Debt as a source of financial stress in Australian households

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Abstract

This paper examines the role of demographic, socioeconomic and debt portfolio characteristics as contributors to financial stress in Australian households. The data is drawn from the most-recent Household Expenditure Survey Confidentialised Unit Record Files (CURF) and relate to 3,268 probability-weighted households. Financial stress is defined, amongst other things, in terms of financial reasons for being unable to have a holiday, have meals with family and friends, and engage in hobbies and other leisure activities and overall financial management. Characteristics examined included family structure and composition, source and level of household income, age, sex and marital status, ethic background, housing value, debt repayments and credit card usage. Binary logit models are used to identify the source and magnitude of factors associated with financial stress. The evidence provided suggests that financial stress is higher in families with more children or other dependents and from ethnic minorities, especially those more reliant on government pensions and benefits, and negatively related to disposable income and housing value. There is little evidence to suggest that Australia's historically high levels of household debt are currently the cause of significant amounts of financial stress in these households.

Keywords: Household and consumer debt, owner-occupied and investor housing, financial stress.

JEL classification: C25, D12, G18, R20

Introduction

Household debt has grown dramatically relative to disposable income over recent years, as has concern that this level of debt poses a threat to the health of global economies. In the United States mortgage debt and consumer credit relative to disposable income are at or near all time record highs, with the primary driver being mortgage debt – rising from less than 36 percent of disposable income to more than 66 percent in the last thirty years (Maki 2000). Since consumer spending accounts for some two-thirds of US GDP, and given that a high level of indebtedness among households could lead to increased delinquencies and bankruptcies, and thereby threaten the health of lenders exposed to loan losses, it is argued that the US economy is then particularly exposed to macroeconomic shocks, especially during the current period of economic recovery.

By the same token, in the United Kingdom the Bank of England has called for 'close monitoring' of the growth in unsecured lending – some 19 percent of household debt up from 14 percent a decade ago – and has expressed concern about total household debt – currently

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rising by 13 percent annually – and the possible impact on the banking system if the housing bubble bursts, particularly in London and the Southeast (Nickell 2003; Scheherazade 2002). There is special concern for the rise in unsecured debt among vulnerable lower-income and younger households. A similar picture emerges in other OECD economies with total household debt to income ratios rising from eighty percent or lower in the early 1980s to at least 120 percent in the UK, Canada, Germany and the US, more than 130 percent in Japan, and 180 percent in the Netherlands.

In Australia too there has been unease about the growth of household debt (Macfarlane 2003). In the decade to December 2002 the ratio of household debt to income rose from a level that was relatively low by international standards (56 percent) to one that is in the upper range for comparable economies (125 percent) (Macfarlane 2003). This represents an average annual growth rate of 13.9 percent over the decade and 14.7 percent in the past five years. And while borrowing for owner-occupied housing still accounts for the major portion of this debt (85.5 percent) and much of its growth (15.3 percent in the last decade and 15.4 percent in the past five years), substantially faster growth rates are found in borrowing for investor housing (21.6 percent over the decade and 20.7 over the past five years) and credit cards (17.4 percent over the decade and 20.9 percent in the past five years) (RBA 2003a).

Reasons for the rapid growth in Australian household indebtedness are not hard to find. Lower mortgage interest rates (averaging 15 percent in the 1980s and 7 percent in the late 1990s) and the fall in servicing costs by itself can account for an almost doubling of household borrowing. This is particularly the case when combined with the strong and sustained growth in housing prices, especially in the capital cities (56.9 percent across Australia and up to 89.3 percent in Melbourne and 62.0 percent in Brisbane from 1997-2002) (RBA 2002b). At the same time, the low inflation environment of the late 1990s and early 2000s (averaging 2.6 percent), while necessary for the lower interest rate, has its own effect in that nominal income growth erodes the real value of debt less rapidly than in a high inflation environment.

Financial deregulation has also had a role to play. To start with, the increase in competition has meant that the reduction in lending margins of about 2 percent has been fully passed on to consumers. Similarly, loans for investor housing have risen dramatically as financial institutions have sought to expand their portfolios with loans on high-return, low-risk domestic properties, and by offering products with investors in mind such as split-purpose and interest only loans and deposit bonds (RBA 2002a). Finally, the development of new

products, particularly home-equity loans and redraw facilities, has enabled households to more flexibly manage equity for building extensions and alterations and other investment and consumption purposes (RBA 2003b). For example, around 20 percent of borrowers refinancing home loans over the period 1997-99 used at least some of the proceeds to fund purchases such as cars and holidays (RBA 2003b).

Nevertheless, it is thought that these outwardly sound contributors to the growth in household debt obscure some changes that have increased its risk and thereby the exposure of Australian households to financial stress and the Australian economy to macroeconomic shocks. To start with, much of the growth in total household debt can be attributed to the very strong growth of borrowing for investor housing. Because such borrowing is inherently riskier, and given its high exposure to inner city, multi-unit apartment markets with the immediate prospects of a glut in supply, it is argued that this exposes some households to a greater level of financial stress than is the case with purely owner-occupied housing. Next, while aggregate debt servicing (ratio of interest payments to disposable income) has fallen, households have increased borrowing by proportionately more than the reduction in interest rates. As with aggregate gearing (the ratio of the value of housing debt to the stock of housing assets) this at first appears to have only increased modestly in the past five years, but since most Australian households hold no housing debt (about seventy percent own their home outright or rent) the effects are more pronounced than at first suggested (20 percent in across all households but 43 percent in mortgaged households). This suggests that at least some Australian households may be exposed to a degree of financial stress because of their borrowing. Unfortunately, the economic and sociological impact of this historically high level of indebtedness is not yet quantified. That is, it is not known whether Australian households currently experience high levels of financial stress because of this debt, nor whether it has the potential to expose households to such stress given an economic shock as feared by many policymakers.

The purpose of the present paper is to add to the small but evolving consumer debt literature an analysis of financial stress in Australian households using the unit record files underlying the Australian Bureau of Statistics' (2002) *Household Expenditure Survey*. This survey focuses on the demographic, socioeconomic and financial characteristics of households and can be linked with these households' perceptions regarding financial stress, as variously measured. It thereby provides an important input into current economic policy regarding the impact of household debt on financial stress as compared to non-debt related influences. To the author's knowledge this is the first study of its kind, both in Australia and overseas, and

adds significantly to the literature concerning the psychological impact of consumer debt. The paper itself is divided into four main areas. The first section briefly reviews the extant literature regarding consumer debt and household behaviour. The second section explains the empirical methodology and data employed in the analysis. The third section discusses the results. The paper ends with some brief concluding remarks.

Literature review

In contrast to the voluminous literature concerned with corporate debt, hypotheses to explain the causes and consequences of household debt are relatively underdeveloped. Most studies are conducted at the aggregate level, and it is only comparatively recently that efforts have been made to construct a conceptual, theoretical and empirical body of work analogous to that concerning the corporate sector. The literature that does exist may be categorised into three main areas: (i) attempts to explain differing household financial strategies, or the different patterns of financial assets and debts found in households, and link these with consumption, saving and borrowing behaviour; (ii) efforts to investigate the factors which are associated with the source, level and conditions of debt which a household demands and is granted or rejected; and (iii) endeavours which explore the issues related to insolvency in household finances, usually in terms of predictive models of debt repayments, delinquency and bankruptcy.

To start with, a small amount of empirical attention has been directed at analysing the linkage between household portfolio choices and other household behaviour. This is important because the impact of policies on households' saving and debt behaviour (and consumption) can vary across different groups in an economy in ways not reflected at the aggregate level. Gunnarsson and Wahlund (1997), for example, categorised the financial choices of one thousand Swedish households into residual saving, contractual saving, security saving, risk hedging, prudent investing and 'divergent' strategies and examined the impact of financial planning and control, financial wealth and home ownership, and attitudes to risk taking across these categories. For debt, Gunnarssosn and Wahlund (1997) concluded that contractual savers had a very heavy debt burden and relied upon credit cards, whereas residual savers had fewer loans and few even possessed credit cards. Alternatively, Viaud and Roland-Levey (2000) organised a typology of four classes defined along the lines of how households strived to build up their capital: namely, 'accumulating savers', 'prodigal households', 'prudent agents' and 'fragile borrowers'. Using the concept of social identity Viaud and Roland-Levey

(2000) reasoned why households in different economic positions may in fact have the same structural relationships regarding savings and credit.

Other work in this area has generally concentrated on the link between household portfolios and decisions regarding consumption or savings/borrowing. For example, de Ruiter and Smant (1999) examined the relationship between the household balance sheet and consumer durables expenditure. In particular, they addressed the potential impact of the excessive debt burdens built up by households and financial deregulation in the 1980s and questioned if it might be behind the slow recovery of OECD economies. While finding, not entirely unexpectedly, that household wealth was an important determinant of consumer expenditure; they found no evidence that the 'excessive' household debt ratios of the 1980s were directly responsible for slowing down consumer durables expenditure during the period of economic recovery. Moreover, DeRuiter and Smant (1999: 266) concluded that an emphasis on debt-income ratios at the aggregate level was misleading and that it was "…probably merely an illustration of common failures to consolidate balance sheets on an appropriate level when discussing macroeconomic issues". Lastly, Engelhardt (1996) examined the empirical link between house price appreciation and the saving/borrowing behaviour of homeowners during the 1980s. Interestingly, it was concluded that a savings asymmetry existed in that households that experience real gains in wealth do not change their saving/borrowing behaviour, rather all the savings offset was from households that experienced a real capital loss.

The second and generally more extensive area of empirical research focuses on the demand for household debt. At least some part of this work is aimed at differentiating mortgage demand and housing demand, while others are concerned with the interactions between the choice of mortgage instrument and the role of mortgage rationing and liquidity constraints. Leece (2000a), for instance, used the UK *Family Expenditure Survey* to estimate reduced form mortgage demand equations to analyse the impact of market rationing and financial liberalisation on households. The main findings of this analysis were that there is significant cross-sectional variation regarding the demand for mortgages and that the choice of mortgage instrument involving saving in an alternative investment vehicle reflects important portfolio and liquidity consideration (Leece 2000b). Leece (2000b) also examined the determinants of UK household mortgage debt, though using the *British Household Panel Survey* and in the context of the choice between floating or fixed interest rates. Leece (2000b) concluded that no socioeconomic variables, including age and first-time buyers and marital status, were significant factors in influencing this choice of mortgage instrument.

Demand functions for household debt have also been modelled in the United States. For example, using the *Survey of Consumer Finance* Crook (2001) examined the factors that determined whether a credit applicant was likely to be rejected and/or discouraged from future application and what variables significantly affected the demand for household debt. While it was concluded that household debt was a function of household age, income, size and employment status, it was largely invariant to the level of expected future interest rates. Alternatively, Ling and McGill (1998) used the *American Housing Survey* to simultaneously estimate mortgage debt level with house value. Ling and McGill (1998) concluded that larger debt values were often associated with greater value residences and with the level of household income, along with household mobility and other demographic variables. Breuckner (1994, 1997), Jones (1993, 1994, 1995), Hendershott et al. (1997) and Lea et al (1993, 1995) have also examined the demand for household debt as a function of financial, demographic and socioeconomic factors.

The final area of empirical research is concerned with consumer debt repayment in the context of household insolvency, delinquency and bankruptcy. Böheim and Taylor (1998), for example, examined evictions and repossessions using the *British Household Panel Survey*. The results showed that previous experience of financial problems had a significant and positive association with the current financial situation and the probability of eviction, and that negative financial surprises were an important route into financial difficulties after controlling for life events such as divorce and loss of employment. Walker (1996) also examined a significant life event (childbirth) as source of financial strain and presented evidence that psychological and behavioural variables had a considerable impact on being in or keeping out of debt. Canner and Luckett (1990), DeVaney and Lytton (1995), DeVaney (1994), Domowitz and Sartain (1999), Gropp et al. (1997), Kau and Keenan (1999), Muelbauer and Cameron (1997) also analysed debt in the context of household repayment difficulties, insolvency and bankruptcy.

This rather more sizeable area of empirical inquiry is generally consistent with DeVany and Lytton's (1995) survey evidence that many demographic and socioeconomic variables influence household debt repayment, the likelihood of default, the propensity for insolvency and ultimately bankruptcy. For example, renter and ethnic minority status, level of education and households with higher ratios of mortgage or consumer debt payments to income are often significant determinants of missed or slow debt payments. Similarly, DeVany and Hanna (1995) found that the age and income of the household head had a negative

relationship with the propensity for insolvency, as did married couples. Alternatively, Lunt and Livingstone (1992) concluded that socio-demographic variables such as social class, age or the number of dependent children were not significant predictors of car debt repayment, though not so disposable income.

When examining existing research on household debt, a number of salient points emerge. First, almost all of this work has been undertaken in the United States and, to a lesser extent, the United Kingdom. Relatively little attention has been paid to disaggregated sets outside of these financial milieus, not least in Australia. Second, there has been an overwhelming emphasis in studies examining problems associated with household debt to focus on extreme conditions such as insolvency and bankruptcy. Certainly, it is expected that households with potential repayment problems would experience less severe examples of financial stress long before these events take place, including cutting back on discretionary areas of consumption, and these are therefore suggestive of leading indicators of debt repayment problems. Finally, much of the existing literature pre-dates the increase in household debt levels found in the past five years. This is important because the full impact of sustained low interest rates and inflation and financial deregulation are only now being fully felt. That is, guidance could be had on the degree of financial stress that exists when debt service and gearing are at historical highs. It is with these considerations in mind that the present study is undertaken.

Research method and data

All data is obtained from the Australian Bureau of Statistics' (ABS) (2002) *Household Expenditure Survey* Confidentialised Unit Record File (CURF) and relate to a sample of 3,268 probability-weighted Australian households with at least some outstanding debt. The strength of this data is that it is a national survey concerning the demographic, socioeconomic and financial characteristics of Australian households and for the first time includes a number of items to identify financial stress in households. Unfortunately, it comprises a single cross-section so there is no meaningful way in which household behaviour in the most recent survey can be linked with the results of earlier surveys and many of the categories of income and expenditure can only be interpreted realistically at the household, as against the personal, level.

The analytical technique employed in the present study is to specify households' perceptions of financial stress as the dependent variable (y) in a regression with demographic, socioeconomic and debt characteristics as explanatory variables (x). The nature of the

dependent variable (either no financial stress or financial stress) indicates discrete dependent variable techniques are appropriate. Accordingly, the following binary logit model is specified:

$$\text{Prob}(y=1) = \frac{1}{1+e^{-\beta' x}} \qquad (1)$$

where x comprises a set of characteristics posited to influence the presence of financial stress, β is a set of parameters to be estimated and e is the exponential. The coefficients imputed by the binary logit model provide inferences about the effects of the explanatory variables on the probability of financial stress.

The dataset employed is composed of four sets of information. All of the sets are derived from the survey responses. The first set of information relates to several different dimensions of financial stress and comprises the dependent variable in the binary logit model specified in equation (1). In the survey the respondents were asked whether their present standard of living was worse than two years ago (*STD*), indicate whether it was for financial reasons that they did not have a holiday away for a least one week a year (*HOL*), have a night out once a fortnight (*NTO*), have friends or family over for a meal once a month (*FML*), have a special meal once a week (*SPM*), buy second-hand clothes most of the time (*CLH*) and do not spend time on leisure or hobby activities (*HOB*), and whether they spend more money than they get most weeks (*MGT*) (y = 1). For *STD* the control was that the household living standard was better or the same as two years ago, for *HOL*, *NTO*, *FML*, *SPM*, *CLH* and *HOB* that the household either engaged in the stated activity or did not because of non-financial reasons only, and for *MGT* that the household broke even or saved money most weeks (y = 0). These eight binary variables comprise the dependent variables in eight separate analyses aimed at explaining the causes of financial stress in Australian households.

Selected descriptive statistics are provided in Table 1. Overall, 758 households (23.19 percent) believed their standard of living was worse than two years earlier, 914 (27.97 percent) could not afford a holiday for one week a year, 665 (20.35 percent) could not afford a night out once a fortnight, 140 (4.25 percent) could not afford to have friends or family over for a meal once a month, 347 (10.47 percent) could not afford a special meal once a week, 317 (9.70 percent) could not afford to buy brand new clothes most of the time and 278 (8.51 percent) could not afford to spend time on leisure or hobby activities. In terms of financial management, 2,204 households or 67.44 percent stated that the household usually spent more money than it received, as against breaking even or saving money most weeks. The internal

reliability of these eight measures is relatively high (α=0.7299) suggesting broad agreement between the alternative dimensions of financial stress.

<TABLE 1 HERE>

The next three sets of information are specified as explanatory variables in the binary logit regression models. The first of these sets of information relates to household demographic characteristics, the second to socioeconomic characteristics, and the final set to debt characteristics. The first two sets of information are generally comparable to those employed in studies of household debt repayment, insolvency and bankruptcy and are intended to proxy for the factors thought to be non-debt sources of financial stress. The third set of information is used to identify households with different levels of debt service as a means of establishing a connection with household financial stress beyond these factors.

The set of demographic variables upon which the financial stress indicators are regressed are first examined. Whilst there is no unequivocal rationale for predicting the direction and statistical significance of many of these independent variables, their inclusion is consistent with both past studies of the determinants of household financial stress (as variously defined) and the presumed interests of policy-makers and other parties. For example, Böheim and Taylor (2000) used personal characteristics and demographics of the household head to help determine the level of transaction costs, preferences and attitudes to risk, and household structure concerning the number and ages of children as explanatory variables in their study of evictions and repossessions, while Ling and McGill (1998) included ethnic background as a means of controlling for variation in household risk preferences.

The first six variables relate to household structure. These represent households composed respectively of couples and lone parents with children over 15 years of age (*CPO* and *LPO*), couples and lone parents with children 14 years or younger (*CPY* and *LPY*) and couples and lone parents with children both under 14 years and over 15 years (*CPB* and *LPB*). The control for these variables is single person or couple only households. The next eleven variables relate to the sex, age, marital status and ethnic background of the household head. These are used as proxies for general characteristics including stage of life cycle, unobservable risk preferences and access to labour and credit markets. For instance, Böheim and Taylor (2000) reasoned non-whites may have experience difficulties with debt payments because of a lack of familiarity with financial institutions or the differential access to credit, while Canner and Luckett (1991) found in a study of US households that divorced or separated and younger

persons were more likely to experience debt repayment problems, as did DeVaney and Hanna (1994). The variables specified include the sex (*SEX*), age (*AGE*) and marital status of the household head (*DIV* and *MAR*), whether the household head was born in Oceania (*OCE*), Europe (*EUR*), the Middle East and North Africa (*MID*), Asia (*ASA*), the Americas (*AMR*) or Sub-Saharan Africa (*AFR*) and the year of arrival in Australia (*RES*). The control variables for *SEX*, *DIV* and *MAR* and *OCE*, *EUR*, *MID*, *ASA*, *AMR* and *AFR* are male, unmarried and born in Australia household heads, respectively. The final two variables are included to reflect additional dimensions of household structure and characteristics. These are the number of income units (*INU*) and the number of dependents (*DEP*) in each household. Ling and McGill (1998), for example, identified two-wage earning households as a positive indicator of financial strain along with the number of children.

The next group of variables relate to the income characteristics of each household. The first three variables are dummy variables indicating whether the principal source of household income is derived from self-employment (*SEL*), superannuation and investments (*SUP*) or government pensions and benefits (*BEN*). The control is wages and salaries as the principal source of household income. In this instance, and holding income constant, it is hypothesised that the more fixed the level of permanent income and the lower the ability to earn extra income, the higher the level of financial stress. Böheim and Taylor (2000) likewise hypothesised that sources of income were a potential source of financial stress in that a household with a retired head was more likely to report housing finance difficulties than employees, and observing that in many cases self-employment predated indebtedness because of the interaction between businesses and the collateral provided by housing wealth.

The next two variables indicate whether the principal residence is being bought (*MRT*) or rented (*RNT*) (control is owned outright) (Canner and Luckett 1991). It is generally the case that transaction costs associated with owner-occupation are sizeable when compared to renting, while mortgaged households with large fixed payments and a general lack of mobility may be less able to adjust to changes in regional employment conditions. Lastly, the estimated value of the principal dwelling (*VAL*) and the level of household disposable income (*DIC*) are also included. All other things being equal, greater wealth and/or income should expose debt holders to a lower level of financial stress.

By and large, the distributional properties of the demographic and socioeconomic variables appear non-normal. Most of the values, with the exception of *MAR* and *MRT* are positively skewed, indicating a long right tail for the continuous variables and the much lower

probability of ones as against zeros in the binary variables. Since the asymptotic sampling distribution of skewness is normal with mean 0 and standard deviation of $\sqrt{6/T}$, where T is the sample size, then the standard error under the null hypothesis of normality is 0.0428: all estimates of skewness are then significant at the .10 level or higher. The kurtosis, or degree of excess, in most variables is also generally positive and larger than three, ranging from 4.1359 for *CPO* to 104.1036 for *AFR*, thereby indicating leptokurtic or peaked distributions. The kurtosis for *DIV*, *EUR*, *AGE*, *DEP*, *RNT*, *MAR*, *CPY*, *SEX* and *MRT* is significantly less than three indicating relatively flat or platykurtic distributions [the sampling distribution of kurtosis is normal with mean 3 and standard deviation of $\sqrt{24/T} = 0.0856$]. Finally, Jarque-Bera statistics and p-values (not shown) are used to test the null hypotheses that the distribution of these variables is not normally distributed. All p-values are smaller than the .01 level of significance suggesting the null hypothesis can be rejected.

The final eight variables in Table 1 represent the indebtedness of households. The six debt service ratios used are calculated by dividing the weekly repayments (in dollars) for various categories of loans by disposable income. The categories examined are loans to buy or build this (*RBP*) or other property (*ROP*), loans for alternations and additions to this (*RAL*) or other property (*ROL*) and loans for motor vehicles (*RMV*), holidays (*RHL*) and other purposes (*ROT*). Broadly, *RBP* and *RAL* are loans for owner-occupied housing while *ROP* and *ROL* are loans for investor housing, though there may be some interplay between these and loans for other purposes due to the existence of equity loans and redraw facilities. A measure of personal debt is also included in the form of the number of household credit cards, which in the absence of available credit limit, is the closest approximation of credit card debt available. On average, loans to buy and build owner-occupied housing account for 34.52 percent of disposable income, loans for investor housing 4.47 percent, owner occupied and investor housing alterations and additions 0.67 and 0.22 percent respectively, and loans for motor vehicle, holidays and other purposes 6.06, 0.12 and 1.66 percent respectively. The average household also has 1.44 credit cards.

Tests for differences in means and proportions for the explanatory variables in Table 2 indicate statistically significant differences between households that do not and do experience financial stress across a number of the categories. For example, and all other things being equal, households seeing their standard of living as being worse than two years previously (*STD*) are more likely to be couples with children both under 14 and over 15 years (*CPB*),

lone parents with children 14 years and younger (*LPY*) and 15 and over (*LPO*), with a female (*SEX*), older (*AGE*), divorced or separated (*DIV*) householder, with superannuation and investments (*SUP*) or government pensions and benefits (*BEN*) as the primary source of income and with a lower value of residence (*VAL*) and disposable income (*DIC*). These households are also likely to have a higher level of repayments relative to disposable income for loans for other purposes (ROT) and fewer credit cards (CRC).

<TABLE 2 HERE>

Households that indicate that they spend more money than they get most weeks (*MGT*) are significantly more likely to be drawn from couples with younger children (*CPY*) and both younger and older children (*CPB*), all categories of lone parents (*LPY*, *LPO*, *LPB*), households with female (*SEX*), divorced/separated (*DIV*) and born in North Africa and the Middle East (*MID*) heads, depending on government pensions and benefits (*BEN*) and a larger number of dependents (*DEP*). They are also more likely to be renting (*RNT*) and pay a higher debt-service ratio on other loans (*ROP*) and with lower residential housing value (*VAL*) and disposable income (*DIC*) and a smaller number of credit cards (*CRC*). Overall, there are significant differences in demographic, income and debt characteristics between household that do and do not experience financial stress across one hundred and forty-two of the two hundred and seventy-two factors (52.2 percent). However, only twenty significant differences in financial stress are found across the sixty-four dimensions of debt (31.25 percent) of which nearly all are concerned with repayments on loans for other purposes (*ROT*) or the number of credit cards (*CRC*).

Empirical findings

The estimated coefficients, standard errors and *p*-values of the parameters for the logit regressions are provided in Table 3. To facilitate comparability, marginal effects are also calculated. These indicate the marginal effect of each outcome on the probability of experiencing financial stress. Also included in Table 3 are statistics for the log-likelihood (*L*), restricted slopes log-likelihood (*RL*), likelihood ratio (*LR*) tests, the McFadden R^2 as an analogue for that used in the linear regression model and the Hannan-Quinn Criterion (*HC*) as a guide to model selection. Sixteen separate models are estimated. The estimated coefficients, standard errors, *p*-values and marginal effects employing the entire set of demographic, socioeconomic and debt characteristics as predictors for the eight measures of financial stress

are presented initially, followed by a refined specification for each of these measures obtained using forward stepwise regression using the Wald criteria.

In all cases, and as indicated by the lower values of *HC*, the refined models are to be preferred over the beginning specifications in terms of the trade-off between comprehensiveness and complexity. Yet irrespective of specification, all of the estimated models are highly significant, with likelihood ratio tests of the hypotheses that all of the slope coefficients are zero rejected at the 1 percent level or lower using the likelihood ratio statistic. The results in these models also appear sensible in terms of both the precision of the estimates and the signs on the coefficients. To test for multicollinearity, variance inflation factors (VIF) are calculated and presented in Table 1. As a rule of thumb, a VIF greater than ten indicates the presence of harmful collinearity. Amongst the explanatory variables the highest VIFs are for *RES* (3.3449), *CPY* (3.0625), and *RNT* (3.009). This suggests that multicollinearity, while present, is not too much of a problem.

<TABLE 3 HERE>

The first model discussed is that predicting financial stress by comparing the current standard of living with those two years previously (*STD*). In the beginning model, the estimated coefficients for *CPO*, *CPB*, *LPO*, *DIV*, *MID*, *RES*, *INU*, *DEP*, *BEN* and *DIC* are significant at the 10 percent level of significance or lower and conform to *a priori* expectations. The estimated coefficients in the beginning specification thus indicate that couples with children fifteen years and over with and without younger children, lone parents with older children, divorced or separated household heads, recently arrived household heads born in North Africa and the Middle East, households with a higher number of dependents and income units and those on government pensions and benefits and lower disposable incomes are more likely to indicate that their present standard of living is worse than two years earlier. The three greatest influences on this viewpoint (marginal effect in brackets) is being from a North African or Middle Eastern background (*MID*) (3.1530), and being a couple with both younger and older children (*CPB*) (1.8187) or on government pensions and benefits (*BEN*) (1.5588).

These results are generally consistent with the estimated coefficients in the refined model, which is obtained by forward stepwise regression using a Wald criterion. Seven variables (excluding the constant) are stepped into the model on this basis (*W*-statistics and *p*-values in brackets): *DIC* (78.27, 0.0000), *INU* (21.93, 0.0000), *AGE* (8.45, 0.0040), *DEP* (6.95, 0.0080), *BEN* (6.84, 0.0090), *MID* (6.49, 0.0110) and *CPB* (4.13, 0.0420). All of these factors

are associated with increasing levels of financial stress with the exception of disposable income, which is negatively reacted to financial stress. Interestingly, none of the parameters associated with household debt are significant, suggesting that demographic and, to a lesser extent, socioeconomic influences dominate perceptions of increasing financial stress.

Broad agreement is found with the estimated coefficients and signs on the estimated coefficients in the next six refined models where *HOL*, *NTO*, *FML*, *SPM*, *CLH* and *HOB* are specified as the dependent variables. In all of these regressions, financial stress is negatively associated with the value of the dwelling (*VAL*) and disposable income (*DIC*) and positively associated with the number of income units (*INU*) and dependents (*DEP*), whether the principal source of household income is from government pensions and benefits (*BEN*) and whether the household head is born in North Africa or the Middle East (*MID*). The remaining significant factors (with dependent variable) are *LPO*, *LPY*, *RES* and *CRC* (*HOL*), *AGE*, *MAR*, *SEL* and *MRT* (*NTO*), *LPB* and *ASA* (*FML*), *CRC* (*CLH*) and *LPY*, *SEL* and *CRC* (*HOB*). With the exception of the number of credit cards (*CRC*) and whether the principal source of household income is from self-employment (*SEL*) all of the signs on the estimated coefficients are positive.

The results in the final two regressions in Table 3 are where financial stress in overall household management (defined as spending more money than received most weeks) is regressed against the same set of explanatory variables. In the beginning model the coefficients for couples with both older and younger children (*CPB*), female-headed (*SEX*) and married or de facto (*MAR*) households, recently arrived (*RES*) household heads from a North African or Middle Eastern background (*MID*), the number of income units (*INU*) and dependents (*DEP*), households on government pensions and benefits (*BEN*), renting households (*RNT*), households with lower disposable incomes (*DIC*) and higher repayments for loans for other purposes (*ROT*) are significant at the .10 level or lower and the signs on these coefficients are consistent with *a priori* expectations. A refined model based on forward stepwise regression includes seven variables (excluding the constant) in the order of (*W*-statistics and *p*-values in brackets): *DIC* (174.47, 0.0000), *DEP* (124.56, 0.0000), *INU* (77.99, 0.0000), *BEN* (9.21, 0.0024), *ROT* (7.04, 0.0080), *RNT* (6.51, 0.0107) and *RBP* (2.57, 0.1089). Overall, households with more income earning units, a larger number of dependents, those that rely principally on government pensions and benefits, renting and lower disposable income households, those with lower repayments on loans for buying and building owner-occupied housing and higher repayments on loans for other purposes are more likely to spend

more money than is received most weeks. The greatest marginal effects on this form of financial stress are high repayments on loans for other purposes, households with larger number of income units and those dependent upon government pensions and benefits as the principal source of income.

At first impression, it would appear that debt has little role to play in determining financial stress in Australian households. In fact, only for household management (*MGT*) is the repayment of a loan (*ROT*) both significant and conform to its hypothesised sign, while the number of credit cards even where significant (*HOL*, *CLH* and *HOB*) is negative suggesting a contradiction with *a priori* reasoning. In the case of the latter, it is of course likely that better access to credit cards increases financial flexibility and therefore has a role in diminishing financial stress in all but the most extreme circumstances. For the former, redundant variable tests of *RBP*, *ROP*, *RAL*, *ROL*, *RMV*, *RHL* and *ROT* reject the null hypothesis of joint insignificance (*F*-statistics and *p*-values in brackets) for *HOL* (3.99, 0.0000), *SPM* (1.93, 0.0514), *CLH* (5.77, 0.0000), *HOB* (5.72, 0.0000) and *MGT* (2.28, 0.0194). This suggests that debt portfolios exert a weak but significant influence on financial stress, but this is offset by effects elsewhere. A real possibility is that households are currently willing to carry high levels of debt with little financial stress seemingly confident that the capital gains provided by strong owner-occupied and investor housing markets, access to equity loans and other household investments, and a low and stable outlook for inflation and mortgage interest rates will provide financial flexibility for the foreseeable future.

As a final requirement, the ability of the various models to accurately predict outcomes in terms of financial stress is examined. Table 4 provides the predicted results for each refined model and compares these to the probabilities obtained from a constant probability model. The probabilities in the constant probability model are the values computed from estimating a model that includes only an intercept term, and thereby correspond to the probability of correctly identifying financial stress on the basis of the proportion experiencing it in the sample. To start with, consider the model where *HOL* (a holiday away for at least one week a year) is specified as the dependent variable. Of the 3,268 households in the sample, 2,354 either had such a holiday or did not for some non-financial reason and 914 indicated that they could not afford such a holiday. Of these the constant probability model correctly predicts 1,696 cases (72.03 percent) as having ‘no financial stress’ and 256 cases (27.97 percent) as having financial stresses. This represents the correct prediction of 1,952 cases (or 59.71 percent) of all households. By way of contrast, the refined model correctly identifies 2,209

cases (93.84 percent) as not having financial stress and 249 cases (27.24 percent) as having financial stress. Thus, the model correctly identifies 2,458 of the 3,268 households (or 75.21 percent) in terms of financial stress or not. This indicates an absolute improvement of 25.92 percent over the constant probability model (in terms of the number of correct predictions) and a relative improvement of 38.40 percent (in terms of the number of incorrect predictions).

<TABLE 4 HERE>

The refined model for the remaining seven dimensions of financial stress delivers a comparable level of correct and incorrect predictions. The total percentages of correct prediction across these models (percentage of correct predictions for constant probability models in brackets) are: *STD* 77.05 (64.37), *NTO* 79.83 (67.58), *FML* 95.62 (91.86), *SPM* 89.32 (81.26), *CLH* 90.33 (82.48), *HOB* 91.40 (84.43) and *MGT* 71.30 (56.08). Of course, these are 'in-sample' predictions and the results could differ if 'out-of-sample' data was made available. It can be seen is that there is little relative improvement between the constant probability and refined models for *FML* and *SPM* and an obvious factor is the very small proportion of households who do not undertake these most basic of social activities because of financial hardship. Likewise, the models generally do much better in predicting the absence of financial stress, and this is not necessarily the most natural focus of interest. For example, just 1.08 and 1.46 percent of financially stressed households are predicted correctly when the dependent variable is respectively HOB and SPM, though 91.52 percent of financially stressed households are predicted correctly when MGT is specified as the dependent variable. Regardless, Hosmer-Lemeshow goodness-of-fit test statistics for all the models with the exception of NTO fail to reject the null hypotheses of no functional misspecification and we may conclude that the models are appropriate for predicting financial stress in Australian households.

Concluding remarks and policy recommendations

The present study uses binary logit models to investigate the role of demographic, socioeconomic and debt characteristics in determining financial stress in Australian households. The current paper extends empirical work in this area in at least two ways. First, it represents the first attempt using qualitative statistical techniques to model financial stress in Australian households. This provides an important starting point for future research in this area. Second, rather than focusing on progressively more acute life events such as problems with debt repayment, insolvency and bankruptcy as found in previous empirical work, this

study examines financial stress as defined by the inability to engage in commonplace social functions and family leisure activities. No comparable study is then thought to exist elsewhere with a focus on financial stress at the margin rather than at the extreme. The evidence provided suggests that financial stress is very much a function of the demographic and socioeconomic characteristics of households and, to a lesser extent, debt portfolios.

First, it has been shown that the primary causes of financial stress in Australian households are basic demographic characteristics. These include the presence of children, the number of dependents and income-earning units, the age of the household head, and also whether the householder was born and a recent immigrant from North Africa and the Middle East and, on occasion, Asia. Policies already in place such as governmental assistance with child support and childcare stand out, especially since being a lone parent is two to three times more likely to suffer financial stress than a couple in the same situation, but the underlying cause of financial stress in Middle Eastern households especially is unknown. One possibility is a general lack of financial literacy skills and management; another is the interplay of global political events and higher perceived risk in, say, labour and credit markets. Regardless of source, such impacts are significant with Middle Eastern households anywhere from two to four times more likely to suffer financial stress in a given situation. Second, it has also been shown that household socioeconomic factors also have a role in fostering financial stress. Key factors here include the increase in financial stress when a household is dependent upon government pensions and benefits and the decrease in financial stress associated with higher values of owner-occupied housing and disposable income. By itself, a ten percent fall in housing values could be associated with up to an eight percent increase in the likelihood of being financial stressed, depending on the dimension employed. This is important because the prospective collapse of both the owner-occupied and investor property markets is feared for its potential impact on aggregate consumption and thereby macroeconomic stability.

Finally, the results indicate that, for the most part, the historically high levels of indebtedness by Australian households appear to have little impact at the margin on financial reasons for being unable to engage in basic social activity such as having family and friends over for meals, having a night out, going on holiday or engaging in hobbies and other leisure activities. A key likelihood is that the very strong owner-occupied and investor housing market coupled with historically (and forecast to continue) low mortgage interest rates provides reassurance to households taking out debt, which in the main, is focused on housing-related purposes. Households have also used a variety of other strategies to cope with the growth in

indebtedness including refinancing with lower interest rates, extending the term of housing loans and substituting mortgage borrowing for more expensive consumer debt (DeKaser 2003). That debt-related financial stress that does exist is not associated with housing, motor vehicle or holiday debt and thereby relates largely to unsecured debt. That said credit cards themselves seem to offer much in reducing financial stress for Australian households, reinforcing the view that they use the flexibility of this form of debt to maintain basic social and consumption activities.

There are, of course, a number of limitations in this study, all of which suggest further areas of research. To start with, the results of this analysis are framed around what could be regarded as relatively mild forms of financial stress; that is, the inability to engage in basic social activities such as meals with family and friends, nights out, holidays, etc. Certainly, most work in this area has emphasised the more extreme forms of financial stress, including insolvency and bankruptcy, and it may be that predictive modelling in that instance could be relatively more accurate, especially when using the demographic, socioeconomic and financial characteristics employed in this study. Another possibility is that the current study has not addressed how households manage financial stress in terms of substituting between activities or reducing the frequency of these activities. In particular, little is known about how households use sources of emergency finance to maintain consumption with temporary changes in income and wealth, even though there is some evidence that this practice, though unsustainable in the longer term, is increasing. Finally, there is renewed concern in Australia over the prohibitive costs of owner-occupied housing, especially for young first-home buyers. In this study age did not appear to be a determining factor of financial stress, though in view of the life cycle approach to household debt this may not be the case in a subset of younger households.

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TABLE 1. *Dependent and independent variable definitions and descriptive statistics*

Variable description		*Mean*	*Std. dev.*	*Skewness*	*Kurtosis*	*VIF*
Present standard of living compared with two years ago	STD	0.2319	0.4221	1.2708	-0.3854	–
Reason household does not have a holiday away at least one week a year	HOL	0.2797	0.4489	0.9822	-1.0360	–
Reason household does not have a night out once a fortnight	NTO	0.2035	0.4027	1.4737	0.1719	–
Reason household does not have friends or family over for a meal once a month	FML	0.0425	0.2018	4.5359	18.5855	–
Reason household does not have a special meal once a week	SPM	0.1047	0.3062	2.5843	4.6814	–
Reason household buys second hand clothes most of the time	CLH	0.0970	0.2960	2.7246	5.4267	–
Reason household does not spend time on leisure or hobby activities	HOB	0.0851	0.2790	2.9760	6.8607	–
Overall management of household income	MGT	0.6744	0.4687	-0.7448	-1.4462	–
Couple with children over 15 years of age	CPO	0.1111	0.3143	2.4766	4.1359	1.6267
Couple with children 14 years or younger	CPY	0.3081	0.4618	0.8314	-1.3095	3.0625
Couple with children both under 14 years and over 15 years	CPB	0.0737	0.2614	3.2634	8.6549	1.9420
Lone parent with children over 15 years of age	LPO	0.0321	0.1764	5.3088	26.1989	1.2455
Lone parent with children 14 years or younger	LPY	0.0422	0.2011	4.5546	18.7558	1.5672
Lone parent with children both under 14 years and over 15 years	LPB	0.0116	0.1072	9.1153	81.1377	1.2117
Sex of household head	SEX	0.3418	0.4744	0.6674	-1.5556	1.1913
Age of household head	AGE	7.6276	2.2957	0.4021	0.2772	1.7376
Marital status of household head – widowed, divorced or separated	DIV	0.1325	0.3391	2.1690	2.7061	2.3143
Marital status of household head – married or de facto relationship	MAR	0.7319	0.4430	-1.0478	-0.9027	2.8512
Country of birth of household head – Oceania (excluding Australia)	OCE	0.0346	0.1827	5.0971	23.9947	1.5963
Country of birth of household head – Europe	EUR	0.1417	0.3488	2.0560	2.2286	1.8794
Country of birth of household head – Middle East and North Africa	MID	0.0113	0.1058	9.2420	83.4653	1.1790
Country of birth of household head – Asia	ASA	0.0526	0.2233	4.0088	14.0789	2.0221
Country of birth of household head – North and South America	AMR	0.0098	0.0985	9.9612	97.2855	1.1533
Country of birth of household head – Sub-Saharan Africa	AFR	0.0092	0.0954	10.2976	104.1036	1.2185
Year of arrival in Australia of household head	RES	0.4777	1.0143	2.5233	6.0304	3.3449
Number of income units in household	INU	1.2983	0.6156	2.3185	6.0551	1.5944
Number of dependents in household	DEP	1.0407	1.1780	0.8722	0.0573	2.6708
Principal source of household income – self employed	SEL	0.0667	0.2496	3.4747	10.0796	1.0378
Principal source of household income – superannuation and investments	SUP	0.0174	0.1309	7.3757	52.4331	1.1303
Principal source of household income – government pensions and benefits	BEN	0.1034	0.3046	2.6058	4.7932	1.4793
Nature of occupancy of principal dwelling – being bought	MRT	0.6527	0.4762	-0.6417	-1.5892	2.3695
Nature of occupancy of principal dwelling – rented	RNT	0.2170	0.4122	1.3741	-0.1120	3.0009
Estimated value of principal dwelling	VAL	1.4696	1.3214	1.9391	8.0774	1.7824
Household disposable income	DIC	0.8952	0.4622	1.3235	4.2232	1.9211
Debt service – loan to buy or build this property	RBP	0.3452	6.0377	39.4498	1712.8496	1.0680
Debt service – loan to buy or build other property	ROP	0.0447	1.5399	55.2673	3115.7374	1.0088
Debt service – loan for alternations and additions to this property	RAL	0.0067	0.0365	9.5150	133.5718	1.0254
Debt service – loan for alternations and additions to other property	ROL	0.0022	0.0590	41.7696	1882.7308	1.0062
Debt service – loan to buy motor vehicle	RMV	0.0606	0.4258	34.2715	1373.5883	1.0399
Debt service – loan for a holiday	RHL	0.0012	0.0101	10.6306	135.3688	1.0251
Debt service – loan for another purpose	ROT	0.0166	0.0679	13.9447	312.5252	1.0474
Number of credit cards in household	CRC	1.4364	1.1618	0.6589	-0.2823	1.1924

Notes: VIF – variance inflation factor. Critical values for significance of skewness and kurtosis at the .05 level are 0.0839 and 0.1678. Dependent variables are binary variables: living standard worse than two years ago (STD) - control is better or same as two years ago; cannot afford holiday (HOL) – control is either had a holiday or did not want a holiday for non-financial reason; cannot afford a night out once a fortnight (NTO) – control is either have a night out once a fortnight or do not want a night out for non-financial reason; cannot afford to have friends or family over for a meal once a month (FML) – control is either have friends or family over for a meal once a month or did not want to for non-financial reason; cannot afford to have a special meal once a week (SML) – control is either have a special meal once a week or did not want to for non-financial reason; household buys second hand clothes for financial reason (CLH) – control is either buy only brand new clothes or want to buy second hand clothes for non-financial reason; cannot afford to spend time on leisure/hobby activities (HOB) – control is either spend time on leisure/hobby activities or did not want to for non-financial reason; spend more money than we get (MGT) – control is just break even or save money most weeks. The control for the family structure dummy variables (CPO, CPY, CPB, LPO, LPY, LPB) is couple only or single person household; the control for sex of household head (SEX) is male; age of household head is defined in fifteen ascending age groups from under 14 years to 75 years or over; control for marital status of household head (MRT, DIV) is never married or single; control for country of birth of household head (OCE, EUR, NID, ASA, AMR, AFR) is born in Australia; year of arrival of household head is from 1981 onwards; control for principal source of household income (SEL, SUP, BEN) is salaries and wages; control for nature of occupancy (MRT, RNT) is owned outright. Estimated value of dwelling in hundred thousands of dollars; household disposable income (weekly) in thousands of dollars. Debt service ratios (RBP, ROP, RAL, ROL, RMV, RHL, ROT) are weekly repayments in dollars divided by weekly disposable income.

TABLE 2 *Tests for differences in means and proportions for independent variables in logit regressions*

	No financial stress	Financial stress	*tt*/Z-statistic	*p*-value	No financial stress	Financial stress	*t*/Z-statistic	*p*-value	No financial stress	Financial stress	*t*/Z-statistic	*p*-value	No financial stress	Financial stress	*t*/Z-statistic	*p*-value
	STD				HOL				NTO				FML			
CPO	0.1116	0.1095	0.1578	0.8747	0.1206	0.0864	2.9826	0.0029	0.1222	0.0677	4.6692	0.0000	0.1122	0.0863	1.0521	0.2944
CPY	0.3127	0.2929	1.0485	0.2946	0.3029	0.3217	-1.0355	0.3006	0.2847	0.4000	-5.4999	0.0000	0.3119	0.2230	2.4429	0.0157
CPB	0.0685	0.0910	-1.9386	0.0528	0.0701	0.0832	-1.2382	0.2158	0.0630	0.1158	-3.9689	0.0001	0.0729	0.0935	-0.8192	0.4140
LPO	0.0275	0.0475	-2.3838	0.0173	0.0259	0.0481	-2.8478	0.0045	0.0323	0.0316	0.0902	0.9281	0.0307	0.0647	-1.6090	0.1098
LPY	0.0378	0.0567	-2.0454	0.0411	0.0293	0.0755	-4.9079	0.0000	0.0369	0.0632	-2.5922	0.0097	0.0393	0.1079	-2.5753	0.0110
LPB	0.0104	0.0158	-1.1019	0.2708	0.0051	0.0284	-4.1003	0.0000	0.0096	0.0195	-1.7438	0.0816	0.0086	0.0791	-3.0603	0.0027
SEX	0.3279	0.3879	-2.9932	0.0028	0.3093	0.4256	-6.1441	0.0000	0.3358	0.3654	-1.4216	0.1555	0.3324	0.5540	-5.1358	0.0000
AGE	7.5418	7.9116	-3.8949	0.0001	7.6232	7.6389	-0.1761	0.8603	7.5743	7.8361	-2.7513	0.0060	7.6235	7.7194	-0.4819	0.6299
DIV	0.1183	0.1794	-3.9762	0.0001	0.1079	0.1958	-6.0199	0.0000	0.1287	0.1474	-1.2249	0.2209	0.1266	0.2662	-3.6658	0.0003
MAR	0.7414	0.7005	2.1756	0.0298	0.7545	0.6740	4.5043	0.0000	0.7211	0.7744	-2.8915	0.0039	0.7405	0.5396	4.6567	0.0000
OCE	0.0363	0.0290	1.0111	0.3122	0.0319	0.0416	-1.2896	0.1974	0.0338	0.0376	-0.4769	0.6335	0.0352	0.0216	1.0603	0.2906
EUR	0.1390	0.1504	-0.7853	0.4323	0.1406	0.1444	-0.2801	0.7794	0.1448	0.1293	1.0524	0.2928	0.1429	0.1151	0.9953	0.3211
MID	0.0072	0.0251	-3.0196	0.0026	0.0047	0.0284	-4.1864	0.0000	0.0065	0.0301	-3.4555	0.0006	0.0096	0.0504	-2.1807	0.0309
ASA	0.0554	0.0435	1.3598	0.1741	0.0463	0.0689	-2.3973	0.0166	0.0519	0.0556	-0.3891	0.6973	0.0505	0.1007	-1.9379	0.0546
AMR	0.0092	0.0119	-0.6639	0.5068	0.0081	0.0142	-1.4203	0.1557	0.0088	0.0135	-0.9697	0.3325	0.0099	0.0072	0.3178	0.7507
AFR	0.0096	0.0079	0.4164	0.6772	0.0085	0.0109	-0.6576	0.5109	0.0096	0.0075	0.5031	0.6149	0.0093	0.0072	0.2508	0.8020
RES	0.4845	0.4551	0.7312	0.4648	0.4384	0.5788	-3.3999	0.0007	0.4679	0.5158	-1.0660	0.2867	0.4743	0.5540	-0.9062	0.3649
INU	1.2952	1.3087	-0.5286	0.5971	1.3093	1.2702	1.7065	0.0881	1.3227	1.2030	5.1475	0.0000	1.2969	1.3309	-0.6378	0.5237
DEP	1.0211	1.1055	-1.7298	0.0838	0.9482	1.2790	-6.9765	0.0000	0.9139	1.5368	11.3400	0.0000	1.0243	1.4101	-3.1821	0.0018
SEL	0.0669	0.0660	0.0937	0.9254	0.0705	0.0569	1.4640	0.1434	0.0692	0.0571	1.1670	0.2435	0.0684	0.0288	2.6535	0.0087
SUP	0.0139	0.0290	-2.3075	0.0212	0.0149	0.0241	-1.6278	0.1038	0.0184	0.0135	0.9431	0.3458	0.0179	0.0072	1.4130	0.1595
BEN	0.0765	0.1926	-7.5976	0.0000	0.0561	0.2254	11.5813	0.0000	0.0718	0.2271	-9.1161	0.0000	0.0898	0.4101	-7.5929	0.0000
MRT	0.6602	0.6280	1.6135	0.1069	0.6776	0.5886	4.7006	0.0000	0.6554	0.6421	0.6424	0.5207	0.6619	0.4460	5.0017	0.0000
RNT	0.2163	0.2190	-0.1558	0.8762	0.1907	0.2845	-5.5176	0.0000	0.2098	0.2451	-1.9107	0.0563	0.2084	0.4101	-4.7465	0.0000
VAL	1.5080	1.3425	3.2320	0.0013	1.6049	1.1213	10.6316	0.0000	1.5397	1.1953	7.0172	0.0000	1.4986	0.8165	8.9450	0.0000
DIC	0.9404	0.7458	11.2688	0.0000	0.9734	0.6939	18.4213	0.0000	0.9440	0.7044	14.9463	0.0000	0.9099	0.5648	13.1144	0.0000
RBP	0.3591	0.2992	0.2393	0.8109	0.3620	0.3018	0.2560	0.7980	0.3364	0.3797	-0.1650	0.8689	0.3548	0.1272	0.4349	0.6637
ROP	0.0488	0.0308	0.2831	0.7771	0.0574	0.0119	0.7583	0.4483	0.0524	0.0142	0.5713	0.5678	0.0461	0.0131	0.2472	0.8048
RAL	0.0069	0.0060	0.6008	0.5480	0.0073	0.0052	1.6540	0.0983	0.0065	0.0071	-0.3644	0.7156	0.0067	0.0053	0.4644	0.6424
ROL	0.0020	0.0028	-0.3276	0.7433	0.0019	0.0029	-0.4183	0.6758	0.0025	0.0009	0.6147	0.5388	0.0023	0.0000	0.4486	0.6538
RMV	0.0590	0.0659	-0.3881	0.6980	0.0545	0.0764	-0.9352	0.3499	0.0615	0.0571	0.2399	0.8104	0.0605	0.0626	-0.0561	0.9553
RHL	0.0013	0.0009	1.2936	0.1960	0.0013	0.0009	0.9762	0.3291	0.0013	0.0009	0.9144	0.3607	0.0012	0.0009	0.3213	0.7480
ROT	0.0149	0.0223	-2.5808	0.0100	0.0138	0.0237	-3.7403	0.0002	0.0158	0.0197	-1.3399	0.1804	0.0159	0.0319	-1.9591	0.0520
CRC	1.4701	1.3245	3.0686	0.0022	1.5705	1.0908	11.1679	0.0000	1.5044	1.1699	6.9593	0.0000	1.4577	0.9568	5.5888	0.0000
	SPM				CLH				HOB				MGT			
CPO	0.1172	0.0585	4.1871	0.0000	0.1176	0.0505	4.9100	0.0000	0.1144	0.0755	2.2968	0.0222	0.1288	0.1025	2.1602	0.0309
CPY	0.3018	0.3626	-2.2203	0.0269	0.3050	0.3375	-1.1662	0.2443	0.3050	0.3417	-1.2354	0.2176	0.2744	0.3244	-2.9509	0.0032
CPB	0.0731	0.0789	-0.3889	0.6974	0.0722	0.0883	-0.9694	0.3330	0.0726	0.0863	-0.7847	0.4332	0.0479	0.0862	-4.3147	0.0000
LPO	0.0335	0.0205	1.5583	0.1198	0.0319	0.0347	-0.2730	0.7848	0.0304	0.0504	-1.4748	0.1413	0.0216	0.0372	-2.5925	0.0096
LPY	0.0369	0.0877	-3.2340	0.0013	0.0322	0.1356	-5.2960	0.0000	0.0398	0.0683	-1.8325	0.0678	0.0235	0.0513	-4.2032	0.0000
LPB	0.0092	0.0322	-2.3605	0.0188	0.0108	0.0189	-1.0233	0.3068	0.0100	0.0288	-1.8360	0.0674	0.0038	0.0154	-3.6147	0.0003
SEX	0.3271	0.4678	-4.9604	0.0000	0.3253	0.4953	-5.7771	0.0000	0.3321	0.4460	-3.6654	0.0003	0.2820	0.3707	-5.1546	0.0000
AGE	7.6227	7.6696	-0.3574	0.7208	7.6645	7.2839	2.8080	0.0050	7.6227	7.6799	-0.3967	0.6916	7.5902	7.6456	-0.6466	0.5179
DIV	0.1275	0.1754	-2.2307	0.0262	0.1210	0.2397	-4.7977	0.0000	0.1261	0.2014	-3.0321	0.0026	0.0968	0.1497	-4.4722	0.0000
MAR	0.7362	0.6959	1.5357	0.1254	0.7445	0.6151	4.5347	0.0000	0.7375	0.6727	2.2100	0.0278	0.7632	0.7169	2.8582	0.0043
OCE	0.0355	0.0263	0.9901	0.3227	0.0356	0.0252	1.0936	0.2748	0.0358	0.0216	1.5160	0.1304	0.0376	0.0331	0.6556	0.5122
EUR	0.1432	0.1287	0.7297	0.4657	0.1457	0.1041	2.2656	0.0240	0.1418	0.1403	0.0694	0.9447	0.1494	0.1379	0.8733	0.3826
MID	0.0089	0.0322	-2.3971	0.0170	0.0108	0.0158	-0.7881	0.4307	0.0087	0.0396	-2.6085	0.0096	0.0028	0.0154	-4.0818	0.0000
ASA	0.0533	0.0468	0.5117	0.6089	0.0539	0.0410	1.0811	0.2803	0.0512	0.0683	-1.0948	0.2744	0.0517	0.0531	-0.1671	0.8673
AMR	0.0089	0.0175	-1.1831	0.2375	0.0091	0.0158	-0.9167	0.3599	0.0094	0.0144	-0.8135	0.4160	0.0103	0.0095	0.2203	0.8256
AFR	0.0099	0.0029	2.0251	0.0433	0.0091	0.0095	-0.0557	0.9556	0.0090	0.0108	-0.2944	0.7684	0.0094	0.0091	0.0910	0.9275
RES	0.4802	0.4561	0.4146	0.6784	0.4859	0.4006	1.4876	0.1376	0.4699	0.5612	-1.3410	0.1809	0.4962	0.4687	0.7274	0.4670
INU	1.3096	1.2018	3.4723	0.0006	1.3033	1.2524	1.4784	0.1401	1.3010	1.2698	0.8087	0.4187	1.2744	1.3099	-1.5560	0.1199
DEP	0.9952	1.4298	-5.8996	0.0000	0.9871	1.5394	-6.9471	0.0000	1.0080	1.3921	-4.6090	0.0000	0.7904	1.1615	-9.0001	0.0000
SEL	0.0687	0.0497	1.4992	0.1345	0.0691	0.0442	2.0027	0.0458	0.0692	0.0396	2.3542	0.0191	0.0667	0.0667	0.0035	0.9972
SUP	0.0178	0.0146	0.4212	0.6736	0.0183	0.0095	1.4776	0.1402	0.0174	0.0180	-0.0724	0.9423	0.0169	0.0177	-0.1591	0.8736
BEN	0.0807	0.2982	-8.6069	0.0000	0.0776	0.3438	-9.7991	0.0000	0.0853	0.2986	-7.6261	0.0000	0.0357	0.1361	10.8408	0.0000
MRT	0.6603	0.5877	2.5863	0.0100	0.6693	0.4984	5.8049	0.0000	0.6595	0.5791	2.6015	0.0097	0.6983	0.6307	3.8798	0.0001
RNT	0.2095	0.2807	-2.7955	0.0054	0.1979	0.3943	-6.9033	0.0000	0.2104	0.2878	-2.7443	0.0064	0.1673	0.2409	-5.0326	0.0000
VAL	1.5187	1.0500	8.4757	0.0000	1.5341	0.8693	10.8882	0.0000	1.5114	1.0204	8.1769	0.0000	1.6353	1.3896	4.9991	0.0000
DIC	0.9257	0.6342	14.4842	0.0000	0.9265	0.6044	16.4564	0.0000	0.9202	0.6267	14.0632	0.0000	1.0583	0.8165	13.6687	0.0000

	No financial stress	Financial stress	*tt*/Z-statistic	*p*-value	No financial stress	Financial stress	*t*/Z-statistic	*p*-value	No financial stress	Financial stress	*t*/Z-statistic	*p*-value	No financial stress	Financial stress	*t*/Z-statistic	*p*-value
RBP	0.3525	0.2822	0.2038	0.8385	0.3685	0.1281	0.6737	0.5006	0.3283	0.5264	-0.5231	0.6009	0.5747	0.2343	1.1005	0.2714
ROP	0.0487	0.0104	0.4349	0.6637	0.0477	0.0158	0.3510	0.7256	0.0467	0.0229	0.2465	0.8053	0.0181	0.0575	-0.6839	0.4941
RAL	0.0066	0.0073	-0.3570	0.7211	0.0070	0.0032	2.9068	0.0038	0.0070	0.0036	1.7635	0.0787	0.0069	0.0065	0.2982	0.7655
ROL	0.0024	0.0001	0.6914	0.4893	0.0023	0.0012	0.3318	0.7400	0.0023	0.0015	0.2055	0.8372	0.0050	0.0009	1.3047	0.1923
RMV	0.0584	0.0797	-0.8735	0.3825	0.0587	0.0787	-0.7972	0.4254	0.0622	0.0432	0.7118	0.4766	0.0514	0.0651	-0.8655	0.3868
RHL	0.0013	0.0004	2.4206	0.0158	0.0013	0.0006	1.8700	0.0620	0.0013	0.0003	2.7827	0.0056	0.0012	0.0012	-0.1508	0.8802
ROT	0.0157	0.0244	-1.8513	0.0649	0.0150	0.0311	-2.9864	0.0030	0.0161	0.0221	-1.2959	0.1960	0.0093	0.0201	-4.7977	0.0000
CRC	1.4833	1.0351	7.7868	0.0000	1.4947	0.8927	10.2659	0.0000	1.4799	0.9676	8.1562	0.0000	1.6053	1.3548	5.8035	0.0000

Notes: Means/proportions are for binary variables indicating no financial stress (control) or financial stress: living standard worse than two years ago (STD) - control is better or same as two years ago; cannot afford holiday (HOL) – control is either had a holiday or did not want a holiday for non-financial reason; cannot afford a night out once a fortnight (NTO) – control is either have a night out once a fortnight or do not want a night out for non-financial reason; cannot afford to have friends or family over for a meal once a month (FML) – control is either have friends or family over for a meal once a month or did not want to for non-financial reason; cannot afford to have a special meal once a week (SML) – control is either have a special meal once a week or did not want to for non-financial reason; household buys second hand clothes for financial reason (CLH) – control is either buy only brand new clothes or want to buy second hand clothes for non-financial reason; cannot afford to spend time on leisure/hobby activities (HOB) – control is either spend time on leisure/hobby activities or did not want to for non-financial reason; spend more money than we get (MGT) – control is just break even or save money most weeks. For the continuous variables (AGE, RES, INU, DEP, VAL, DIC, RBP, ROP, RAL, ROL, RMV, RHL, ROT, CRC) Levene's test for equality of variances determines whether the *t*-values and *p*-values for equality of means assume equal or unequal variances. (b) For the binary variables (CPO, CPY, CPB, LPO, LPY, LPB, SEX, DIV, MAR, OCE, EUR, MID, ASA, AMR, AFR, SEL, SUP, BEN, MRT, RNT) the *Z* and *p*-values are for differences between proportions.

TABLE 3 *Estimated logit regression models*

Variable	Estimated coefficient	Standard error	*p*-value	Marginal effect	Estimated coefficient	Standard error	*p*-value	Marginal effect	Estimated coefficient	Standard error	*p*-value	Marginal effect	Estimated coefficient	Standard error	*p*-value	Marginal effect	Estimated coefficient	Standard error	*p*-value	Marginal effect	Estimated coefficient	Standard error	*p*-value	Marginal effect
	Beginning model				Refined model				Beginning model				Refined model				Beginning model				Refined model			
	STD								HOL								NTO							
CONS.	-1.2115	0.2935	0.0000	0.2977	-1.2949	0.1936	0.0000	0.2739	-0.4816	0.2963	0.1041	0.6178	-0.1942	0.1492	0.1930	0.8235	-2.0882	0.3499	0.0000	0.1239	-1.9141	0.2379	0.0000	0.1475
CPO	0.3158	0.1776	0.0755	1.3713	–	–	–	–	0.3747	0.1835	0.0412	1.4545	0.3502	0.1587	0.0274	1.4193	-0.1594	0.2125	0.4531	0.8526	–	–	–	–
CPY	0.2047	0.1671	0.2204	1.2272	–	–	–	–	0.1290	0.1644	0.4329	1.1376	–	–	–	–	0.1542	0.1784	0.3874	1.1667	–	–	–	–
CPB	0.5981	0.2233	0.0074	1.8187	0.3432	0.1688	0.0420	1.4095	0.2507	0.2251	0.2654	1.2849	–	–	–	–	0.2737	0.2312	0.2365	1.3148	–	–	–	–
LPO	0.4109	0.2447	0.0930	1.5082	–	–	–	–	0.5737	0.2462	0.0198	1.7748	0.6136	0.2269	0.0069	1.8470	0.4462	0.2990	0.1356	1.5623	–	–	–	–
LPY	0.0338	0.2477	0.8916	1.0343	–	–	–	–	-0.0038	0.2419	0.9876	0.9962	0.9437	0.3832	0.0138	2.5696	0.0695	0.2690	0.7962	1.0720	–	–	–	–
LPB	0.0437	0.3998	0.9130	1.0446	–	–	–	–	0.8942	0.4138	0.0307	2.4453	–	–	–	–	0.1624	0.4106	0.6924	1.1764	–	–	–	–
SEX	-0.0183	0.0988	0.8533	0.9819	–	–	–	–	0.1120	0.0977	0.2520	1.1185	–	–	–	–	-0.1322	0.1124	0.2395	0.8762	–	–	–	–
AGE	0.0212	0.0242	0.3828	1.0214	0.0549	0.0189	0.0037	1.0564	-0.0020	0.0242	0.9348	0.9980	–	–	–	–	0.1051	0.0270	0.0001	1.1109	0.0946	0.0224	0.0000	1.0993
DIV	0.3209	0.1864	0.0852	1.3784	–	–	–	–	0.2951	0.1841	0.1089	1.3433	–	–	–	–	0.1263	0.2230	0.5712	1.1346	–	–	–	–
MAR	0.2638	0.1716	0.1244	1.3018	–	–	–	–	0.2851	0.1692	0.0919	1.3299	–	–	–	–	0.7148	0.2089	0.0006	2.0438	0.5653	0.1253	0.0000	1.7600
OCE	0.2116	0.3061	0.4895	1.2356	–	–	–	–	0.7074	0.2877	0.0139	2.0287	–	–	–	–	0.3605	0.3194	0.2592	1.4340	–	–	–	–
EUR	0.2524	0.1681	0.1333	1.2871	–	–	–	–	0.3746	0.1652	0.0234	1.4543	–	–	–	–	0.0238	0.1866	0.8986	1.0241	–	–	–	–
MID	1.1484	0.3863	0.0030	3.1530	0.8762	0.3439	0.0108	2.4018	1.9209	0.4269	0.0000	6.8272	1.3832	0.3948	0.0005	3.9875	1.1704	0.4144	0.0047	3.2234	0.9879	0.3706	0.0077	2.6856
ASA	-0.0104	0.2852	0.9708	0.9896	–	–	–	–	0.7399	0.2626	0.0048	2.0958	–	–	–	–	0.0512	0.3013	0.8651	1.0525	–	–	–	–
AMR	0.5188	0.4410	0.2394	1.6800	–	–	–	–	0.9527	0.4266	0.0255	2.5927	–	–	–	–	0.5403	0.4643	0.2445	1.7166	–	–	–	–
AFR	0.3181	0.5167	0.5382	1.3745	–	–	–	–	0.9340	0.4618	0.0431	2.5448	–	–	–	–	0.0651	0.5702	0.9091	1.0673	–	–	–	–
RES	-0.1356	0.0816	0.0967	0.8732	–	–	–	–	-0.1044	0.0755	0.1666	0.9009	0.1059	0.0406	0.0090	1.1117	-0.0870	0.0853	0.3078	0.9167	–	–	–	–
INU	0.3491	0.0912	0.0001	1.4178	0.3661	0.0782	0.0000	1.4421	0.3859	0.0949	0.0000	1.4710	0.3469	0.0883	0.0001	1.4146	0.2869	0.1109	0.0097	1.3323	0.2406	0.0997	0.0158	1.2720
DEP	0.0496	0.0587	0.3985	1.0509	0.1065	0.0404	0.0084	1.1124	0.2849	0.0569	0.0000	1.3297	0.3349	0.0376	0.0000	1.3978	0.4373	0.0595	0.0000	1.5485	0.4957	0.0420	0.0000	1.6417
SEL	-0.0779	0.1754	0.6568	0.9250	–	–	–	–	-0.3473	0.1785	0.0517	0.7066	–	–	–	–	-0.4703	0.1999	0.0186	0.6248	-0.4377	0.1976	0.0268	0.6455
SUP	0.5505	0.3020	0.0683	1.7342	–	–	–	–	0.4860	0.3165	0.1247	1.6257	–	–	–	–	-0.5914	0.4025	0.1418	0.5536	–	–	–	–
BEN	0.4439	0.1549	0.0042	1.5588	0.3661	0.1400	0.0089	1.4422	0.5292	0.1590	0.0009	1.6975	0.5863	0.1415	0.0000	1.7973	0.4262	0.1660	0.0102	1.5315	0.4110	0.1534	0.0074	1.5083
MRT	-0.0072	0.1340	0.9573	0.9929	–	–	–	–	0.0689	0.1399	0.6222	1.0714	–	–	–	–	0.2934	0.1585	0.0643	1.3409	0.2427	0.1160	0.0365	1.2747
RNT	-0.0994	0.1759	0.5720	0.9054	–	–	–	–	0.0963	0.1800	0.5924	1.1011	–	–	–	–	0.2172	0.2016	0.2814	1.2426	–	–	–	–
VAL	-0.0429	0.0456	0.3468	0.9580	–	–	–	–	-0.2117	0.0537	0.0001	0.8092	-0.2050	0.0407	0.0000	0.8147	-0.2166	0.0589	0.0002	0.8053	-0.2609	0.0543	0.0000	0.7704
DIC	-1.2771	0.1570	0.0000	0.2788	-1.1960	0.1352	0.0000	0.3024	-1.6879	0.1685	0.0000	0.1849	-1.5684	0.1532	0.0000	0.2084	-1.7655	0.1889	0.0000	0.1711	-1.6718	0.1746	0.0000	0.1879
RBP	-0.0102	0.0100	0.3108	0.9899	–	–	–	–	-0.0085	0.0090	0.3461	0.9916	–	–	–	–	0.0013	0.0075	0.8600	1.0013	–	–	–	–
ROP	-0.0287	0.0461	0.5334	0.9717	–	–	–	–	-0.4866	0.3283	0.1382	0.6147	–	–	–	–	-0.2328	0.2887	0.4199	0.7923	–	–	–	–
RAL	-1.3489	1.3011	0.2999	0.2595	–	–	–	–	-1.8930	1.3574	0.1631	0.1506	–	–	–	–	-0.5883	1.2550	0.6393	0.5553	–	–	–	–
ROL	0.6029	0.6924	0.3839	1.8274	–	–	–	–	0.9446	0.6853	0.1681	2.5719	–	–	–	–	-2.6428	3.4049	0.4377	0.0712	–	–	–	–
RMV	-0.0772	0.1060	0.4664	0.9257	–	–	–	–	-0.0339	0.1061	0.7491	0.9666	–	–	–	–	-0.1180	0.1172	0.3141	0.8887	–	–	–	–
RHL	-4.6094	4.8534	0.3423	0.0100	–	–	–	–	-4.6776	4.4896	0.2975	0.0093	–	–	–	–	-2.9637	5.1010	0.5612	0.0516	–	–	–	–

Variable	FML				SPM				CLH											
	Estimated coefficient	Standard error	*p*-value	Marginal effect	Estimated coefficient	Standard error	*p*-value	Marginal effect	Estimated coefficient	Standard error	*p*-value	Marginal effect	Estimated coefficient	Standard error	*p*-value	Marginal effect	Estimated coefficient	Standard error	*p*-value	Marginal effect	Estimated coefficient	Standard error	*p*-value	Marginal effect
ROT	0.2597	0.5680	0.6475	1.2965	–	–	–	–	0.1809	0.5718	0.7518	1.1983	–	–	–	–	-0.5800	0.6744	0.3899	0.5599	–	–	–	–
CRC	0.0407	0.0407	0.3182	1.0415	–	–	–	–	-0.1686	0.0422	0.0001	0.8449	-0.1678	0.0415	0.0001	0.8455	-0.0559	0.0463	0.2265	0.9456	–	–	–	–
L				-1663.0690				-1676.9730				-1657.5370				-1679.1470				-1418.8260				-1430.7450
RL				-1770.0050				-1770.0050				-1936.7880				-1936.7880				-1650.9950				-1650.9950
LR				213.8723				186.0644				558.5033				515.2824				464.3382				440.5003
R^2				0.0604				0.0526				0.1442				0.1330				0.1406				0.1334
HC				1.0626				1.0365				1.0592				1.0430				0.9131				0.8897
CONS.	-2.3629	0.6359	0.0002	0.0941	-2.5539	0.3151	0.0000	0.0778	-1.6577	0.4310	0.0001	0.1906	-1.2014	0.1834	0.0000	0.3008	-1.6924	0.4579	0.0002	0.1841	-1.4587	0.2271	0.0000	0.2325
CPO	0.7270	0.4139	0.0790	2.0688	–	–	–	–	-0.1898	0.2907	0.5138	0.8271	–	–	–	–	0.0623	0.3283	0.8495	1.0643	–	–	–	–
CPY	-0.0380	0.3936	0.9230	0.9627	–	–	–	–	0.0625	0.2335	0.7890	1.0645	–	–	–	–	0.1461	0.2596	0.5737	1.1573	–	–	–	–
CPB	0.2578	0.4837	0.5941	1.2940	–	–	–	–	-0.2047	0.3166	0.5180	0.8149	–	–	–	–	0.1079	0.3328	0.7459	1.1139	–	–	–	–
LPO	0.5786	0.4353	0.1838	1.7835	–	–	–	–	-0.4462	0.4363	0.3064	0.6400	–	–	–	–	-0.1822	0.3787	0.6305	0.8335	–	–	–	–
LPY	-0.1532	0.4254	0.7187	0.8579	–	–	–	–	-0.0337	0.3079	0.9130	0.9669	–	–	–	–	-0.0695	0.3025	0.8183	0.9329	–	–	–	–
LPB	1.2172	0.5152	0.0181	3.3775	1.2980	0.4232	0.0022	3.6621	0.4234	0.4451	0.3416	1.5271	–	–	–	–	-1.1173	0.5307	0.0352	0.3272	–	–	–	–
SEX	0.1552	0.2153	0.4711	1.1679	–	–	–	–	0.2458	0.1392	0.0775	1.2787	–	–	–	–	0.0849	0.1509	0.5737	1.0886	–	–	–	–
AGE	0.0522	0.0507	0.3028	1.0536	–	–	–	–	0.0581	0.0331	0.0790	1.0599	–	–	–	–	-0.0192	0.0358	0.5913	0.9810	–	–	–	–
DIV	-0.1749	0.3426	0.6098	0.8396	–	–	–	–	-0.1970	0.2567	0.4427	0.8212	–	–	–	–	0.4903	0.2579	0.0573	1.6328	–	–	–	–
MAR	-0.2225	0.3719	0.5497	0.8005	–	–	–	–	0.2375	0.2421	0.3264	1.2681	–	–	–	–	0.2312	0.2656	0.3839	1.2601	–	–	–	–
OCE	-0.0500	0.7222	0.9448	0.9512	–	–	–	–	-0.1135	0.4561	0.8034	0.8927	–	–	–	–	-0.5008	0.5064	0.3228	0.6061	–	–	–	–
EUR	0.2947	0.3623	0.4159	1.3428	–	–	–	–	0.0779	0.2432	0.7488	1.0810	–	–	–	–	-0.1776	0.2773	0.5218	0.8372	–	–	–	–
MID	1.8652	0.6096	0.0022	6.4575	1.4812	0.4704	0.0016	4.3981	1.0540	0.4766	0.0270	2.8691	0.8600	0.3937	0.0289	2.3631	-0.2710	0.6128	0.6583	0.7626	–	–	–	–
ASA	1.3540	0.5157	0.0086	3.8728	0.7886	0.3227	0.0145	2.2003	-0.0260	0.4045	0.9487	0.9743	–	–	–	–	-0.2944	0.4551	0.5176	0.7450	–	–	–	–
AMR	0.3512	1.0905	0.7474	1.4208	–	–	–	–	0.9270	0.5445	0.0887	2.5269	–	–	–	–	0.6789	0.6042	0.2612	1.9716	–	–	–	–
AFR	1.0538	1.1440	0.3570	2.8684	–	–	–	–	-0.7039	1.0803	0.5147	0.4947	–	–	–	–	0.5708	0.7480	0.4454	1.7697	–	–	–	–
RES	-0.2336	0.1677	0.1637	0.7917	–	–	–	–	-0.0988	0.1156	0.3931	0.9060	–	–	–	–	-0.0630	0.1272	0.6206	0.9390	–	–	–	–
INU	0.5990	0.1868	0.0013	1.8202	0.7340	0.1666	0.0000	2.0835	0.3042	0.1434	0.0339	1.3555	–	–	–	–	0.6847	0.1432	0.0000	1.9832	0.5714	0.1256	0.0000	1.7708
DEP	0.4083	0.1098	0.0002	1.5043	0.3310	0.0747	0.0000	1.3923	0.3574	0.0740	0.0000	1.4296	0.3425	0.0472	0.0000	1.4084	0.4791	0.0769	0.0000	1.6147	0.4852	0.0514	0.0000	1.6245
SEL	-0.8471	0.5372	0.1149	0.4287	–	–	–	–	-0.4896	0.2748	0.0748	0.6129	–	–	–	–	-0.5891	0.3045	0.0530	0.5548	–	–	–	–
SUP	-1.1432	1.0399	0.2716	0.3188	–	–	–	–	-0.4032	0.5081	0.4274	0.6682	–	–	–	–	-0.7001	0.6289	0.2656	0.4965	–	–	–	–
BEN	0.2997	0.2755	0.2766	1.3495	0.6326	0.2380	0.0079	1.8825	0.3633	0.1940	0.0611	1.4381	0.6495	0.1664	0.0001	1.9145	0.5181	0.2030	0.0107	1.6788	0.6168	0.1750	0.0004	1.8529
MRT	-0.1527	0.2980	0.6085	0.8584	–	–	–	–	0.0398	0.1973	0.8400	1.0406	–	–	–	–	0.1837	0.2301	0.4248	1.2016	–	–	–	–
RNT	0.2097	0.3753	0.5764	1.2333	–	–	–	–	-0.1366	0.2535	0.5901	0.8724	–	–	–	–	0.4556	0.2754	0.0980	1.5771	–	–	–	–
VAL	-0.3197	0.1624	0.0490	0.7264	-0.4277	0.1073	0.0001	0.6520	-0.2853	0.0889	0.0013	0.7518	-0.2054	0.0606	0.0007	0.8144	-0.1921	0.1005	0.0561	0.8253	-0.3708	0.0718	0.0000	0.6902
DIC	-2.8505	0.4950	0.0000	0.0578	-2.4201	0.4109	0.0000	0.0889	-1.8816	0.2689	0.0000	0.1523	-1.6012	0.2200	0.0000	0.2017	-2.4462	0.3181	0.0000	0.0866	-2.0631	0.2733	0.0000	0.1271
RBP	-0.1256	0.2813	0.6552	0.8820	–	–	–	–	-0.0052	0.0153	0.7337	0.9948	–	–	–	–	-0.4315	0.3399	0.2043	0.6495	–	–	–	–
ROP	-0.4095	0.8305	0.6220	0.6640	–	–	–	–	-0.6364	0.7096	0.3698	0.5292	–	–	–	–	-0.1483	0.3553	0.6764	0.8622	–	–	–	–
RAL	-0.8180	2.8440	0.7736	0.4413	–	–	–	–	0.0793	1.5994	0.9605	1.0825	–	–	–	–	-5.4529	2.7363	0.0463	0.0043				

Variable	Estimated coefficient	Standard error	*p*-value	Marginal effect	Estimated coefficient	Standard error	*p*-value	Marginal effect	Estimated coefficient	Standard error	*p*-value	Marginal effect	Estimated coefficient	Standard error	*p*-value	Marginal effect	Estimated coefficient	Standard error	*p*-value	Marginal effect	Estimated coefficient	Standard error	*p*-value	Marginal effect
ROL	-0.9813	0.8733	0.9869	0.0000	–	–	–	–	19.9563	17.222	0.2465	0.0000	–	–	–	–	-1.6248	4.1902	0.6982	0.1970	–	–	–	–
RMV	-0.2454	0.3704	0.5077	0.7824	–	–	–	–	-0.0264	0.1037	0.7994	0.9740	–	–	–	–	-0.0838	0.1151	0.4663	0.9196	–	–	–	–
RHL	-3.5214	10.473	0.7367	0.0296	–	–	–	–	13.0474	9.7466	0.1807	0.0000	–	–	–	–	-9.0003	8.8617	0.3098	0.0001	–	–	–	–
ROT	-0.2606	1.0668	0.8070	0.7706	–	–	–	–	-0.3551	0.7728	0.6459	0.7011	–	–	–	–	0.1579	0.7257	0.8278	1.1710	–	–	–	–
CRC	-0.0753	0.0954	0.4300	0.9274	–	–	–	–	-0.1099	0.0621	0.0766	0.8959	–	–	–	–	-0.2157	0.0694	0.0019	0.8060	-0.2177	0.0681	0.0014	0.8043
L				-460.5820				-472.6392				-950.6307				-970.6032				-837.7222				-856.4742
RL				-574.8880				-574.8880				-1095.3810				-1095.3810				-1040.6740				-1040.6740
LR				228.6120				204.4975				289.5015				249.5566				405.9028				368.3989
R^2				0.1988				0.1779				0.1321				0.1139				0.1950				0.1770
HC				0.3267				0.3008				0.6266				0.6017				0.5575				0.5331
				HOB								MGT												
CONS.	-1.4332	0.4730	0.0024	0.2385	-1.4826	0.2360	0.0000	0.2271	0.0062	0.2739	0.9818	1.0063	0.6475	0.1269	0.0000	1.9107								
CPO	0.3119	0.3020	0.3017	1.3661	–	–	–	–	0.1244	0.1603	0.4376	1.1325	–	–	–	–								
CPY	0.1868	0.2606	0.4735	1.2054	–	–	–	–	0.2340	0.1543	0.1296	1.2636	–	–	–	–								
CPB	0.1081	0.3447	0.7538	1.1142	–	–	–	–	0.6030	0.2341	0.0100	1.8276	–	–	–	–								
LPO	0.3950	0.3522	0.2620	1.4844	–	–	–	–	0.2513	0.2722	0.3559	1.2857	–	–	–	–								
LPY	-0.4930	0.3494	0.1583	0.6108	-0.6578	0.2820	0.0197	0.5180	-0.0301	0.2781	0.9138	0.9703	–	–	–	–								
LPB	-0.0035	0.4884	0.9942	0.9965	–	–	–	–	0.4178	0.5727	0.4657	1.5186	–	–	–	–								
SEX	0.0726	0.1541	0.6374	1.0753	–	–	–	–	0.1709	0.0921	0.0635	1.1864	–	–	–	–								
AGE	0.0163	0.0366	0.6569	1.0164	–	–	–	–	0.0238	0.0234	0.3097	1.0241	–	–	–	–								
DIV	0.1937	0.2769	0.4842	1.2137	–	–	–	–	0.2217	0.1827	0.2250	1.2482	–	–	–	–								
MAR	0.1998	0.2730	0.4643	1.2212	–	–	–	–	0.2836	0.1472	0.0541	1.3279	–	–	–	–								
OCE	-0.3219	0.5149	0.5318	0.7248	–	–	–	–	0.2072	0.2789	0.4577	1.2302	–	–	–	–								
EUR	0.1871	0.2542	0.4617	1.2057	–	–	–	–	0.1649	0.1577	0.2960	1.1792	–	–	–	–								
MID	1.1824	0.4840	0.0146	3.2623	1.0482	0.3997	0.0087	2.8527	1.3346	0.6351	0.0356	3.7986	–	–	–	–								
ASA	0.3682	0.3975	0.3542	1.4452	–	–	–	–	0.1543	0.2559	0.5465	1.1668	–	–	–	–								
AMR	0.6954	0.6179	0.2604	2.0044	–	–	–	–	0.0285	0.4385	0.9481	1.0289	–	–	–	–								
AFR	0.8238	0.7227	0.2543	2.2791	–	–	–	–	0.3856	0.4604	0.4023	1.4705	–	–	–	–								
RES	-0.0536	0.1150	0.6410	0.9478	–	–	–	–	-0.1479	0.0724	0.0411	0.8625	–	–	–	–								
INU	0.5140	0.1443	0.0004	1.6720	0.5169	0.1263	0.0000	1.6768	0.7031	0.0881	0.0000	2.0200	0.6729	0.0762	0.0000	1.9599								
DEP	0.3416	0.0800	0.0000	1.4073	0.3720	0.0534	0.0000	1.4506	0.3243	0.0622	0.0000	1.3830	0.4378	0.0392	0.0000	1.5492								
SEL	-0.7584	0.3319	0.0223	0.4684	-0.6995	0.3275	0.0327	0.4968	-0.1525	0.1645	0.3540	0.8586	–	–	–	–								
SUP	-0.1943	0.5237	0.7106	0.8234	–	–	–	–	-0.2156	0.3290	0.5122	0.8060	–	–	–	–								
BEN	0.3183	0.2102	0.1298	1.3748	0.3933	0.1887	0.0372	1.4819	0.4785	0.2055	0.0199	1.6137	0.5788	0.1907	0.0024	1.7838								
MRT	-0.0448	0.2200	0.8387	0.9562	–	–	–	–	0.1851	0.1295	0.1527	1.2034	–	–	–	–								
RNT	-0.1311	0.2756	0.6343	0.8771	–	–	–	–	0.6685	0.1741	0.0001	1.9514	0.2661	0.1043	0.0107	1.3049								
VAL	-0.3100	0.1015	0.0023	0.7335	-0.2042	0.0679	0.0027	0.8153	0.0721	0.0423	0.0886	1.0747	–	–	–	–								
DIC	-2.2306	0.3081	0.0000	0.1075	-2.0341	0.2741	0.0000	0.1308	-1.5948	0.1310	0.0000	0.2030	-1.4443	0.1093	0.0000	0.2359								

Notes: The beginning models are obtained by including all the independent variables in Table 1; the refined models are obtained by using forward stepwise regression using the Wald criterion on this model. *L* – log-likelihood, *RL* – restricted slopes log-likelihood, *LR* – likelihood ratio statistic; R^2 – McFadden R^2, HC - Hannan-Quinn criteria; marginal effects calculated at sample means.

Variable	Estimated coefficient	Standard error	*p*-value	Marginal effect	Estimated coefficient	Standard error	*p*-value	Marginal effect	Estimated coefficient	Standard error	*p*-value	Marginal effect	Estimated coefficient	Standard error	*p*-value	Marginal effect	Estimated coefficient	Standard error	*p*-value	Marginal effect	Estimated coefficient	Standard error	*p*-value	Marginal effect
RBP	-0.0001	0.0087	0.9921	0.9999	–	–	–	–	-0.0138	0.0095	0.1449	0.9863	-0.0145	0.0091	0.1089	0.9856								
ROP	-0.0424	0.1093	0.6981	0.9585	–	–	–	–	0.0124	0.0519	0.8110	1.0125	–	–	–	–								
RAL	-4.8015	2.7354	0.0792	0.0082	–	–	–	–	-0.9331	1.0806	0.3879	0.3933	–	–	–	–								
ROL	-0.2450	2.4084	0.9190	0.7827	–	–	–	–	-2.5638	2.5274	0.3104	0.0770	–	–	–	–								
RMV	-1.7011	0.8516	0.0458	0.1825	–	–	–	–	-0.0710	0.1137	0.5321	0.9314	–	–	–	–								
RHL	-	13.393	0.1406	0.0000	–	–	–	–	2.0337	4.0267	0.6135	7.6420	–	–	–	–								
ROT	-1.3962	1.1230	0.2138	0.2475	–	–	–	–	2.7855	1.0945	0.0109	16.208	2.9158	1.0987	0.0080	18.462								
CRC	-0.1826	0.0696	0.0087	0.8331	-0.1896	0.0685	0.0056	0.8273	-0.0127	0.0374	0.7330	0.9873	–	–	–	–								
L				-817.8579				-831.4921				-1832.3780				-1851.4310								
RL				-950.9042				-950.9042				-2062.1250				-2062.1250								
LR				266.0924				238.8241				459.4940				421.3888								
R^2				0.1399				0.1256				0.1114				0.1022								
HC				0.5453				0.5217				1.1662				1.1433								

TABLE 4. *Observed and predicted values for the logit models*

		Observed	Constant probability model			Refined model			Hosmer-Lemeshow	
			No	Yes	%	No	Yes	%	H-L	*p*-value
STD	No	2510	1928	582	76.81	2494	16	99.36	7.3706	0.4972
	Yes	758	582	176	23.19	734	24	3.17		
	Total	3268	2510	758	64.37	3228	40	77.05		
HOL	No	2354	1696	658	72.03	2209	145	93.84	8.0606	0.4276
	Yes	914	658	256	27.97	665	249	27.24		
	Total	3268	2354	914	59.71	2874	394	75.21		
NTO	No	2603	2073	530	79.65	2525	78	97.00	18.7162	0.0165
	Yes	665	530	135	20.35	581	84	12.63		
	Total	3268	2603	665	67.58	3106	162	79.83		
FML	No	3129	2996	133	95.75	3122	7	99.78	5.5866	0.6934
	Yes	139	133	6	4.25	136	3	2.16		
	Total	3268	3129	139	91.86	3258	10	95.62		
SPM	No	2926	2620	306	89.53	2914	12	99.59	4.2070	0.8380
	Yes	342	306	36	10.47	337	5	1.46		
	Total	3268	2926	342	81.26	3251	17	89.32		
CLH	No	2951	2665	286	90.30	2928	23	99.22	3.0701	0.9299
	Yes	317	286	31	9.70	293	24	7.57		
	Total	3268	2951	317	82.48	3221	47	90.33		
HOB	No	2990	2736	254	91.49	2984	6	99.80	10.5293	0.2298
	Yes	278	254	24	8.51	275	3	1.08		
	Total	3268	2990	278	84.43	3259	9	91.40		
MGT	No	1064	346	718	32.56	313	751	29.42	11.8736	0.1569
	Yes	2204	718	1486	67.44	187	2017	91.52		
	Total	3268	1064	2204	56.08	500	2768	71.30		

Notes: Observed is the number of No – no financial stress and Yes - financial stress responses in the sample; the probabilities in the constant probability model are the values computed from estimating a model that includes only an intercept term, and thereby corresponds to the probability of correctly identifying No and Yes responses on the basis of their proportion in the sample; the refined model corresponds to the refined model results in Table 3. H-L – Hosmer-Lemeshow test statistic. The null hypothesis for H-L is no functional misspecification. % - is the number of correct predictions for each response (i.e. No or Yes) as a percentage of the observed values for No and Yes; Total percent correct is the number of correct predictions (i.e. No and Yes) as a percentage of the total observed values for No and Yes.

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School of Economics and Finance

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