029	*(18.71)*	-0.0787	*(12.66)*
Cohabiting	0.0844	*(7.85)*	-0.0376	*(10.19)*	-0.0252	*(3.91)*
Number of Children	-0.0199	*(5.97)*	-0.0153	*(7.28)*	0.0498	*(23.34)*
Household Size	-0.0386	*(8.86)*	0.0114	*(4.80)*	0.0174	*(5.73)*
Employee	0.0567	*(3.51)*	0.0350	*(3.73)*	0.0471	*(5.46)*
Self Employed	0.0595	*(3.12)*	0.0683	*(4.13)*	-0.0828	*(10.08)*
Unemployed	-0.1308	*(5.93)*	0.0748	*(4.05)*	0.1752	*(9.21)*
Not in labour market	-0.1237	*(4.24)*	0.2187	*(7.24)*	-0.0174	*(1.15)*
Student	-0.1844	*(8.37)*	0.0713	*(3.81)*	0.1575	*(8.67)*
L(Savings+Investments)	0.0128	*(8.68)*	-0.0018	*(2.09)*	-0.0203	*(16.85)*
L(Household Income)	0.1351	*(25.51)*	-0.0352	*(16.82)*	-0.0810	*(28.30)*
Degree	0.1489	*(13.45)*	0.0117	*(2.06)*	-0.1864	*(53.97)*
Further Education	0.1535	*(18.09)*	-0.0150	*(3.21)*	-0.1364	*(35.14)*
A Level	0.1388	*(13.45)*	-0.0293	*(6.03)*	-0.1262	*(33.29)*
GCSE (Grades ≥ C)	0.1106	*(12.03)*	-0.0300	*(6.58)*	-0.0898	*(22.35)*
GCSE (Grades < C)	0.0983	*(5.82)*	-0.0313	*(4.75)*	-0.0629	*(9.28)*
Other Education	0.0871	*(6.02)*	-0.0255	*(3.41)*	-0.0625	*(10.42)*
Observations	42,894					
$\chi^2(120)$	25689.65 *p=[0.000]*					
Pseudo R squared	0.2378					

Notes (i) Other controls: year and region dummies in each panel; (ii) M.E. denotes marginal effect; (iii) The base category is owned outright.

Table 3B: Housing Tenure and Household Financial Expectations

	Owner Occupier (Mortgage)		Rent (Council)		Rent (Private)	
	M.E.	TSTAT	M.E.	TSTAT	M.E.	TSTAT
HFEI	0.0037	*(1.13)*	0.0076	*(3.96)*	0.0011	*(0.43)*
Age	0.0476	*(21.98)*	-0.0240	*(22.02)*	-0.0219	*(16.34)*
Age^2	-0.0007	*(25.51)*	0.0002	*(17.67)*	0.0003	*(16.38)*
Male	0.1167	*(14.87)*	0.0102	*(2.78)*	-0.0937	*(15.74)*
White	0.0696	*(6.73)*	-0.0072	*(1.24)*	0.0327	*(5.21)*
Married	0.1591	*(17.62)*	-0.1046	*(18.89)*	-0.0787	*(12.58)*
Cohabiting	0.0846	*(7.86)*	-0.0381	*(10.34)*	-0.0256	*(3.98)*
Number of Children	-0.0199	*(6.00)*	-0.0154	*(7.32)*	0.0498	*(22.93)*
Household Size	-0.0395	*(8.96)*	0.0099	*(4.12)*	0.0172	*(5.58)*
Employee	0.0569	*(3.52)*	0.0350	*(3.74)*	0.0470	*(5.45)*
Self Employed	0.0599	*(3.14)*	0.0689	*(4.16)*	-0.0831	*(10.06)*
Unemployed	-0.1302	*(5.90)*	0.0759	*(4.09)*	0.1743	*(9.17)*
Not in labour market	-0.1230	*(4.22)*	0.2160	*(7.19)*	-0.0161	*(1.06)*
Student	-0.1844	*(8.38)*	0.0711	*(3.81)*	0.1578	*(8.67)*
L(Savings+Investments)	0.0128	*(8.67)*	-0.0018	*(2.11)*	-0.0203	*(16.66)*
L(Household Income)	0.1353	*(25.54)*	-0.0352	*(16.80)*	-0.0811	*(27.40)*
Degree	0.1491	*(15.05)*	0.0122	*(2.14)*	-0.1865	*(47.85)*
Further Education	0.1538	*(18.13)*	-0.0147	*(3.14)*	-0.1366	*(33.52)*
A Level	0.1389	*(13.46)*	-0.0292	*(6.02)*	-0.1262	*(31.71)*
GCSE (Grades ≥ C)	0.1108	*(12.06)*	-0.0298	*(6.53)*	-0.0900	*(21.92)*
GCSE (Grades < C)	0.0985	*(5.83)*	-0.0311	*(4.71)*	-0.0630	*(9.28)*
Other Education	0.0872	*(6.02)*	-0.0254	*(3.39)*	-0.0626	*(10.39)*
Observations	42,894					
$\chi^2(120)$	25680.22 *p=[0.000]*					
Pseudo R squared	0.2377					

Notes (i) Other controls: year and region dummies; (ii) M.E. denotes marginal effect; (iii) The base category is owned outright.

Table 4A: Mortgage Debt and Individual Financial Expectations (Sample: $htc_{ht} = 1$)

	LMORT		PMORT	
FEI	0.0245	*(3.85)*	0.0239	*(4.40)*
Age	0.0832	*(12.91)*	-0.0082	*(2.14)*
Age^2	-0.0014	*(17.08)*	-0.0001	*(2.46)*
Male	0.1014	*(3.84)*	0.0366	*(3.01)*
White	-0.0226	*(0.58)*	0.0189	*(1.18)*
Married	0.0654	*(3.25)*	-0.0059	*(0.46)*
Cohabiting	0.0754	*(3.64)*	0.0620	*(4.39)*
Number of Children	0.0022	*(0.32)*	-0.0153	*(3.71)*
Household Size	-0.0176	*(2.08)*	-0.0343	*(5.96)*
L(Savings+Investments)	-0.0021	*(0.99)*	-0.0069	*(4.19)*
L(Household Income)	0.1017	*(10.27)*	0.0471	*(6.75)*
Degree	0.3102	*(11.21)*	0.0046	*(0.33)*
Further Education	0.1379	*(5.92)*	0.0104	*(0.81)*
A Level	0.1091	*(3.94)*	-0.0106	*(0.71)*
GCSE (Grades $\geq$ C)	0.0767	*(2.94)*	-0.0062	*(0.45)*
GCSE (Grades < C)	0.1318	*(2.90)*	0.0150	*(0.65)*
Other Education	0.0790	*(1.67)*	0.0112	*(0.48)*
Endowment Mortgage	0.0613	*(4.96)*	0.0424	*(4.92)*
Repayment Mortgage	0.0751	*(5.02)*	-0.0095	*(0.93)*
Mortgage Protection Plan	0.0167	*(1.85)*	0.0117	*(1.57)*
Structural Insurance	-0.0361	*(3.33)*	-0.0167	*(1.92)*
Contents Insurance	0.0563	*(4.19)*	0.0409	*(3.88)*
Other Insurance	0.0030	*(0.15)*	0.0056	*(0.32)*
Building Extension	-0.0311	*(1.44)*	-0.0276	*(1.84)*
Home Improvements	0.0101	*(-0.66)*	-0.0334	*(3.17)*
Car Purchase	0.0019	*(0.05)*	0.0086	*(0.30)*
Other Reason for Extra Mortgage	0.1822	*(8.57)*	0.0614	*(4.04)*
South East	0.1789	*(5.73)*	0.0614	*(4.10)*
South West	0.1105	*(2.65)*	0.0647	*(3.47)*
East Anglia	-0.0222	*(0.41)*	0.0428	*(1.75)*
East Midlands	-0.1594	*(3.80)*	0.0504	*(2.66)*
West Midlands	-0.1448	*(3.42)*	0.0424	*(2.25)*
North West	-0.1726	*(4.37)*	0.0544	*(3.12)*
York and Humberside	-0.1800	*(4.20)*	0.0761	*(4.10)*
North East	-0.3777	*(7.26)*	0.0640	*(3.00)*
Wales	-0.2037	*(5.85)*	0.0674	*(4.04)*
Scotland	-0.1202	*(3.73)*	0.1249	*(8.24)*
1993	-0.1390	*(8.50)*	0.0603	*(4.50)*
1994	-0.1134	*(7.26)*	0.0377	*(2.88)*
1995	-0.1035	*(6.85)*	0.0865	*(6.66)*
1996	-0.1103	*(7.55)*	0.0499	*(3.89)*
1997	-0.0806	*(5.73)*	0.0749	*(6.04)*
1998	-0.0743	*(5.47)*	0.0627	*(5.09)*
1999	-0.0834	*(6.75)*	0.0277	*(2.47)*
2000	-0.0216	*(1.85)*	0.0119	*(1.08)*
Inverse Mills Ratio Term	0.1718	*(4.70)*	0.0969	*(4.08)*
ρ	0.7272		0.1383	
$\chi^2(47)$	2626.81 *p=[0.000]*		2601.34 *p=[0.000]*	
Observations	19,941			

Table 4B: Mortgage Debt and Household Financial Expectations (Sample: $htc_{ht} = 1$)

	LMORT		PMORT	
HFEI	0.0067	*(2.61)*	0.0098	*(2.70)*
Age	0.0810	*(12.60)*	-0.0092	*(2.42)*
Age^2	-0.0014	*(16.78)*	-0.0001	*(2.22)*
Male	0.0989	*(3.73)*	0.0356	*(2.92)*
White	-0.0254	*(0.66)*	0.0180	*(1.13)*
Married	0.0633	*(3.14)*	-0.0078	*(0.61)*
Cohabiting	0.0742	*(3.59)*	0.0611	*(4.32)*
Number of Children	0.0027	*(0.39)*	-0.0154	*(3.72)*
Household Size	-0.0177	*(2.08)*	-0.0358	*(6.14)*
L(Savings+Investments)	-0.0021	*(1.02)*	-0.0069	*(4.20)*
L(Household Income)	0.0973	*(9.88)*	0.0456	*(6.54)*
Degree	0.3118	*(11.25)*	0.0057	*(0.41)*
Further Education	0.1379	*(5.91)*	0.0110	*(0.86)*
A Level	0.1090	*(3.93)*	-0.0105	*(0.70)*
GCSE (Grades $\geq$ C)	0.0769	*(2.94)*	-0.0061	*(0.44)*
GCSE (Grades < C)	0.1307	*(2.87)*	0.0149	*(0.64)*
Other Education	0.0797	*(1.68)*	0.0112	*(0.48)*
Endowment Mortgage	0.0610	*(4.93)*	0.0416	*(4.82)*
Repayment Mortgage	0.0763	*(5.11)*	-0.0095	*(0.92)*
Mortgage Protection Plan	0.0171	*(1.89)*	0.0118	*(1.59)*
Structural Insurance	-0.0362	*(3.34)*	-0.0168	*(1.93)*
Contents Insurance	0.0565	*(4.21)*	0.0411	*(3.90)*
Other Insurance	0.0031	*(0.16)*	0.0055	*(0.31)*
Building Extension	0.0308	*(1.43)*	-0.0280	*(1.87)*
Home Improvements	-0.0101	*(0.66)*	-0.0335	*(3.17)*
Car Purchase	0.0024	*(0.06)*	0.0091	*(0.32)*
Other Reason for Extra Mortgage	0.1823	*(8.58)*	0.0619	*(4.07)*
South East	0.1768	*(5.65)*	0.0611	*(4.07)*
South West	0.1113	*(2.67)*	0.0650	*(3.48)*
East Anglia	-0.0227	*(0.42)*	0.0431	*(1.76)*
East Midlands	-0.1587	*(3.78)*	0.0506	*(2.66)*
West Midlands	-0.1452	*(3.42)*	0.0426	*(2.26)*
North West	-0.1742	*(4.40)*	0.0540	*(3.09)*
York and Humberside	-0.1810	*(4.22)*	0.0756	*(4.07)*
North East	-0.3798	*(7.28)*	0.0633	*(2.96)*
Wales	-0.2017	*(5.78)*	0.0678	*(4.06)*
Scotland	-0.1206	*(3.73)*	0.1252	*(8.25)*
1993	-0.1413	*(8.64)*	0.0586	*(4.37)*
1994	-0.1150	*(7.37)*	0.0365	*(2.78)*
1995	-0.1054	*(6.98)*	0.0853	*(6.58)*
1996	-0.1113	*(7.62)*	0.0494	*(3.85)*
1997	-0.0818	*(5.83)*	0.0745	*(6.01)*
1998	-0.0749	*(5.52)*	0.0625	*(5.07)*
1999	-0.0834	*(6.75)*	0.0278	*(2.48)*
2000	-0.0217	*(1.86)*	0.0120	*(1.10)*
Inverse Mills Ratio Term	0.1554	*(4.23)*	0.0902	*(3.81)*
ρ	0.7291		0.1397	
$\chi^2(47)$	2600.87 *p=[0.000]*		2581.41 *p=[0.000]*	
Observations	19,941			

Table 5: Mortgage Debt and Financial Expectations (Sample: $htc_{ht} = 1$)

PANEL A: Individual	LMORT		PMORT	
Whether Optimistic	0.0212	*(2.47)*	0.0503	*(5.67)*
Whether Pessimistic	-0.0314	*(-2.50)*	-0.0342	*(2.45)*
Inverse Mills Ratio Term	0.1150	*(3.35)*	0.0439	*(2.83)*
ρ	0.7376		0.1301	
$\chi^2(48)$	2180.26 *p=[0.000]*		2181.05 *p=[0.000]*	
Observations	19,941			
PANEL B: Household	**LMORT**		**PMORT**	
Whether 1 Person Optimistic	0.0221	*(2.63)*	0.0430	*(4.83)*
Whether ≥2 People Optimistic	0.0105	*(0.56)*	0.0815	*(3.87)*
Whether 1 Person Pessimistic	0.0120	*(1.24)*	-0.0277	*(-2.55)*
Whether ≥2 People Pessimistic	-0.0145	*(-0.91)*	-0.0662	*(-3.71)*
Inverse Mills Ratio Term	0.1205	*(3.51)*	0.0453	*(1.89)*
ρ	0.7375		0.1299	
$\chi^2(50)$	2179.99 *p=[0.000]*		2184.83 *p=[0.000]*	
Observations	19,941			

Notes (i) Other controls as in Table 4; (ii) M.E. denotes marginal effect.

Table 6: Mortgage Debt and Financial Expectations – Tobit Model (Sample: All)

PANEL A: Individual	LMORT		PMORT	
FEI	0.1384	*(3.24)*	0.0186	*(3.20)*
ρ	0.5093	*(7.81)*	0.3766	*(6.77)*
$\chi^2(47)$	22315.46 *p=[0.000]*		12075.80 *p=[0.000]*	
Observations	42,894			
Uncensored (i.e. mortgagees)	19,941			
Left censored	22,953			
PANEL B: Household	**LMORT**		**PMORT**	
HFEI	0.0368	*(2.28)*	0.0031	*(2.89)*
ρ	0.5094	*(3.88)*	0.3769	*(6.81)*
$\chi^2(47)$	22317.75 *p=[0.000]*		12062.59 *p=[0.000]*	
Observations	42,894			
Uncensored (i.e. mortgagees)	19,941			
Left censored	22,953			

Notes (i) Controls as in Table 4 excluding the inverse mills ratio term.

Table 7: Mortgage Debt and Relative Financial Expectations (Sample: $htc_{ht} = 1$)

Panel A: Individual	LMORT		PMORT	
FEI_{rt}	0.0296	*(3.82)*	0.0310	*(3.81)*
Inverse Mills Ratio Term	0.1627	*(4.51)*	0.0721	*(2.71)*
ρ	0.7274		0.1385	
$\chi^2(47)$	2623.36 *p=[0.000]*		2268.87 *p=[0.000]*	
Observations	42,894			
Panel B: Household	**LMORT**		**PMORT**	
$HFEI_{rt}$	0.0122	*(2.83)*	0.0162	*(2.24)*
Inverse Mills Ratio Term	0.1763	*(4.82)*	0.0893	*(3.34)*
ρ	0.7291		0.1763	
$\chi^2(47)$	2610.09 *p=[0.000]*		2263.32 *p=[0.000]*	
Observations	42,894			

Notes (i) Controls as in Table 4.