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HOUSEHOLD DEBT AND FINANCIAL ASSETS: EVIDENCE FROM GREAT BRITAIN, GERMANY AND THE UNITED STATES

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Abstract: We explore the determinants of debt and financial asset accumulation at the household level using survey data for Great Britain, Germany and the United States (US). Given that debt and assets are both components of a household's financial portfolio, we explore the degree of inter-dependence between households' assets and liabilities by jointly modelling these two aspects of the portfolio. Indeed, our empirical findings for both countries support a high degree of inter-dependence between debt and asset holding. Furthermore, the nature of this inter-dependence varies across income ranges and age groups with the weakest correlation between financial assets and debt being found for the lowest income groups in Great Britain, suggesting that such groups may be particularly vulnerable to adverse financial shocks. Evidence supporting inter-dependence between assets and debt no longer remains, however, once we focus on debtors which suggests that households in debt may potentially face difficulties following adverse changes in their financial situation.

Key Words: Debt; Financial Assets; Household Financial Portfolio; Random Effects; Tobit Estimator.

JEL Classification: D14, G11; H31

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I Introduction

Over the last decade there has been an explosion in consumer credit on both sides of the Atlantic. In the U.K., for example, the amount of unsecured borrowing accumulated by individuals and households, as a proportion of GDP, has more than doubled since 1993 to 16 per cent. At the end of the third quarter of 2003, the total amount of unsecured debt was nearly £168 billion, or more than £4,000 for every adult of working age. The level of household debt (secured and unsecured) relative to income in the U.K. has increased from approximately 90% to 115% over the last five years (Hamilton, 2003). Similarly, for Germany, the Bundesbank has shown concern over the growth in debt (see the Bundesbank Monthly Report, January 1999). By the end of 1997, households in Germany had accumulated around £140 billion (394 billion DM) through borrowing for consumption purposes.[1]

The US Federal Reserve has also expressed concern about debt levels revealing that the value of consumer credit stood at nearly $135 billion by the end of 2000 – an increase of around 10% on 1999. Moreover, families' holdings of total outstanding debt rose by 9.6% from 1998 to 2001. Furthermore, Aizcorbe *et al*. (2003) found that the growth in debt over the period 1998 to 2001 in the US was outweighed by the growth in financial assets. Alan Greenspan, Chairman of the US Federal Reserve Board, has recently commented that unless one simultaneously considers financial assets along with liabilities it is difficult to assess the true burden of debt.[2]

[1] The accumulation of debt has also been noted in a number of other European countries. For example, the European Central Bank (ECB) reported that falling interest rates have allowed households to borrow more and accumulate more debt. As a consequence, household indebtedness 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, 11 November 2004.

[2] Remarks 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.

Similarly, the Monetary Policy Committee in Great Britain has acknowledged the importance of establishing whether the same households have been accumulating financial assets as well as debt over recent years. As recorded in the Minutes of the Monetary Policy Committee, June 2002:

> 'the aggregate expansion of both sides of the household sector balance sheet concealed a risk at a disaggregated level; to the extent that some households were accumulating liabilities whilst others were increasing their assets, there was a risk that indebted households might have to adjust their balance sheets and consequently reduce their consumption in the event of an adverse shock.'

Clearly, ascertaining the distribution of financial assets and liabilities at the household level is of paramount importance for economic policy-making since it indicates the extent of financial stress at the household level. Cox *et al.* (2002) explore the distribution of financial pressure across households in Great Britain. Their findings, which are drawn from a descriptive analysis of the data, suggest that households with the highest absolute levels of debt also tend to have the highest income and net wealth. This implies that households may be relatively well disposed towards dealing with adverse financial shocks given that they have financial assets to draw upon. In addition, such findings reveal interesting insights into the behaviour of households with respect to asset and debt accumulation. For example, the accumulation of debt is often associated with a higher interest rate than that received from, for example, savings.[3] Thus, joint holding of debt and financial assets suggests that some households may be disinclined to dis-save in order to repay debts.

Given the degree of Government concern over debt accumulation on both sides of the Atlantic, the scarcity of research into the determinants of debt at the household level in the economics literature is somewhat surprising. The aim of this paper is to further explore whether the concerns raised by the Federal Reserve Board, the Monetary Policy Committee and the Bundesbank are warranted. To be specific, we expand the descriptive analysis of Cox *et al.* (2002) and Aizcorbe *et al.* (2003) by

[3] It may be the case, however, that households are taking advantage of the numerous interest free credit arrangements on offer in order to enhance current liquidity.

conducting econometric analysis of the determinants of debt and asset accumulation at the household level. Moreover, given that debt and financial assets are both components of the household's financial portfolio, we model their accumulation jointly. In order to ascertain the extent to which households can absorb financial shocks, such as reductions in their income or increases in the interest rate, it is important to consider financial assets and liabilities simultaneously at the household level. We explore household data from Great Britain, Germany and the US in order to ascertain whether differences exist in the relationship between households' assets and debts across countries. Household level analysis is clearly appropriate since, as argued by Leece (1995), the use of aggregate time series data may mask household responses to changes in the economic environment. In addition, such aggregate data does not indicate which households have accumulated the most debt (Cox *et al*., 2002).

II Background

There is a growing empirical literature on households' financial portfolios (see, for example, Guiso *et al.*, 2002, for a comprehensive review of this area). In general, economists have focused on specific aspects of the financial portfolio such as the demand for risky financial assets (e.g. stocks and shares), debt or savings.[4]

Turning initially to the literature on risky financial assets, Guiso *et al.* (1996) recognise the influence of earnings risk on a household's demand for risky financial assets and report an inverse relationship between investment in risky financial assets and income risk. The implications of household asset market participation and non-participation for inter-temporal consumption have been explored using US data by Vissing-Jørgensen (2002) and Vissing-Jørgensen and Attanasio (2003). Differences in estimates of the elasticity of inter-temporal consumption between asset holders and non-asset holders are found to be large and statistically significant. Attanasio *et al.*

[4] One exception is Hochguertel *et al.* (1997) who adopt a trivariate tobit approach to model the portfolio choice of households.

(2002) report consistent U.K. evidence. Whilst, Guiso *et al*. (2003) have shown that stock market participation is correlated with household wealth across countries.

Hochguertel *et al.* (1997) argue that the typical household's portfolio consists of only a few different assets. Given that a wide range of financial assets are available on the stock market they pose an interesting question as to why risk averse households do not diversify to a greater extent. Using cross-section data for the Netherlands in 1988 they show that the portfolio choice of households, i.e. allocation between risky (stocks and bonds) and risk-free assets (savings accounts), is influenced by overall financial wealth and the marginal tax rate.

Recent empirical studies of debt accumulation at the household level include Godwin (1997) who explores households' use of credit using US panel data. The findings support considerable mobility in debt status during the 1980s, with the majority of households being in a different debt quintile in 1989 relative to 1983. In a more recent study, Crook (2001) aims to ascertain the factors that explain US household debt over the period 1990-1995 using data from the *Survey of Consumer Finances*. Income, home ownership and family size all impact positively on household debt.

In one of the few papers based on U.K. data, Bridges and Disney (2004) explore access to credit, default and arrears among low-income U.K. households. The results indicate that differences in the incidence of credit and default across households are influenced by labour market status, age, access to social security benefits and household composition.

Brown *et al.* (2005) present a theoretical framework where optimistic financial expectations impact positively on the quantity of unsecured debt at the individual and the household level. Their empirical analysis based on British panel data confirms that financial expectations are an important determinant of unsecured debt. Furthermore, the empirical results indicate that it is optimistic financial expectations *per se* that are

important in influencing unsecured debt, rather than the accuracy of individuals' predictions regarding their future financial situation.

Leece (1995) explores mortgage demand at the household level using cross-section data from the British *Family Expenditure Survey* (*FES*) and focuses on whether financial deregulation in the 1980s affected mortgage demand. Leece found that such structural changes were evident in the data. Other factors found to influence mortgage demand were income, the size of the property, regional location and age. Leece (2000) investigated whether the factors that influenced overall mortgage demand differ by the type of mortgage undertaken – such as an endowment mortgage (interest only) versus a repayment mortgage (annuity). The results from the 1986 *FES* suggest that financial deregulation and credit market rationing had differing impacts on each type of mortgage demand.

Saving at the household level has been analysed from both a theoretical and an empirical perspective. For example, Dynan *et al*. (2004) report a positive relationship between savings rates and lifetime income. From a theoretical perspective, life cycle models have been used to explain how saving and dis-saving are associated with consumption smoothing over the life cycle. The notion of precautionary saving introduces an additional role for saving as a type of insurance against future unforeseen events such as job loss or illness. Lusardi (1998) explores the importance of precautionary saving exploiting US data on individuals' subjective probabilities of job loss from the *Health and Retirement Survey*. The evidence is consistent with precautionary savings motives in that individuals facing higher income risk save more, although the findings suggest that the contribution of precautionary saving to wealth accumulation is not particularly large.

Jappelli and Pistaferri (2000) provide a test of both the precautionary saving model and the excess sensitivity of consumption to predicted income using Italian household panel data over the period 1989-1993. Consumption growth is found to be

uncorrelated with expected income growth, whilst income risk is correlated with consumption risk – partially supporting the precautionary savings motive. Similarly, Guariglia (2001) analyses the extent to which British households save in order to self-insure against uncertainty. The findings support a significant relationship between earnings uncertainty and savings. Moreover, the results imply that households save more if they expect their financial situation to deteriorate. Guariglia and Rossi (2002) report further U.K. evidence supporting precautionary saving motives.

III Data and Methodology

In the remainder of the paper, we explore the empirical determinants of the amount of debt and financial assets accumulated at the household level in Great Britain, Germany and the US.

For Great Britain, we exploit information contained in the 2000 wave of the *British Household Panel Survey* (*BHPS*), which is the most recent wave containing information about households' debt and financial investments.[5] 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). For wave one, interviews were conducted during the autumn of 1991. The same individuals are re-interviewed in successive waves – the latest available being wave twelve, collected in 2002.

In 2000, individuals were asked how much in total they owed. This question relates to non-mortgage debt as details about mortgages are asked in a separate question. The answers thus provide information about the amount of outstanding unsecured debt. With respect to secured debt, each head of household was asked to state how much in total is owed with respect to the total amount of mortgage borrowed at purchase as well as the amount of any additional mortgage taken on.

[5] In the *BHPS*, there are unfortunately only two waves (1995 and 2000), which include questions relating to unsecured debt and financial assets.

Thus, in order to calculate the total liabilities of each household, d_h, we sum the information related to secured and unsecured debt, where total unsecured debt at the household level is derived by summing each household member's revealed level of unsecured debt.

Turning to financial assets, individuals were asked to state the total value of financial investments held including shares, personal equity plans, unit trusts, other investments (including government and company securities), premium bonds, National Savings and building society accounts, tax exempt special savings accounts, investment savings accounts and the total value in savings accounts. Again, in order to ascertain the amount of financial assets at the household level, a_h, we aggregate the financial assets of each household member.

For Germany, we use the *German Socio-Economic Panel* (*GSOEP*), a representative longitudinal study of private households who have been surveyed annually since 1984, funded by the German National Science Foundation. The *GSOEP* has followed approximately 13,500 individuals, living in around 7,000 households, each year since 1984. We concentrate on the 2002 wave since it is the most recent year that respondents are asked detailed questions about holdings of financial assets and debt.[6] To be specific, individuals were asked to specify the total value of financial assets over the value of 2500 euros, which are held in the form of a savings balance, savings bonds, bonds, shares or investments. We obtain a measure of a_h by summing the information provided by each household member. Turning to household unsecured debt, we focus on credit obtained as a private individual from a bank, similar institution or another individual. This data concerns debt that is greater than 2500 euros before interest. The value of total mortgage debt is defined as the remaining mortgage debt on the first property as well as any mortgages on second

[6] Information on debt and assets at the household level is only available in 1988 and 2002 in the *GSOEP*. In addition, there are some discrepancies across the questions such that less detailed information is available with respect to financial assets and no information is available with respect to unsecured debt in 1988.

owned properties excluding interest. As in the case of the *BHPS*, in order to obtain information on total debt at the household level (d_h), we sum total secured and unsecured debt within each household.

For the US, we use the *Panel Study of Income Dynamics* (*PSID*), which began in 1968, and is a longitudinal study of a representative sample of US individuals (men, women, and children) and the family units in which they reside. It emphasises the dynamic aspects of economic and demographic behaviour. The sample size has grown from 4,800 families in 1968 to more than 7,000 families in 2001. We concentrate on the 2001 wave since it is the most recent year that households are asked detailed questions about their holdings of financial assets and debt.[7] To be specific, turning to financial assets, the head of family is asked to specify the amount of shares of stock in publicly held corporations, mutual funds, investment trusts, money in checking or savings accounts, money market funds, certificates of deposit, and government savings bonds or treasury bills. In terms of debt the head of family is asked to specify the amount remaining on first mortgage, second mortgage, credit card charges, student loans, medical or legal bills, or other loans. Since both of these questions are asked to the head of the family, the responses yield household level totals.[8]

By definition a_h and d_h cannot be negative and so we treat them as censored variables in our econometric analysis. Following Bertaut and Starr-McCluer (2002), we employ a tobit model to ascertain the determinants of debt and assets at the household level, which allows for the fact that a number of households report zero

[7] The questions on financial assets and debt were first asked in the *PSID* in 1999 in Section W of the questionnaire called "*Wealth and Active Savings*". Prior to this period there was no exact match to the questions posed in the subsequent periods.

[8] It is apparent that differences exist with respect to the specific questions in the *GSOEP*, *BHPS* and *PSID* regarding assets and debts. The key difference is the specification that assets and debts are over 2500 euros in the case of Germany. In terms of the figures for average debt levels, Table 1 reveals that there is no significant difference in that reported in the two European countries, although the figure for the US is relatively high. In terms of financial assets, it is apparent that the mean level is highest for Germany which accords with *a priori* expectations given the nature of the *GSOEP* question.

assets and/or debt.[9] This is apparent in Figures 1 to 6, which show the distributions of $\ln(a_h)$ and $\ln(d_h)$ for each country. Hence, we estimate the following in the case of household debt, where we specify a logarithmic dependent variable following Gropp *et al.* (1997): [10]

$$\ln(d_h^*) = \beta_1' X_h + \varepsilon_h \tag{1}$$

$$\ln(d_h) = \ln(d_h^*) \quad if \quad d_h^* > 0$$
$$\ln(d_h) = 0 \quad otherwise \tag{2}$$

where the debt of household h is given by d_h such that $h=1,\ldots,n_h$, X_h denotes a vector of head of household and household characteristics and ε_h represents the random error term. With respect to household asset accumulation, we repeat the tobit analysis replacing d_h with a_h. Thus, we initially model d_h and a_h independently assuming that the correlation between the random error terms across the two equations equals zero. Our samples drawn from the *BHPS*, the *GSOEP* and the *PSID* comprise 3,887, 8,956 and 4,885 households respectively with an employed head of household as our unit of observation.

<<FIGURES 1 TO 6 HERE>>

We draw upon Guiso *et al.* (1996, 2002, 2003) and Brown *et al*. (2005) in order to specify X_h. We include demographic characteristics of the head of household such as age, gender, marital status, ethnicity, region and highest educational qualification as well as labour market characteristics such as occupation, industrial

[9] For Germany the number of households reporting zero assets is 2,865 (32%) and the number of households reporting zero debt is 4,704 (53%). The figures for Great Britain are 1,310 (34%) and 1,382 (36%) respectively, whilst the corresponding figures for the US are 1,200 (25%) and 1,265 (26%) respectively. Those reporting both zero assets and zero debts in Germany, Great Britain and the US are 2,008 (22%), 618 (16%) and 598 (12%) respectively. For those with positive household debt and zero assets the figures in Germany, Great Britain and the US are 857 (10%), 692 (18%) and 602 (12%) respectively.

[10] For households reporting zero financial assets or debts, $\ln(d_h)$ and $\ln(a_h)$ were recoded to zero, as there is no reported debt or assets between zero and unity. Throughout the analysis we refer to debt and assets as logged variables due to the fact that the distributions of debt and assets are both highly skewed towards zero.

affiliation and having a second job. We also control for a number of household characteristics including the number of children in the household, household size, the value of the house and whether the house is owner occupied. We control for the head of household's income, the income of his/her spouse, unearned income, the amount of any windfall and the amount of past total income observed in the survey, as a proxy for lifetime income, because one would expect the amount of debt and financial assets accumulated to vary over the life cycle. For the *GSOEP*, this is income accumulated over 1990-2001, for the *BHPS* this is income accumulated over 1991-1999, whilst for the *PSID* this is income accumulated over 1993-2000.[11] Full summary statistics of the variables used in our empirical analysis are presented in Table 1. The monetary figures are all expressed in real terms and have been converted, where appropriate, into US Dollars.

<<TABLE 1 HERE>>

Given that d_h and a_h represent two components of the household's financial portfolio, we contrast our findings from modelling them independently with the findings from modelling them jointly by employing a bivariate tobit estimator. Such an approach allows for the possibility of inter-dependent decision-making with respect to financial assets and liabilities. The bivariate tobit model is specified as follows:

$$\ln\left(d_h^*\right) = \beta_1' X_{h_1} + \varepsilon_{h_1} \tag{3}$$

$$\ln\left(a_h^*\right) = \beta_2' X_{h_2} + \varepsilon_{h_2} \tag{4}$$

where ε_{h_1} and ε_{h_2} are the stochastic disturbance terms, $\varepsilon_{h_1}, \varepsilon_{h_2} \sim N\left(0,0,\sigma_{h_1}^2,\sigma_{h_2}^2,\rho\right)$ and the covariance is $\sigma_{h_1 h_2} = \rho\sigma_{h_1}\sigma_{h_2}$. In the bivariate tobit model, the disturbance terms, ε_{h_1} and ε_{h_2}, are jointly normally distributed with variances σ_{h_1} and σ_{h_2}. If

[11] The time period over which we aggregate is determined by a variety of factors. For the *BHPS*, the first wave was conducted in 1991. For *GSOEP*, we aggregate from the year after unification. For *PSID* the income question is only comparable across waves 1993 through to 2001.

the correlation term, ρ, is zero, then the asset and debt decisions are independent. If $\rho \neq 0$, then joint estimation is characterised by greater efficiency and implies a degree of inter-dependence between d_h and a_h. The parameters of the bivariate model are estimated by full information maximum likelihood.

IV Results

The Determinants of Household Debt and Financial Assets

The results from estimating equations (1) and (2) are presented in Table 2 below. These findings inform us about the determinants of debt and financial assets at the household level maintaining the assumption that the accumulation of these two components of a household's financial portfolio are independent from each other. It is apparent that in Germany and the US debt accumulation increases with age but at a diminishing rate whilst there is no life-cycle effect in Great Britain. Being male is positively associated with the accumulation of financial assets across countries, but is insignificantly related to the accumulation of debt apart from in the US where males have less debt than females, *ceteris paribus*. There are interesting differences with respect to the effect of marital status on asset and debt accumulation across the three countries. In Germany being married is positively associated with household debt and financial assets, whilst in Great Britain, there is an inverse relationship between being married and both asset and debt accumulation. For the US marital status has no significant influence upon either asset or debt accumulation.[12]

Income of the head of household and that of his/her spouse are positively associated with both financial assets and liabilities across each country. The same holds for unearned income with the exception of the significant inverse relationship between debt and unearned income for Great Britain and the US. In each country, the

[12] The positive influence of being married on debt and assets in Germany may reflect the possibility that they could be held jointly between spouses. Unfortunately, there is not a common question across countries to enable us to explicitly control in a consistent manner for whether debt or assets are held at the individual level within the household or whether there is joint financial responsibility. Brown *et al.* (2005) investigating debt in Great Britain using the *BHPS* found that, even controlling for joint responsibility for debt, married couples had lower levels of debt.

number of children is inversely related to financial asset holdings and debt levels with the exception of Germany, whereas household size only has a significant positive effect on debt and assets for Great Britain, and debt accumulation in the US. In contrast to Great Britain, the value of the house has a relatively large and highly significant positive influence on financial assets and debt in both Germany and the US. In general, higher levels of educational attainment are positively related to financial asset accumulation in Germany and Great Britain, but interestingly education yields an insignificant effect in the US – the only exception is the influence of a college degree yet this effect is only significant at the 10 percent level.[13]

<<TABLE 2 HERE>>

Inter-dependence between Household Debt and Financial Assets

In Panel B of Table 2, we explore the relationship between debt and financial assets at the household level by augmenting equations (1) and (2) to include debt in the asset equation and vice versa. It is apparent that, across countries, household debt (financial assets) is positively related to household financial assets (debt). Hence, our findings suggest that assets and debt are not accumulated independently from one another.[14] Moreover, our findings support a positive association between assets and debt at the household level suggesting that the concerns of the Federal Reserve Board, the Monetary Policy Committee and the Bundesbank about the nature of households' balance sheets may be unwarranted.

In order to explore such considerations more fully, we estimate the determinants of debt and assets by specifying a bivariate tobit model that allows for possible inter-dependence between these two components of the household's financial portfolio. These results are presented in Table 3 and generally concur with those

[13] Both the *BHPS* and *GSOEP* also ask questions about households' financial concerns and their financial optimism for the future. These controls are omitted since corresponding questions are not asked in the *PSID*. The results for Great Britain and Germany are robust to their inclusion. In accordance with Brown *et al*. (2005), financial optimism is positively associated with the level of household debt.

[14] In addition, the correlation between the residuals from the asset equation and that from the debt equation for Germany, Great Britain and the US is relatively high and statistically significant.

shown above. The correlation parameter, ρ, is statistically significant for Germany, Great Britain and the US indicating that debt and asset accumulation are inter-dependent and so a joint modelling approach is appropriate for each country. It is apparent that the correlation term is positive across countries implying, conditional on the covariates, that debt accumulation takes place simultaneously with asset accumulation. The relatively large ρ parameter in Germany suggests a greater degree of complementarity (i.e. symmetry) between household debt and financial asset accumulation in Germany relative to Great Britain and the US (where the order of magnitude is similar for the ρ parameter).

Thus, our findings support a positive association between household assets and liabilities, which may be a consequence of households holding debt and assets simultaneously.[15] One could argue that it is irrational to hold both debt and assets simultaneously since debt usually attracts a higher interest rate than, for example, the rate of return on savings. A possible reason why it might be optimal for households to jointly hold debt and assets is to overcome short-term cash flow problems (see Cox *et al*., 2002, and Banks *et al*., 2002). For instance, in the face of cash flow problems it could be easier to use savings rather than to arrange credit. Conversely, it might be easier to arrange credit than to liquidate financial assets such as stocks and shares. A further reason for jointly holding debt and assets might be that in the short term debt may attract zero interest payments for a limited period.

The existence of a positive relationship between assets and liabilities suggests that households may be able to absorb adverse financial shocks providing further evidence suggesting that the concerns of the Monetary Policy Committee, the Bundesbank and the Federal Reserve may be unfounded. However, it may be the case that certain types of households are vulnerable to financial shocks, i.e. not all

[15] Following Flavin and Yamashita (2002), we have explored the robustness of our findings by further analysing the role of housing wealth by including housing wealth in the definition of household assets. Our findings, which are available on request, are largely unchanged. The correlation parameter, ρ, remained positive and statistically significant in each country.

households may be characterised by such a strong symmetry in holdings of debt and assets. In order to explore such issues more fully, we ascertain the nature of the relationship between assets and debt, firstly, across different income groups and, secondly, across different age groups.

<<TABLE 3 HERE>>

Does the Degree of Inter-Dependence vary with Income or across the Life Cycle?

We further investigate the symmetry between household debt and financial asset accumulation in Great Britain, Germany and the US by estimating a bivariate tobit model: firstly by splitting each sample into quartiles according to household income, defined as household labour income plus household non labour income; and secondly by age quartiles, given that debt and asset accumulation may differ over the life cycle (see Banks *et al*., 2002, and Guiso *et al*., 2002). As such, we estimate the following across either income or age quartiles:

$$\left.\begin{aligned} \ln\left(d_h^*\right) &= \beta_1' \tilde{X}_{h_1} + \varepsilon_{h_1} \\ \ln\left(a_h^*\right) &= \beta_2' \tilde{X}_{h_2} + \varepsilon_{h_2} \end{aligned}\right\} \quad \forall \quad < q_1, \geq q_1 \text{ and } < q_2, \geq q_2 \text{ and } < q_3, \geq q_3 \qquad (5)$$

where q_1 is the 25th quartile, q_2 is the 50th quartile, q_3 is the 75th quartile and $\tilde{X}_h$ is the same as X_h, as defined above, but excludes income of the head of household, income of his/her spouse and unearned income in the case of estimating equation (5) by income quartiles and age in the case of estimating equation (5) by head of household age quartiles. Specifically, we are interested in the sign, magnitude and significance of ρ across income and age groups.[16] To be specific, we explore the nature of the relationship between household debt and financial assets across household income as well as across age groups.

<<TABLES 4 AND 5 HERE>>

[16] The results are robust to controlling for income (age) within income (age) quartiles, but are omitted for brevity.

The results of estimating equation (5) across household income quartiles are summarised in Table 4, where Panel A refers to Germany, Panel B to Great Britain and Panel C to the US. Each panel shows ρ across each income quartile as well as the raw correlation in the data between debt and financial assets, and average debt and financial asset values. Clearly, across countries average household debt and average financial assets increase monotonically from the lowest to the highest income quartiles. This is also evident for the correlation in the raw data between debt and assets for Germany. Interestingly, the opposite is evident in the US with the raw correlations decreasing monotonically across income quartiles. No clear pattern is evident from the raw correlations in the case of Great Britain. The correlation coefficients derived from the bivariate tobit estimates generally increase monotonically from the lowest to the highest income quartiles in Germany and Great Britain. However, in the US the evidence from the bivariate tobit estimates shows a monotonic fall in the correlation coefficients – akin to the pattern in the raw data. For Germany and Great Britain, this suggests, conditional on the covariates, that the inter-dependence between household debt and financial assets is greater for higher income groups. In other words a greater degree of complementarity appears to exist at higher levels of household income – whereas in the US the opposite appears to hold. It should be noted that there is always a symmetry between these two components of the households financial portfolio, i.e. a positive correlation between assets and liabilities, although the degree of correlation in Great Britain is relatively modest for the two lowest income quartiles.

The results of estimating equation (5) across head of household age quartiles are summarised in Table 5, where the Panels are arranged as in Table 4. Clearly, in Germany and Great Britain average household debt decreases monotonically moving from the youngest to the oldest age quartiles – that is younger households are the large debt holders. The opposite is evident in the US in that older households have

more debt. For household financial assets the pattern is the same as for household income quartiles, see Table 4, in that there is a monotonic increase in asset accumulation with age. The raw correlation coefficients for Germany show that household debt and assets are greater complements for the lowest age quartile (less than 37 years of age) and exhibit the lowest correlations between the first and second age quartiles (aged 37 to 44). The same is evident for Great Britain, where high correlations exist below the first age quartile (aged ≤ 32) and the lowest complementarity exists between the second and third age quartiles (aged 40 to 48). For the US the highest correlations appear in the middle quartile ranges (aged 31 to 47).

The correlation coefficients derived from the bivariate tobit model do not increase monotonically across head of household age quartiles. Rather, our results suggest that, conditional upon the covariates, the inter-dependence between household debt and financial assets is greater at higher age groups – aged 44 *(q_2)* to 57 *(q_3)* for Germany, 48 *(q_3)* or over in Great Britain, and aged 39 *(q_2)* to 47 *(q_3)* in the US. It should be noted that although there is always a symmetry between these two components of the household's financial portfolio across age quartiles, in Great Britain this falls over each quartile until the final one, whilst in Germany the opposite is evident in that the correlation rises then falls to its lowest level by the third age quartile, a similar pattern is evident in the US. This suggests that there are different life cycle effects across the three countries which drive the inter-dependence observed in the data, and should be borne in mind when considering how such households can deal with adverse financial shocks.

Households reporting Positive Debt

It is apparent, however, that the positive and significant relationship between assets and debt might reflect that the fact that a number of households report zero assets and zero debt (see Figures 1 to 6). Thus, in order to explore the issue of financial pressure,

it seems appropriate to focus on those households reporting positive levels of debt. We specify a sequential (nested) tobit model, which controls for sample selection (see Lee, 1992, and Howe *et al*., 1994), and serves to select on those households reporting a strictly positive level of debt. In terms of equations (3) and (4), $ln(a_h)$ and X_{h_2} are only observed when $ln(d_h) > 0$.

The results, which are obtained via full information maximum likelihood, are presented in Table 6 and are similar to those of the bivariate tobit model (Table 3) in terms of the statistical significance of the covariates. However, it is apparent that ρ becomes insignificant for Germany, Great Britain and the US, indicating that those households in debt may well be vulnerable to changes in their financial situation. Indeed, based upon our results if a common macroeconomic shock led to unemployment so labour income fell by 100% in each country, then debt would fall by 30%, 46% and 21% in Germany, Great Britain and the US respectively, *ceteris paribus*. This may imply that current levels of international debt are not sustainable if such shocks were to occur, for instance in the advent of a recessionary period, as current debtors would arguably have problems in maintaining their current liabilities.

Moreover, Table 7 shows that this pattern exists across all income quartiles, with average debt exceeding average assets across all income quartiles. The finding that there is no significant ρ across quartiles is potentially worrying as it suggests that households in debt are vulnerable to economic shocks. Furthermore, this is especially the case for low income households.[17] The pattern is less clear in the case of age quartiles since for Germany (Great Britain), ρ is insignificant across all quartiles except the highest age quartile where there is a positive (negative) and

[17] For the US, data from the 1998 *Survey of Consumer Finances* shows that more than 20% of families earning below $50,000 had 40% of their income set aside to cover debt payments. Indeed in 2001 those families with repayment difficulties on loans were typically in the lowest quartile of the income distribution, Aizcorbe *et al*. (2003).

significant relationship between assets and debt respectively. For the US there are no significant correlation coefficients across age quartiles.

<<TABLES 6 TO 8 HERE>>

Thus, our findings suggest that joint holding of assets and debt may not be prevalent once we restrict our sample to those households reporting positive debt. Our estimates of ρ, however, do not inform us about the level of asset accumulation *vis a vis* debt accumulation. An insignificant correlation parameter, for example, may reflect a situation where the distribution of assets differs from that of debt yet lies to the right of the debt distribution – hence rendering financial pressure minimal. In order to compare the distribution of assets and debt, Figures 7 to 9 present kernel density plots of the two distributions for each country, for those households in debt.

It is apparent that – especially for Great Britain and the US – debt outweighs financial assets for a significant proportion of households. Moreover, one might argue that the problem may be abated if we include housing wealth in the definition of assets. Although Cox *et al.* (2002) argue that households experiencing a financial shock may find it difficult in the short term to realise some of their housing equity to ease financial pressure. However, abstracting from such liquidity issues, it is apparent from Figures 10 to 12 that even when including housing equity in the definition of financial assets, there still remains – again especially in Great Britain and the US – a significant proportion of households with debt in excess of financial assets.

<<FIGURES 7 TO 12 HERE>>

V Conclusion

Gaining an insight into the factors that influence debt accumulation at the household level is an important issue for economic policy making. Furthermore, as Alan Greenspan, Chairman of the Federal Reserve Board, has recently argued whether households have the financial assets to cover debt repayments is a crucial economic question.

Our results suggest that household debt and financial assets should be modelled simultaneously, which ties in with our *a priori* expectations given that debt and assets represent two components of the household's financial portfolio. Our empirical analysis supports a positive association between debt and assets at the household level, although the nature of this relationship varies over both household income and age quartiles. The positive relationship between financial assets and liabilities at the household level may be indicative of households aiming to reduce financial risks by holding a diversified financial portfolio.

However, this positive association between assets and debts dissipates once we focus on the sample of households in debt, with the poorest and the youngest households being the most vulnerable to changes in their financial circumstances. Thus, our findings suggest that the concerns of the Monetary Policy Committee, the Bundesbank and the Federal Reserve over the potential degree of financial stress at the household level are well founded.

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Figure 1: Distribution of Household Debt for Germany

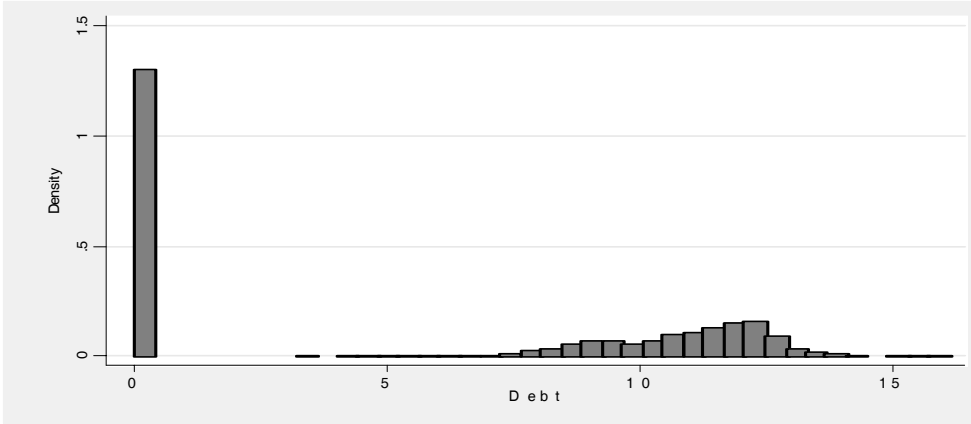


Figure 2: Distribution of Household Financial Assets for Germany

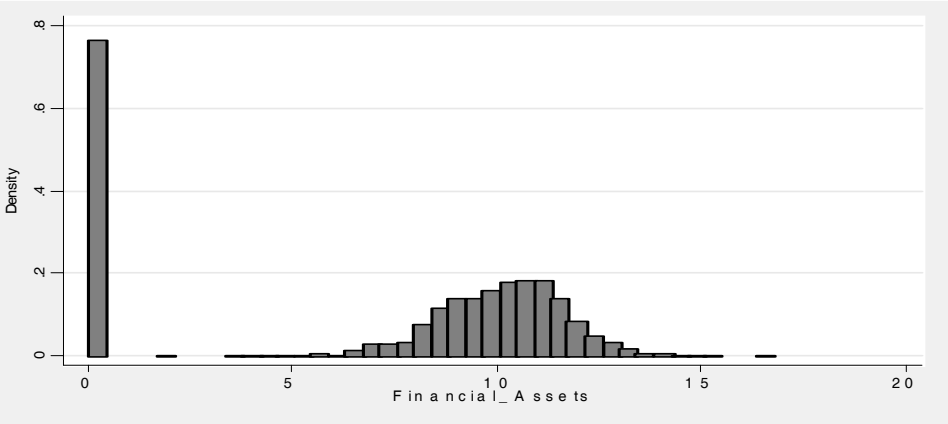


Figure 3: Distribution of Household Debt for Great Britain

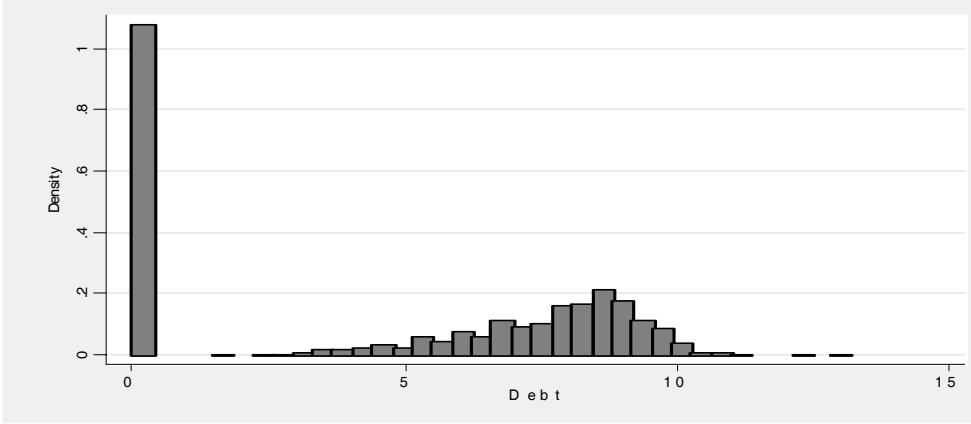


Figure 4: Distribution of Household Financial Assets for Great Britain

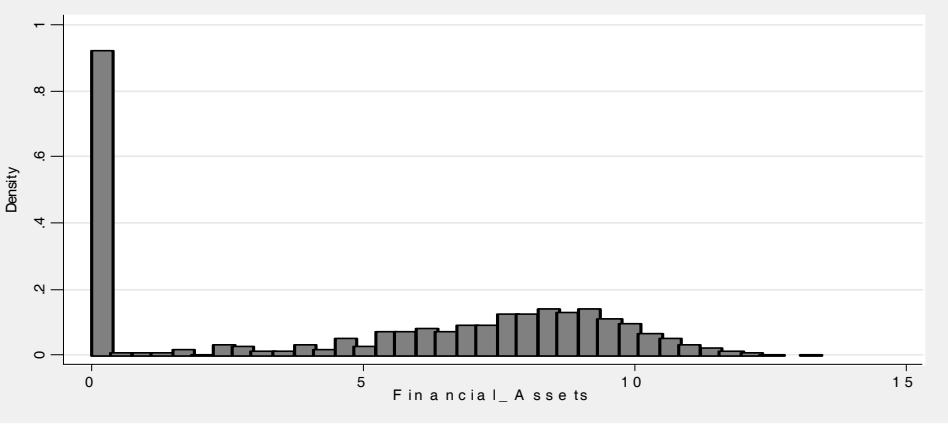


Figure 5: Distribution of Household Debt for the US

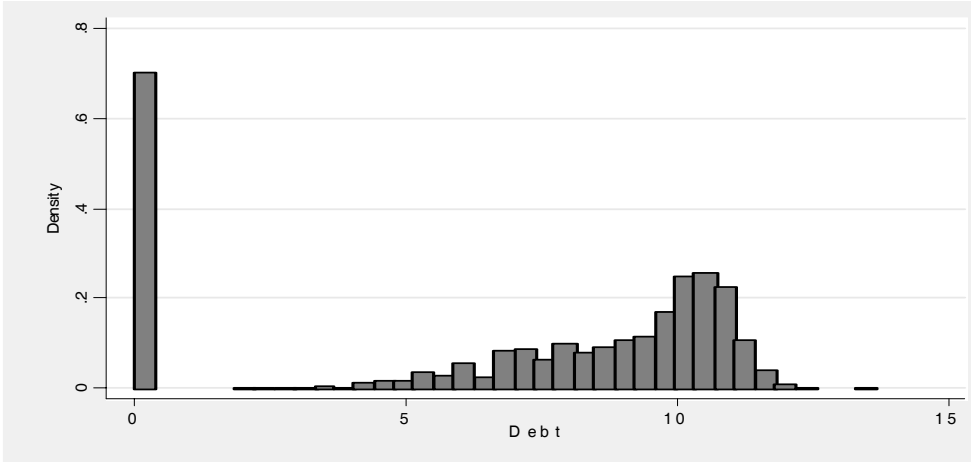


Figure 6: Distribution of Household Financial Assets for the US

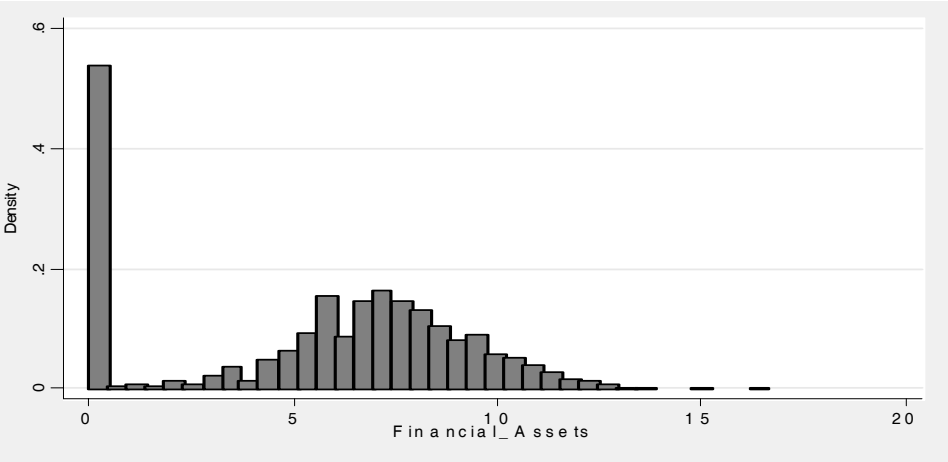


Figure 7: Kernel Density of Household Financial Assets and Debt for Germany

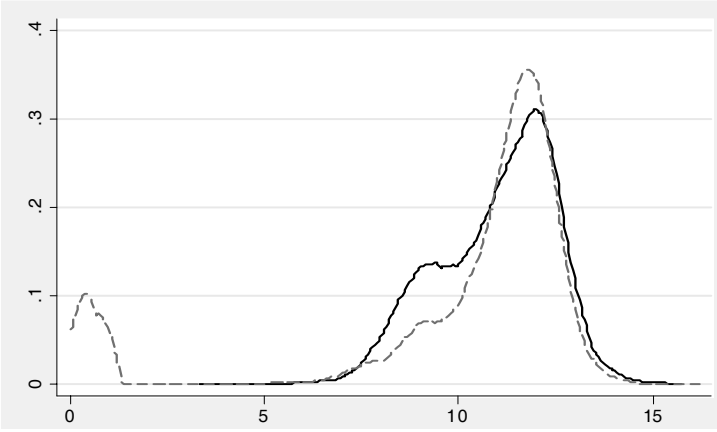


Figure 8: Kernel Density of Household Financial Assets and Debt for Great Britain

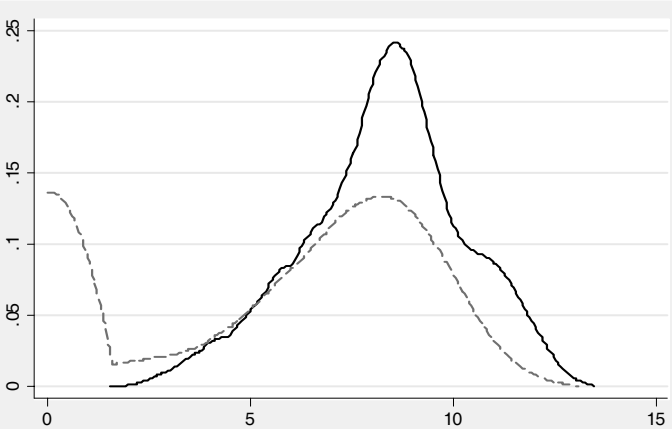


Figure 9: Kernel Density of Household Financial Assets and Debt for the US

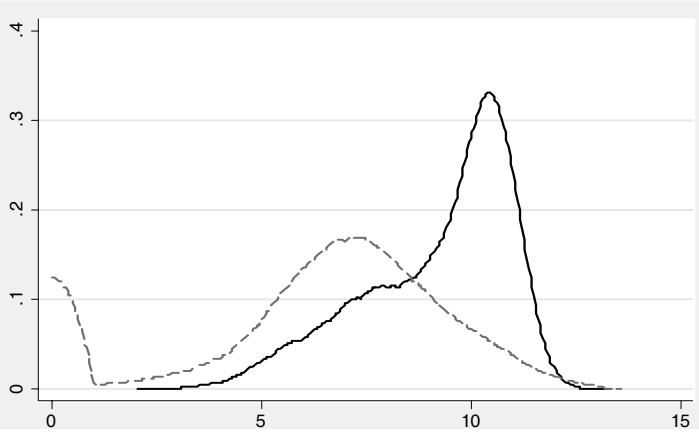


Figure 10: Kernel Density of Household Financial Assets (including house value) and Debt for Germany

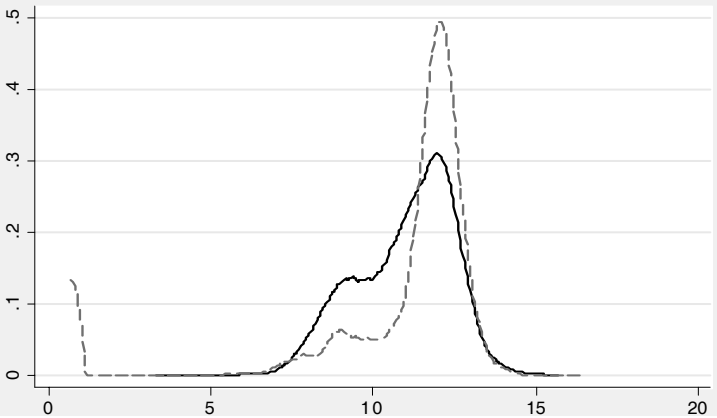


Figure 11: Kernel Density of Household Financial Assets (including house value) and Debt for Great Britain

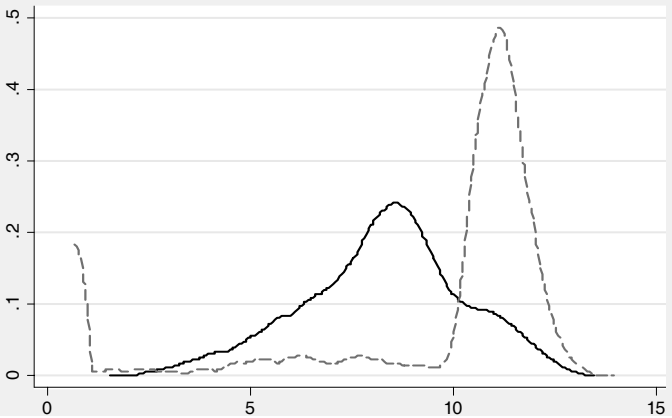
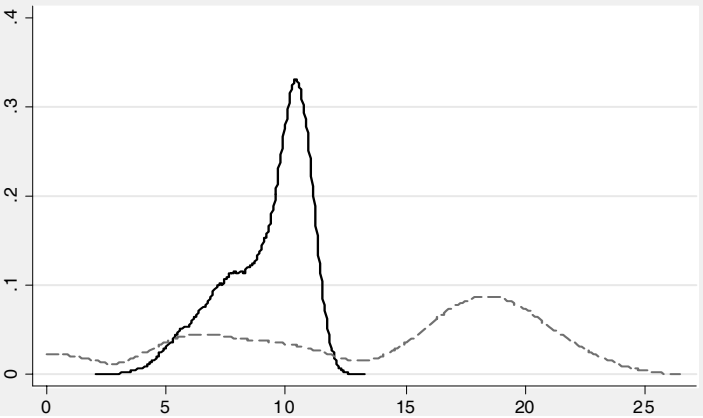


Figure 12: Kernel Density of Household Financial Assets (including house value) and Debt for the US



Key: ——— Household Debt - - - - - - - - Household Financial Assets

Table 1: Summary Statistics

GERMANY			GREAT BRITAIN			US		
Variable	*Mean*	*Standard Deviation*	*Variable*	*Mean*	*Standard Deviation*	*Variable*	*Mean*	*Standard Deviation*
$ln(a_h)$	6.8868	4.8697	$ln(a_h)$	4.9935	4.0554	$ln(a_h)$	5.4881	3.6582
$ln(d_h)$	5.2050	5.5757	$ln(d_h)$	5.3291	4.2682	$ln(d_h)$	6.8035	4.3032
Age	44.0873	9.6074	Age	40.1317	10.8516	Age	39.2993	10.5807
Age^2	2035.983	848.0952	Age^2	1728.282	896.3197	Age^2	1656.363	853.9483
Male	0.8193	0.3848	Male	0.7304	0.4438	Male	0.7343	0.4418
Married	0.7537	0.4309	Married	0.6928	0.4614	Married	0.5910	0.4917
Immigrant	0.0922	0.2894	Non-White	0.5379	0.4986	Non-White	0.4068	0.4913
Ln (Income)	8.8691	1.9830	Ln (Income)	9.1156	2.2242	Ln (Income)	8.5906	2.7048
Ln (Unearned Income)	1.6420	1.1131	Ln (Unearned Income)	3.7618	3.4065	Ln (Unearned Income)	2.0294	3.1138
No. Children	0.8211	1.0961	No. Children	0.7350	0.9924	No. Children	1.0192	1.1671
Household Size	1.9024	2.1809	Household Size	2.7708	1.2896	Household Size	2.8968	1.4899
Ln (Spouse Income)	9.2453	1.5124	Ln (Spouse Income)	4.5754	4.6048	Ln (Spouse Income)	4.0507	4.4602
Ln (House Value)	5.3280	5.8700	Ln (House Value)	8.2848	4.9499	Ln (House Value)	6.0602	5.2870
Second Job	0.0384	0.1922	Second Job	0.0826	0.2753	Second Job	0.0147	0.1205
Ln (Windfall)	0.2686	1.5884	Ln (Windfall)	0.4639	1.2872	Ln (Windfall)	0.3473	1.9014
ED1 (Realschule)	0.0135	0.1155	ED1 (O – Levels)	0.2344	0.4237	ED1 (GED)	0.0186	0.1352
ED2 (Arbitur)	0.0057	0.0753	ED2 (A – Levels)	0.2020	0.4015	ED2 (High School)	0.2784	0.4483
ED3 (Vocational)	0.5803	0.4935	ED3 (Further Education)	0.0697	0.2547	ED3 (Vocational Degree)	0.2364	0.4249
ED4 (Degree)	0.3157	0.4648	ED4 (Degree)	0.1487	0.3558	ED4 (College Degree or higher)	0.3433	0.4749
Health	1.2918	0.6334	Health	3.8693	1.6312	Health	2.7732	0.9817
Home Owner	0.5361	0.4987	Home Owner	0.7373	0.4401	Home Owner	0.5830	0.4931
Ln (Life Time Income)	9.5920	4.1965	Ln (Life Time Income)	10.0199	3.0213	Ln (Life Time Income)	10.6222	0.8853
OBSREVATIONS		*8,956*			*3,887*			*4,885*

Note: For reasons of brevity, we have omitted summary statistics on region, month of interview, industry and occupation. They are available from the authors on request.

Table 2: The Determinants of Household Debt and Assets

PANEL A	GERMANY						GREAT BRITAIN						US					
	$\ln(a_h)$			$\ln(d_h)$			$\ln(a_h)$			$\ln(d_h)$			$\ln(a_h)$			$\ln(d_h)$		
Intercept	-10.3046	*(-6.420)*	*	-18.6596	*(-7.490)*	*	-3.6647	*(-0.980)*		-0.3470	*(-0.080)*		-2.2984	*(-2.020)*	ɵ	-3.1294	*(-2.330)*	ɵ
Age	0.0857	*(1.410)*		0.5787	*(6.080)*	*	0.0813	*(1.290)*		-0.0733	*(-1.010)*		0.0382	*(0.990)*		0.1742	*(3.760)*	*
Age^2	-0.0007	*(-0.970)*		-0.0076	*(-7.020)*	*	-0.0009	*(-1.170)*		-0.0007	*(-0.770)*		-0.0003	*(-0.630)*		-0.0031	*(-5.350)*	*
Male	0.6805	*(3.210)*	*	-0.3973	*(-1.240)*		0.7653	*(3.180)*	*	0.1670	*(0.600)*		0.4943	*(2.620)*	*	-0.5896	*(-2.610)*	*
Married	0.6334	*(3.190)*	*	0.6504	*(2.140)*	ɵ	-0.9979	*(-3.330)*	*	-0.8508	*(-2.480)*	ɵ	0.2033	*(0.930)*		0.0259	*(0.100)*	
Immigrant/Non-white	-1.8348	*(-6.680)*	*	-0.1222	*(-0.300)*		-0.0579	*(-0.290)*		-0.1015	*(-0.440)*		-1.5121	*(-11.570)*	*	-0.8231	*(-5.290)*	*
Ln (Income)	0.2276	*(6.260)*	*	0.3022	*(5.380)*	*	0.1196	*(2.040)*	ɵ	0.4581	*(6.830)*	*	0.2476	*(11.090)*	*	0.2141	*(8.200)*	*
Ln (Unearned Income)	0.2545	*(4.180)*	*	0.1870	*(2.020)*	ɵ	0.2924	*(10.580)*	*	-0.0763	*(-2.420)*	ɵ	0.2172	*(11.710)*	*	-0.0643	*(-2.890)*	*
No. Kids	-0.3900	*(-2.580)*	*	0.2426	*(1.130)*		-1.3475	*(-9.080)*	*	-1.0348	*(-6.110)*	*	-0.2717	*(-2.540)*	ɵ	-0.4065	*(-3.220)*	*
Household Size	0.0571	*(0.740)*		0.0988	*(0.880)*		0.7408	*(6.230)*	*	1.1916	*(8.680)*	*	-0.0048	*(-0.050)*		0.3103	*(2.880)*	*
Ln (Spouse Income)	0.4377	*(9.010)*	*	0.1424	*(2.090)*	ɵ	0.2713	*(10.810)*	*	0.1874	*(6.560)*	*	0.0746	*(4.030)*	*	0.1366	*(6.210)*	*
Ln (House Value)	0.5209	*(24.130)*	*	0.9099	*(27.900)*	*	0.2675	*(2.000)*	ɵ	0.0303	*(0.190)*		0.3859	*(7.990)*	*	0.5797	*(10.620)*	*
Second Job	0.7867	*(2.280)*	ɵ	2.2269	*(4.550)*	*	0.4604	*(1.540)*		0.8208	*(2.380)*	ɵ	0.2552	*(0.580)*		0.6074	*(1.160)*	
Ln (Windfall)	0.1946	*(4.750)*	*	0.0208	*(0.340)*		0.1345	*(2.100)*	ɵ	0.1873	*(2.520)*	ɵ	0.0798	*(2.850)*	*	0.0390	*(1.170)*	
ED1	0.9975	*(1.080)*		0.1116	*(0.080)*		1.0714	*(3.880)*	*	0.2584	*(0.810)*		-0.2146	*(-0.500)*		-0.7786	*(-1.520)*	
ED2	0.9732	*(3.460)*	*	-0.5048	*(-1.210)*		1.0210	*(3.500)*	*	0.4055	*(1.210)*		0.1748	*(0.940)*		-0.2797	*(-1.270)*	
ED3	1.2277	*(3.850)*	*	-1.3203	*(-2.790)*	*	1.2420	*(3.140)*	*	0.2850	*(0.630)*		0.0453	*(0.240)*		-0.2031	*(-0.890)*	
ED4	1.2714	*(1.480)*		2.2465	*(1.910)*	#	1.7984	*(5.290)*	*	-0.3503	*(-0.590)*		0.3241	*(1.770)*	#	0.0772	*(0.350)*	
Health	-0.0883	*(-0.750)*		0.4444	*(2.570)*	ɵ	0.1206	*(2.050)*	ɵ	-0.0221	*(-0.330)*		0.3551	*(6.120)*	*	-0.0285	*(-0.410)*	
Home Owner	-3.9891	*(-15.300)*	*	-0.0177	*(-0.650)*		-1.4527	*(-0.970)*		1.0944	*(0.630)*		-2.4887	*(-4.920*	*	-0.6393	*(-1.110)*	
Ln (Life Time Income)	0.0546	*(2.940)*	*	0.0529	*(2.940)*	*	-0.0432	*(-1.150)*		-0.1999	*(-4.780)*	*	0.1146	*(1.780)*	#	0.0863	*(1.150)*	
Other Controls																		
Region									*yes*									
Month of Interview									*yes*									
Occupation									*yes*									
Industry									*yes*									
Observations			8,956						3,887						4,885			
LR chi2, p-value	2114.90 *[0.000]*			3354.33 *[0.000]*			1136.11 *[0.000]*			775.32 *[0.000]*			2193.72 *[0.000]*			2194.69 *[0.000]*		
Pseduo R Squared	0.0454			0.0860			0.0602			0.0410			0.0896			0.0857		

PANEL B	$\ln(a_h)$			$\ln(d_h)$			$\ln(a_h)$			$\ln(d_h)$			$\ln(a_h)$			$\ln(d_h)$		
$\ln(a_h)$				0.2533	*(10.810)*	*				0.1284	*(4.650)*	*				0.1062	*(6.52)*	*
$\ln(d_h)$	0.1543	*(10.590)*	*				0.1218	*(5.690)*	*				0.1189	*(5.32)*	*			
Controls	*AS IN PANEL A*																	
Observations			8,956						3,887						4,885			
LR chi2, p-value	2226.81 *[0.000]*			3472.26 *[0.000]*			1168.56 *[0.000]*			796.93 *[0.000]*			2222.95 *[0.000]*			0.2236.32 *[0.000]*		
Pseduo R Squared	0.0478			0.0890			0.0619			0.0421			0.0868			0.0913		

*, ɵ, # denote 1, 5 and 10 per cent levels of significance.

Table 3: The determinants of Household Debt and Assets (Bivariate Tobit Model)

PANEL A	GERMANY						GREAT BRITAIN						US					
	$\ln(a_h)$			$\ln(d_h)$			$\ln(a_h)$			$\ln(d_h)$			$\ln(a_h)$			$\ln(d_h)$		
Intercept	-10.3326	*(-6.681)*	*	-18.6508	*(-7.312)*	*	-3.9022	*(-0.036)*		-0.6925	*(-0.011)*		-2.2910	*(-2.026)*	ɵ	-3.1627	*(-2.489)*	ɵ
Age	0.0855	*(1.438)*		0.5781	*(6.062)*	*	0.0869	*(1.375)*		-0.0712	*(-0.968)*		0.0363	*(0.945)*		0.1739	*(4.153)*	*
Age^2	-0.0007	*(-0.979)*		-0.0076	*(-6.902)*	*	-0.0009	*(-1.231)*		-0.0007	*(-0.802)*		-0.0003	*(-0.578)*		-0.0031	*(-5.925)*	*
Male	0.6762	*(3.224)*	*	-0.4148	*(-1.310)*		0.7562	*(3.045)*	*	0.1720	*(0.613)*		0.4973	*(2.741)*	*	-0.5916	*(-2.829)*	*
Married	0.6305	*(3.133)*	*	0.6429	*(2.189)*	ɵ	-0.9783	*(-3.294)*	*	-0.8538	*(-2.430)*	ɵ	0.1994	*(0.946)*		0.0236	*(0.098)*	
Immigrant/Non-white	-1.8439	*(-7.474)*	*	-0.1633	*(-0.403)*		-0.0544	*(-0.260)*		-0.0970	*(-0.412)*		-1.5215	*(-11.660)*	*	-0.8383	*(-5.294)*	*
Ln (Income)	0.2266	*(6.788)*	*	0.2998	*(5.483)*	*	0.1174	*(2.102)*	ɵ	0.4567	*(6.984)*	*	0.2482	*(12.963)*	*	0.2146	*(9.299)*	*
Ln (Unearned Income)	0.2543	*(3.817)*	*	0.1852	*(2.061)*	ɵ	0.2950	*(10.222)*	*	-0.0751	*(-2.361)*	ɵ	0.2185	*(11.014)*	*	-0.0637	*(-2.822)*	*
No. Kids	-0.3935	*(-2.546)*	ɵ	0.2349	*(0.988)*		-1.3447	*(-8.034)*	*	-1.0340	*(-5.631)*	*	-0.2715	*(-2.625)*	*	-0.4053	*(-3.086)*	*
Household Size	0.0573	*(0.715)*		0.0953	*(0.812)*		0.7342	*(5.420)*	*	1.1918	*(7.653)*	*	-0.0042	*(-0.048)*		0.3095	*(2.806)*	*
Ln (Spouse Income)	0.4412	*(10.201)*	*	0.1540	*(2.325)*	ɵ	0.2730	*(10.312)*	*	0.1876	*(6.495)*	*	0.0757	*(3.990)*	*	0.1371	*(5.950)*	*
Ln (House Value)	0.5253	*(21.209)*	*	0.9217	*(17.650)*	*	0.2698	*(2.034)*	ɵ	0.0330	*(0.181)*		0.3864	*(10.003)*	*	0.5786	*(13.116)*	*
Second Job	0.7933	*(1.998)*	ɵ	2.2419	*(4.146)*	*	0.4366	*(1.388)*		0.8258	*(2.109)*	ɵ	0.2693	*(0.528)*		0.6150	*(0.903)*	
Ln (Windfall)	0.1950	*(3.911)*	*	0.0273	*(0.424)*		0.1393	*(1.940)*	#	0.1888	*(2.326)*	ɵ	0.0797	*(2.493)*	ɵ	0.0388	*(0.971)*	
ED1	1.0003	*(1.010)*		0.1131	*(0.070)*		1.0770	*(3.906)*	*	0.2570	*(0.819)*		-0.3064	*(-0.715)*		-0.8052	*(-1.577)*	
ED2	0.9741	*(3.841)*	*	-0.4884	*(-1.205)*		1.0578	*(3.600)*	*	0.4125	*(1.225)*		0.1511	*(0.787)*		-0.2633	*(-1.137)*	
ED3	1.2343	*(4.080)*	*	-1.2929	*(-2.738)*	*	1.2531	*(3.104)*	*	0.2895	*(0.634)*		0.0293	*(0.148)*		-0.1992	*(-0.842)*	
ED4	1.3018	*(0.824)*		2.2565	*(1.572)*		1.8348	*(5.247)*	*	0.4236	*(1.070)*		0.3369	*(1.775)*	#	0.1095	*(0.474)*	
Health	-0.0884	*(-0.748)*		-0.3123	*(-1.763)*	#	0.1300	*(2.199)*	ɵ	-0.0220	*(-0.329)*		0.3573	*(6.152)*	*	0.0067	*(0.099)*	
Home Owner	-4.0160	*(-15.467)*	*	0.0257	*(0.073)*		-1.4467	*(-0.978)*		1.0658	*(0.524)*		-2.6256	*(-6.574)*	*	-0.8759	*(-2.068)*	ɵ
Ln (Life Time Income)	0.0551	*(2.741)*	*	-0.0157	*(-0.558)*		-0.0480	*(-1.300)*		-0.2009	*(-4.580)*	*	0.1221	*(1.967)*	ɵ	0.0976	*(1.310)*	
<u>Other Controls</u>																		
Region									*yes*									
Month of Interview									*yes*									
Occupation									*yes*									
Industry									*yes*									
Observations				8,956					3,887							4,885		
LR chi2, p-value				39980.23 *[0.000]*					17876.98 *[0.000]*							22811.25 *[0.000]*		
σ_{h1}				6.0101 *(46.971)* *					4.9284 *(38.576)* *							3.6555 *(65.546)* *		
σ_{h2}				8.1871 *(31.597)* *					5.5938 *(35.333)* *							4.3222 *(50.857)* *		
ρ				0.1533 *(12.177)* *					0.1104 *(6.291)* *							0.1162 *(8.209)* *		

*, ɵ, # denote 1, 5 and 10 per cent levels of significance.

Table 4: Household Debt and Financial Assets Correlations by Household Income Quartiles

PANEL A	ρ (Bivariate Tobit)	ρ (Raw Data)	Average $\ln(d_h)$	Average $\ln(a_h)$	Observations
		GERMANY			
Income Quartile 1 (< 25th)	0.1165 *(3.759)* *	0.1727	2.9179	5.0489	2,212
Income Quartile 2 (≥ 25th and < 50th)	0.1156 *(4.150)* *	0.1741	4.7193	6.4374	2,268
Income Quartile 3 (≥ 50th and < 75th)	0.1942 *(7.610)* *	0.2183	5.9417	7.1317	2,237
Income Quartile 4 (≥ 75th)	0.1860 *(6.766)* *	0.2631	7.2202	8.8329	2,239
Total Income	0.1533 *(12.177)* *	0.2703	5.2049	6.8668	8,956
PANEL B		**GREAT BRITAIN**			
Income Quartile 1 (< 25th)	0.0793 *(1.850)* #	0.0903	3.9089	2.8599	971
Income Quartile 2 (≥ 25th and < 50th)	0.0794 *(2.952)* *	-0.0139	5.2413	4.4662	973
Income Quartile 3 (≥ 50th and < 75th)	0.1048 *(2.872)* *	-0.0008	6.0635	5.5961	971
Income Quartile 4 (≥ 75th)	0.1391 *(3.811)* *	0.0535	6.1019	7.0512	972
Total Income	0.1104 *(6.291)* *	0.1020	5.3291	4.9935	3,887
PANEL C		**US**			
Income Quartile 1 (< 25th)	0.1656 *(4.672)* *	0.2696	4.5278	3.2314	1,228
Income Quartile 2 (≥ 25th and < 50th)	0.1298 *(3.898)* *	0.2232	5.9832	4.4978	1,060
Income Quartile 3 (≥ 50th and < 75th)	0.0836 *(3.090)* *	0.1878	7.6428	5.9584	1,375
Income Quartile 4 (≥ 75th)	-0.0271 *(0.765)*	0.0124	8.8575	8.0859	1,222
Total Income	0.1162 *(8.209)* *	0.3354	6.8035	5.4882	4,885

*, # denote 1 and 5 per cent levels of significance.

Table 5: Household Debt and Assets Correlations by Age Quartiles

PANEL A	ρ (Bivariate Tobit)	ρ (Raw Data)	Average $\ln(d_h)$	Average $\ln(a_h)$	Observations
		GERMANY			
Age Quartile 1 (< 25th)	0.1615 *(5.206)* *	0.0587	1.8519	5.6622	2,066
Age Quartile 2 (≥ 25th and < 50th)	0.1710 *(6.450)* *	0.0370	1.8477	6.5581	2,176
Age Quartile 3 (≥ 50th and < 75th)	0.2143 *(8.473)* *	0.0561	1.5637	7.3235	2,215
Age Quartile 4 (≥ 75th)	0.1022 *(3.988)* *	0.0554	1.3446	7.7266	2,499
All Ages	0.1533 *(12.177)* *	0.2703	5.2049	6.8668	8,956
PANEL B	ρ (Bivariate Tobit)	ρ (Raw Data)	Average $\ln(d_h)$	Average $\ln(a_h)$	Observations
		GREAT BRITAIN			
Age Quartile 1 (< 25th)	0.1132 *(3.205)* *	0.2182	6.3756	4.2306	942
Age Quartile 2 (≥ 25th and < 50th)	0.1115 *(3.010)* *	0.1340	5.7570	4.7685	987
Age Quartile 3 (≥ 50th and < 75th)	0.0466 *(1.224)*	0.0391	5.3454	5.3388	903
Age Quartile 4 (≥ 75th)	0.1805 *(4.718)* *	0.1397	3.9803	5.5899	1,055
All Ages	0.1104 *(6.291)* *	0.1020	5.3291	4.9935	3,887
PANEL C	ρ (Bivariate Tobit)	ρ (Raw Data)	Average $\ln(d_h)$	Average $\ln(a_h)$	Observations
		US			
Age Quartile 1 (< 25th)	0.1148 *(3.843)* *	0.3557	6.1269	4.7716	1,357
Age Quartile 2 (≥ 25th and < 50th)	0.1128 *(3.504)* *	0.3693	6.9452	5.2409	1,103
Age Quartile 3 (≥ 50th and < 75th)	0.1293 *(4.253)* *	0.3575	7.1270	5.5632	1,248
Age Quartile 4 (≥ 75th)	0.0770 *(2.676)* *	0.2322	7.1457	6.4459	1,177
All Ages	0.1162 *(8.209)* *	0.3354	6.8035	5.4882	4,885

*denotes 1 per cent level of significance.

Table 6: The determinants of Household Debt and Assets (Nested Tobit Model)

PANEL A	GERMANY						GREAT BRITAIN						US					
	$\ln(a_h)$			$\ln(d_h)$			$\ln(a_h)$			$\ln(d_h)$			$\ln(a_h)$			$\ln(d_h)$		
Intercept	-8.5086	*(3.032)*	*	-18.6518	*(7.331)*	*	-3.2919	*(2.048)*	ɵ	2.4008	*(1.455)*		-0.9761	*(-0.822)*		-3.1294	*(-2.483)*	ɵ
Age	0.0565	*(0.665)*		0.5798	*(6.051)*	*	0.0481	*(0.673)*		-0.0735	*(1.005)*		0.0414	*(0.993)*		0.1742	*(4.173)*	*
Age^2	-0.0003	*(0.303)*		-0.0076	*(6.896)*	*	-0.0003	*(0.295)*		-0.0007	*(0.775)*		-0.0003	*(-0.571)*		-0.0031	*(-5.953)*	*
Male	1.1072	*(4.463)*	*	-0.3974	*(1.247)*		0.5621	*(2.054)*	ɵ	0.1722	*(0.615)*		0.4772	*(2.270)*	ɵ	-0.5896	*(-2.840)*	*
Married	0.7906	*(3.155)*	*	0.6506	*(2.203)*	ɵ	-0.7795	*(2.417)*	ɵ	-0.8477	*(2.418)*	ɵ	0.3511	*(1.476)*		0.0259	*(0.108)*	
Immigrant/Non-white	-1.1550	*(3.729)*	*	-0.1193	*(0.293)*		-0.1112	*(0.502)*		-0.1029	*(0.439)*		-0.8647	*(-6.506)*	*	-0.8231	*(-5.250)*	*
Ln (Income)	0.2292	*(4.668)*	*	0.3024	*(5.505)*	*	0.0642	*(0.983)*		0.4578	*(7.004)*	*	0.2108	*(9.597)*	*	0.2141	*(9.289)*	*
Ln (Unearned Income)	0.2457	*(2.678)*	*	0.1868	*(2.061)*	ɵ	0.2416	*(7.886)*	*	-0.0763	*(2.396)*	ɵ	0.1865	*(9.093)*	*	-0.0643	*(-2.875)*	*
No. Kids	-0.0496	*(0.299)*		0.2422	*(1.013)*		-1.3183	*(7.346)*	*	-1.0358	*(5.651)*	*	-0.2781	*(-2.691)*	*	-0.4065	*(-3.114)*	*
Household Size	0.0042	*(0.048)*		0.0987	*(0.837)*		0.6187	*(4.137)*	*	1.1920	*(7.670)*	*	0.0210	*(0.236)*		0.3103	*(2.833)*	*
Ln (Spouse Income)	0.2115	*(4.837)*	*	0.1422	*(2.173)*	ɵ	0.2345	*(8.076)*	*	0.1874	*(6.472)*	*	0.0503	*(2.554)*	ɵ	0.1366	*(5.976)*	*
Ln (House Value)	0.1427	*(2.210)*	ɵ	0.9107	*(18.307)*	*	0.2914	*(2.430)*	ɵ	0.0302	*(0.168)*		0.4079	*(8.611)*	*	0.5797	*(12.865)*	*
Second Job	0.4947	*(1.215)*		2.2236	*(4.128)*	*	0.1779	*(0.550)*		0.8215	*(2.105)*	ɵ	0.0737	*(0.153)*		0.6074	*(0.906)*	
Ln (Windfall)	0.0938	*(1.912)*	#	0.0206	*(0.324)*		0.0567	*(0.747)*		0.1873	*(2.335)*	ɵ	0.0954	*(2.982)*	*	0.0390	*(1.021)*	
ED1	0.3198	*(0.287)*		0.1159	*(0.071)*		0.9064	*(2.889)*	*	0.2638	*(0.842)*		0.0263	*(0.054)*		-0.8046	*(-1.611)*	
ED2	0.2848	*(0.392)*		-0.4995	*(1.233)*		0.5517	*(1.731)*	ɵ	0.4099	*(1.223)*		-0.1011	*(-0.522)*		-0.2714	*(-1.184)*	
ED3	0.2949	*(0.766)*		-1.3152	*(2.787)*	*	1.0899	*(2.491)*	ɵ	0.2899	*(0.640)*		-0.1445	*(-0.718)*		-0.2050	*(-0.877)*	
ED4	0.9696	*(0.686)*		2.2529	*(1.563)*		0.9224	*(2.392)*	ɵ	0.4086	*(1.039)*		0.0612	*(0.320)*		0.1019	*(0.446)*	
Health	0.0927	*(0.629)*		-0.2912	*(1.636)*		0.1528	*(2.394)*	ɵ	-0.0228	*(0.343)*		0.3677	*(6.161)*	*	0.0071	*(0.105)*	
Home Owner	-0.6048	*(1.724)*	#	0.1467	*(0.419)*		-4.2947	*(4.748)*	*	1.0918	*(0.544)*		-3.2525	*(-6.992)*	*	-0.8926	*(-2.042)*	ɵ
Ln (Life Time Income)	0.0183	*(0.803)*		-0.0178	*(0.629)*		0.0191	*(0.727)*		-0.2201	*(4.579)*	*	0.1053	*(1.820)*	#	0.0969	*(1.321)*	
<u>Other Controls</u>																		
Region									*yes*									
Month of Interview									*yes*									
Occupation									*yes*									
Industry									*yes*									
Observations				8,956						3,887						4,885		
LR chi2, p-value				28965.17 *[0.000]*						14914.48 *[0.000]*						20207.23 *[0.000]*		
σ_{h1}				8.1799 *(33.417)* *						5.5902 *(35.461)* *						4.3277 *(52.544)* *		
σ_{h2}				4.7889 *(41.223)* *						4.3399 *(35.838)* *						3.2187 *(66.535)* *		
ρ				0.0224 *(0.193)*						-0.0542 *(0.822)*						0.0215 *(0.370)*		

*, ɵ, # denote 1, 5 and 10 per cent levels of significance.

Table 7: Household Debt and Financial Assets Correlations by Household Income Quartiles, Conditional on Positive Debt

PANEL A	ρ (Nested Tobit)		ρ (Raw Data)	Average $\ln(d_h)$	Average $\ln(a_h)$	Observations
			GERMANY			
Income Quartile 1 (< 25th)	-0.5379	*(1.897)* #	0.1368	9.8842	6.2068	653
Income Quartile 2 (≥ 25th and < 50th)	0.2369	*(1.060)*	0.1151	10.4832	7.2903	1,021
Income Quartile 3 (≥ 50th and < 75th)	-0.2083	*(0.811)*	0.0212	11.0031	8.0994	1,208
Income Quartile 4 (≥ 75th)	0.1379	*(0.571)*	0.0203	11.8001	9.8027	1,370
Total Income	0.0224	*(0.193)*	0.1886	10.9632	8.1632	4,252
PANEL B	ρ (Nested Tobit)		ρ (Raw Data)	Average $\ln(d_h)$	Average $\ln(a_h)$	Observations
			GREAT BRITAIN			
Income Quartile 1 (< 25th)	-0.0186	*(0.120)*	0.0375	7.5739	3.3442	644
Income Quartile 2 (≥ 25th and < 50th)	-0.1048	*(0.771)*	-0.0549	8.0996	4.6559	652
Income Quartile 3 (≥ 50th and < 75th)	-0.3019	*(2.425)* ɵ	-0.0733	8.5624	5.9516	622
Income Quartile 4 (≥ 75th)	0.0759	*(0.405)*	0.0529	8.9093	7.2491	587
Total Income	-0.0542	*(0.822)*	0.0834	8.2691	5.2481	2,505
PANEL C	ρ (Nested Tobit)		ρ (Raw Data)	Average $\ln(d_h)$	Average $\ln(a_h)$	Observations
			US			
Income Quartile 1 (< 25th)	-0.0612	*(0.328)*	0.1811	8.2007	4.0034	678
Income Quartile 2 (≥ 25th and < 50th)	0.1125	*(0.714)*	0.1509	8.5590	4.9114	741
Income Quartile 3 (≥ 50th and < 75th)	-0.1743	*(1.775)* #	0.0988	9.2998	6.2048	1,130
Income Quartile 4 (≥ 75th)	-0.0497	*(0.484)*	0.1241	10.1063	8.0546	1,072
Total Income	0.0215	*(0.370)*	0.2940	9.1809	6.0750	3,620

ɵ, # denote 5 and 10 per cent levels of significance.

Table 8: Household Debt and Financial Assets Correlations by Age Quartiles, Conditional on Positive Debt

PANEL A	ρ (Bivariate Tobit)		ρ (Raw Data)	Average $\ln(d_h)$	Average $\ln(a_h)$	Observations
			GERMANY			
Age Quartile 1 (< 25th)	0.0721	*(0.627)*	0.1470	10.3925	6.8315	755
Age Quartile 2 (≥ 25th and < 50th)	-0.2463	*(1.166)*	0.1275	11.0086	7.8207	1,124
Age Quartile 3 (≥ 50th and < 75th)	0.2848	*(1.357)*	0.2364	11.2369	8.6867	1,216
Age Quartile 4 (≥ 75th)	0.5070	*(3.310)* *	0.1528	11.0040	8.8150	1,157
All Ages	0.0224	*(0.193)*	0.1886	10.9632	8.1632	4,252
PANEL B	ρ (Bivariate Tobit)		ρ (Raw Data)	Average $\ln(d_h)$	Average $\ln(a_h)$	Observations
			GREAT BRITAIN			
Age Quartile 1 (< 25th)	0.0411	*(0.373)*	0.1474	8.5675	4.6247	701
Age Quartile 2 (≥ 25th and < 50th)	-0.0511	*(0.374)*	0.1623	8.4055	4.6247	676
Age Quartile 3 (≥ 50th and < 75th)	-0.0558	*(0.357)*	0.0531	8.2510	5.0159	585
Age Quartile 4 (≥ 75th)	-0.4242	*(2.688)* *	0.0458	7.7334	5.4190	543
All Ages	-0.0542	*(0.822)*	0.0834	8.2691	5.2481	2,505
PANEL C	ρ (Bivariate Tobit)		ρ (Raw Data)	Average $\ln(d_h)$	Average $\ln(a_h)$	Observations
			US			
Age Quartile 1 (< 25th)	-0.0536	*(0.433)*	0.2821	8.6158	5.3971	965
Age Quartile 2 (≥ 25th and < 50th)	-0.1930	*(1.401)*	0.2771	9.2858	5.9296	822
Age Quartile 3 (≥ 50th and < 75th)	-0.0062	*(0.047)*	0.2866	9.4772	6.1999	940
Age Quartile 4 (≥ 75th)	0.1473	*(1.249)*	0.2729	9.3831	6.8099	893
All Ages	0.0215	*(0.370)*	0.2940	9.1809	6.0750	3,620

*denotes 1 per cent level of significance.