Present bias, self-control, and financial fragility[*]

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Abstract

Present bias is largely attributed to impulsivity and self-control issues. In this study, we empirically examine the relationship between present bias and financial fragility based on the short-term savings of households. Prior observational studies measure present bias using a double-barrelled question based on impulsivity and overspending. We construct and decompose a similar measure and show that impulsivity is not related to short-term saving in households. We report similar findings for a psychometrically validated self-control instrument. These results are robust to alternative measures of financial fragility and econometric models, and indicate that self-control and impulsivity do not explain short-term saving and financial fragility in households.

Keywords: Financial fragility; Present bias; Self-control; Household finance

1 Introduction

Financial fragility represents a state in which a household is unable to cover an unanticipated financial shock (Lusardi et al. 2011, Gathergood & Wylie 2018, Brunetti et al. 2016, Kleimeier et al. 2023). The prevalence of financial fragility has implications at both micro and macro levels. At the household level, financial hardship is related to poorer mental health (Rohde et al. 2016, Bialowolski et al. 2021, Butterworth et al. 2009, Lahelma et al. 2006, Mirowsky & Ross 1999, Frankham et al. 2020). At the macro level, financial fragility among households represents systemic risk to government and institutions (Mian & Sufi 2010, Davis 1995, Acemoglu et al. 2015, Tsomocos 2003). A large theoretical literature highlights several factors associated with the ability of a household to cover a financial shock, such as consumption insurance mechanisms (Cochrane 1991, Blundell et al. 2008), the precautionary saving motive (Kimball 1990, Deaton 1991, Carroll 1997), and life-cycle behaviours (Shefrin & Thaler 1988).

How prepared are households for financial shocks in practice? Many studies address this question based on the ability of a household to raise a small amount of money on short-notice (Lusardi et al. 2011, Brunetti et al. 2016, Gathergood & Wylie 2018), or the ability to repay debt (Jappelli et al. 2013, Ampudia et al. 2016). Kleimeier et al. (2023) also consider a subjective financial fragility indicator using a money management stress scale (Netemeyer et al. 2018). These studies reveal many households are unprepared for financial shocks, highlighting the role of household characteristics (Worthington 2004, Lusardi et al. 2011), financial literacy (Gathergood & Wylie 2018, Kleimeier et al. 2023), mortgage debt (Brunetti et al. 2016), and non-cognitive abilities (Kleimeier et al. 2023). Theory also suggests that behavioural characteristics play an important role. For example, the 'present bias' toward immediate consumption despite long-term preferences is related to lower savings (Ameriks et al. 2007). However, studies which explore the relationship between present bias and financial fragility are scarce. An exception is Gathergood & Wylie (2018), who find present bias is negatively related to choosing savings as a mechanism to cover a financial shock.

In this paper we shed new light on the relationship between financial fragility and present bias. We use survey data from a representative sample of Australian households which includes wealth information to measure household financial fragility, along with survey items to measure present

bias. Our main findings are that impulsivity and self-control, which are typically considered the underlying drivers of present bias, are unimportant to explaining financial fragility in households. We instead find much stronger effects for other factors such as time preferences, financial circumstances, financial literacy and risk aversion. We also report similar findings to Kleimeier et al. (2023) showing that low mastery affects financial fragility.

We make four new contributions to the literature on present bias and financial fragility. Our first contribution is to address a conceptual issue in prior studies that measure present bias using a single survey item based on impulsivity and overspending (Gathergood 2012, Gathergood & Weber 2017, Gathergood & Wylie 2018). We decompose a similar measure and find that while overspending increases the likelihood of financial fragility, impulsivity is unrelated. The different estimates imply that overspending and impulsivity do not necessarily "combine" to create a suitable proxy for present bias in the observational setting.

Our second contribution substitutes the single survey item for a more rigorous self-control scale to measure the underlying drivers of present bias. For this purpose, we use the Brief Self Control Scale (BSCS) as a more complete measure of impulsivity and self-control (Tangney & Baumeister 2004). The BSCS improves on a single survey item as it contains information on the dimensions and magnitude of self-control. Supporting our main finding above, self-control is also unrelated to financial fragility as it does not explain the liquid assets held by the household.

Our third contribution addresses a methodological limitation in prior studies on financial fragility by more explicitly tackling endogeneity issues. We employ both instrumental variable and panel regression models to better control unobserved heterogeneity. This approach addresses a salient design issue in prior studies that rely on a single survey item, namely that present bias (if partly measured by overspending) endogenously arises with financial fragility.

Our fourth contribution is to examine the financial fragility of Australian households. Prior studies have been performed in the US (Lusardi et al. 2011), UK (Gathergood & Wylie 2018), and Italy (Brunetti et al. 2016). These studies show that the incidence of financial fragility differs across countries. To our knowledge, we are the first to examine the relationship between present bias and financial fragility in Australian households and show that fewer Australian households are financially

fragile compared to households in other countries.

Our paper proceeds as follows. Section 2 briefly surveys related research on financial fragility. Section 3 introduces the data set and describes the econometric modelling strategy. Section 4 presents and discusses the results, and conducts robustness checks. Lastly, Section 5 concludes the study and outlines limitations and suggestions for future research.

2   Related literature

Several empirical studies examine the prevalence and determinants of financial fragility in households. Lusardi et al. (2011) examine financial fragility based on the ability to raise $2,000 within thirty days. They find approximately a quarter of US households could not raise the funds. Additionally, their study explores alternative coping methods, such as selling possessions, relying on social networks, or borrowing from a bank. Gathergood & Wylie (2018) use a similar survey question to examine the financial fragility of UK households, and find around one fifth had no plan when asked how they would come up with the funds. They also find evidence that life-cycle characteristics, behavioural traits, and financial literacy are related to the choice of coping method. Brunetti et al. (2016) use an objective measure of financial fragility based on reported wealth and income, thereby addressing subjectivity bias in survey measures used in prior studies. They find portfolio choices, particularly homeownership, influences financial fragility among Italian households.

A separate strand of literature examines financial fragility using debt-based measures instead. Jappelli et al. (2013) constructs a measure based indebtedness and the likelihood of insolvency. They find a positive correlation across multiple countries supporting a financial fragility hypothesis that more indebted households tend to be more financially fragile.[1] Along similar lines, Ampudia et al. (2016) construct a measure using the financial margin of the household, capturing the ability to repay debt. Using micro-level data, they examine the metric across multiple Euro-area countries and find that households are financially resilient. Davis (1995) also constructs a measure of personal indebtedness to measure financial fragility.

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[1] Jappelli et al. (2013) is based on aggregate data, unlike the previously mentioned studies.

Financial fragility is also measured subjectively. Kleimeier et al. (2023) examines financial fragility during the COVID-19 pandemic, using a survey question similar to Lusardi et al. (2011) to measure objective financial fragility, and a money management stress scale by Netemeyer et al. (2018) to measure *subjective* financial fragility.[2] The authors primarily examine the role of financial literacy and non-cognitive abilities on financial fragility across four countries, and find negative experiences during the pandemic are positively related to financial fragility, but these effects are moderated by financial literacy and an internal locus of control. Also studying the pandemic period, Clark et al. (2021) find approximately one fifth of older households aged between 45 - 75 are financially fragile, but financially literate households are better able to cope with financial shocks during this period.

Fewer studies examine the role of behavioural traits on financial fragility. A particularly strong theoretical candidate is present bias, which is the tendency for individuals to prefer immediate gratification relative to their long-run preferences (Laibson 1997). Present bias is thus usually framed as an issue of self-control (Gathergood & Weber 2017, Ameriks et al. 2007). This bias is related to lower wealth accumulation, particularly liquid assets which can be easily accessed (Ameriks et al. 2007), and other financial behaviours, such as credit card debt and pay-down (Kuchler & Pagel 2021, Meier & Sprenger 2010, Gathergood 2012), mortgage product choice (Gathergood & Weber 2017), and retirement saving (Angeletos et al. 2001). Particularly relevant to our study is Gathergood & Wylie (2018) who find present bias is negatively related to selecting savings as a coping mechanism to cover a financial shock, and Strömbäck et al. (2017) who find low self-control is negatively related to saving behaviour.

Overall, multiple factors are related to financial fragility in households including demographics, financial circumstances, financial literacy, homeownership, indebtedness, and non-cognitive abilities. Importantly, some studies find self-control issues decrease household saving. Financial fragility is measured using survey questions asking households if they could raise a small amount of money, or based on their indebtedness. Alternatively, measures based on reported wealth are used to address subjectivity bias, while money management stress is proposed as a distinct form of financial fragility.

Our study aims to examine the relationship specifically between present bias and financial fragility,

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[2]Lusardi et al. (2011) and Brunetti et al. (2016) both consider the objective measure in Kleimeier et al. (2023) as subjective, given responses are likely affected by subjectivity bias.

which is relatively less explored in prior empirical work. As discussed above, the diversity of proxies to capture financial fragility highlight the importance of selecting a suitable proxy. A key contribution of our study is to construct several proxies for financial fragility (and present bias), and to examine their relationship in a representative sample of households. Our primary research question is as follows: does present bias explain financial fragility in households?

3 Data and methodology

3.1 Survey data

We employ the Household Income and Labour Dynamics Survey (HILDA) Survey for our analysis, which is a nationally representative longitudinal survey of Australian households conducted annually since 2001 (Summerfield et al. 2021, Wooden & Watson 2007). The survey collects information on a range of topics including household demographics, income, employment, health, and finances. There are three advantages to using the HILDA data. First, the data contains survey questions to construct subjective measures of financial fragility (Lusardi et al. 2011, Kleimeier et al. 2023), along with reported wealth to construct measures less susceptible to subjectivity bias (Brunetti et al. 2016). Second, the data contains a rich set of demographic, financial, and behavioural variables which can be used to control for confounding factors. Third, the survey has a large sample size which is representative of the Australian population. We use the 2018 wave of the survey which contains detailed information on household assets and liabilities.[3]

3.2 Measuring present bias

We first address the salient issue of how present bias is measured in the observational setting. Prior studies use a survey item based on impulsivity and spending behaviour. Specifically, it is the respondent's level of agreement with the statement "I am impulsive and tend to buy things even when I can't really afford them" (Gathergood 2012, Gathergood & Weber 2014, 2017, Gathergood & Wylie 2018). This survey item captures the preference for instant gratification despite it being

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[3]The HILDA Survey includes a wealth module every four years.

suboptimal.[4] Our data lacks an identical survey item, therefore we construct a similar proxy based on two available items. The first is the respondents level of agreement with the statement "I am impulsive" which is measured on a 7-point Likert scale, where 1 is "strongly disagree" and 7 is "strongly agree". A dummy variable is coded 1 if the respondent agrees or strongly agrees with this statement. The second item asks the respondent to pick a statement that best describes their saving habits. We code a dummy variable as 1 if the respondent selects a statement which indicates they spend all or more than their income (other available statements suggest that the respondent is saving). We then construct a present bias dummy variable if the respondent is impulsive ($= 1$) and spends all or more than their income ($= 1$). This dummy variable is conceptually similar to the single survey item used in prior studies as it jointly captures impulsivity and overspending.[5]

The present bias measure as described has two issues we aim to address in this study. First, a single survey item lacks interpretability on whether a respondent is impulsive, overspending, or both (Krosnick 2018). Given we construct this measure based on impulsivity and overspending separately, we are also able to examine the effect of each component on financial fragility. This approach allows us to examine whether the effects of impulsivity and overspending are distinctly related to financial fragility. Second, the binary classification is also a limitation, as the functional form of present bias is typically denoted by an open interval (O'Donoghue & Rabin 2015). Moreover, a binary classification lacks information on the magnitude and dimensions of impulsivity which is considered itself a dimension of self-control (Maloney et al. 2012).

To address these issues, we also construct another proxy using the Brief Self Control Scale (BSCS) developed by Tangney & Baumeister (2004). The BSCS measures "the ability to override or change one's inner responses, as well as to interrupt undesired behavioral tendencies and refrain from acting on them" (Tangney & Baumeister 2004, p.274). A large body of psychology literature tests the internal consistency and retest reliability of the BSCS, which is shown to relate to several life outcomes (Inzlicht et al. 2021, Tangney & Baumeister 2004). The BSCS gives a respondent a value between 13 - 65, where 13 is the lowest level of self-control and 65 is the highest. We convert this

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[4]The survey item reflects the behavioural lifecycle depiction of self-control as being an internal conflict. The first statement (impulsivity) reflects the "doer" and the second statement recognizes overspending as suboptimal, reflecting the "planner" (Shefrin & Thaler 1988).

[5]The proxy is referred to as *impulsive spender* in Gathergood (2012) and Gathergood & Weber (2014), and *present bias* in Gathergood & Weber (2017) and Gathergood & Wylie (2018). We refer to this variable as *impulsive and overspending* to elucidate each component.

to a value between 1 - 13 for simpler interpretation.[6] In our view, this variable is a more rigorous proxy for the self-control problems commonly associated with present bias (Gathergood & Weber 2017).

3.2.1 Additional controls

Financial fragility can be explained by numerous factors outlined in the literature review. This section discusses the additional controls included in our analysis. We first include *financial literacy*, which is related to financial behaviours and outcomes, including financial fragility (Lusardi & Mitchell 2014). We construct a variable based on five questions related to interest rates, inflation, diversification, risk, and money illusion (Preston & Wright 2019). A dummy variable is coded 1 if a respondent answers all questions correctly. We next include *risk aversion* for its theoretical relevance in standard precautionary saving models (Carroll 1997). We use a survey item that asks how much financial risk a respondent is willing to take. Available responses are on a scale of 1 to 4, where 1 is the most risk averse. We construct a dummy variable if a respondent is not willing to take any financial risks. Next, we include a measure to capture *financial inattentiveness* which is constructed from a 7-point Likert scale item based on the level of agreement with the statement "I keep a close personal watch on my financial affairs". We also measure time preferences, based on *planning horizon*. This item asks a respondent to select the most important time horizon for spending and saving decisions. A response takes a value between 1 - 6 and increases with the planning horizon duration, where 1 is the next week and 6 is more than ten years ahead.

Prior studies also highlight the role of non-cognitive abilities and personality traits in predicting saving behaviour and financial fragility. Kleimeier et al. (2023) find the locus of control mitigates financial fragility during the COVID-19 pandemic. We therefore include a variable for *low mastery*, which is conceptually similar. Mastery is represented by a 7-item scale measuring the degree to which a respondent believes their life is under their control (Pearlin & Schooler 1978).[7] A dummy variable is coded 1 if a respondent has a score below 21, which is used as a cut-off point for low mastery in

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[6]We note that this variable is coded in the opposite direction to impulsivity. A higher score indicates higher self-control.

[7]The mastery scale items are typically on a 4-point scale, but a 7-point scale is used in our data. We rescale these items to 4-point scales to provide a value between 7 - 28 for each respondent.

prior studies (Crowe et al. 2016). Next, we include a variable that captures *motivation* which could plausibly influence saving behaviour. This scale contains 9 items such as "I have many aspirations" and "I always look out for opportunities for improving my situation" (Kempson et al. 2013). We also include a measure for one of the big-five personality traits, namely *conscientiousness*, which is particularly relevant to saving behaviour (Goldberg 1990, Ameriks et al. 2007). This variable is a 7-item scale measuring the degree of conscientiousness.

Lastly, we include demographic characteristics, which are age, sex, education, marital status, presence of children, and foreign-born. We also include variables related to financial circumstances, which are net worth, income, and mortgage debt.

3.3   Measuring financial fragility

Financial fragility is measured differently across the literature. For our baseline measure we use the ability of a household to cover an emergency expense equal to one month's income (Gathergood & Wylie 2018). We calculate if a household meets this measure by summing liquid assets which includes cash, bank balances, equities and trusts.[8] However, this proxy requires an atheoretical threshold at which a household is no longer financially fragile.[9] To address this issue, we also construct a measure using the log ratio of liquid-assets to income. This measure removes the threshold and assumes financial fragility decreases as liquid assets grow. A possible objection to this approach is that we do not consider additional mechanisms households could use to insure future consumption shocks, for example borrowing from banks or relatives (Gathergood & Wylie 2018, Lusardi et al. 2011). However, we note that savings are the most common mechanism selected by households to cover a financial shock (Lusardi et al. 2011). Furthermore, asset to income ratios are used by others to capture financial fragility (Christelis et al. 2009), and are likely measured with less error than survey responses (Bertrand & Mullainathan 2001, Jahedi & Méndez 2014, Brunetti et al. 2016). The two financial fragility measures are given by:

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[8] Liquid assets are defined similarly in the precautionary saving literature. See, for example, Carroll & Samwick (1998). Alternatively, we could measure if a household is able to raise a few thousands dollars (Lusardi et al. 2011). In our robustness checks, we estimate additional regression models using this measure. The results are presented in Table A3 and A4.

[9] Lusardi et al. (2011) notes that the threshold (i.e. a few thousand dollars) is below what is recommended by many financial advisors (p. 6).

$$FF = \begin{cases} 1 & \text{if } LA \geq \frac{Y_t}{12} \\ 0 & \text{otherwise} \end{cases} \tag{1}$$

$$FF^* = \log\left(\frac{LA}{Y_t}\right) \tag{2}$$

where Y_t is household income in year t, and LA is liquid assets.

3.4 Sample selection

The sample is collected using the 2018 wave of the HILDA Survey. We impose the following restrictions on the sample. First, we remove observations with missing data for any of the variables described in the previous section. Second, we remove extreme observations by excluding households with an income, or net worth, more than 3 standard deviations from the mean. This restriction reflects our interest in the typical household, in the spirit of Campbell (2006). Lastly, we restrict the sample to those aged between 18 - 65 to include working age households only where we do not expect large drops in income or consumption associated with retirement (Battistin et al. 2009). The final sample consists of 6,692 observations. Table A1 provides a summary of the sample selection process. Our main analysis focuses on the 2018 wave, however we also collect data from the 2010 and 2014 waves to construct a panel data set which we discuss in the next section.

3.5 Econometric models

Prior studies on financial fragility estimate multivariate regression models that predict a binary financial fragility measure using cross-sectional data (Lusardi et al. 2011, Gathergood & Wylie 2018, Brunetti et al. 2016). We follow this approach for our baseline model using the 2018 wave as a cross-section. We estimate the following probit regression model to predict the financial fragility measure specified in Equation (1):

$$P(FF_i = 1 \mid \mathbf{X}'_i, PB_i) = \Phi\left(\beta_1 \mathbf{X}'_i + \beta_2 PB_i\right) \tag{3}$$

where FF_i is the financial fragility dummy variable for respondent i taking a value of 1 if the respondent has more than 1-month of income in liquid assets, Φ is the standard normal cumulative distribution function, $\mathbf{X}'$ is a vector of control variables, and PB is the present bias (i.e. impulsive and overspending) of the respondent. Thus, β_2 in Equation (3) is the parameter of interest and a negative estimate indicates that present bias is associated with a lower likelihood of meeting the threshold (i.e. increases the likelihood of financial fragility).

Decomposing present bias

We extend the model specified in Equation (3) by decomposing PB into its underlying components (impulsivity and overspending), and substituting these components for PB, which gives the following model:

$$P(FF_i = 1 \mid \mathbf{X}'_i, I_i, OS_i) = \Phi\left(\beta_1 \mathbf{X}'_i + \beta_2 I_i + \beta_3 OS_i\right) \tag{4}$$

where I is the impulsivity component, and OS is the overspending component. In Equation (4), β_2 and β_3 are the parameters of interest. A negative estimate for both parameters indicates that impulsivity and overspending are each associated with a lower likelihood of meeting the threshold.

Substituting self-control

Finally, we substitute a self-control measure (the BSCS) as a more robust proxy for present bias in Equation (3). We then examine the relationship between self-control and a less restrictive measure of financial fragility provided earlier in Equation (2) by estimating the following model:

$$FF_i^* = \beta_0 + \beta_1 \mathbf{X}'_i + \beta_2 SC_i + \epsilon_i \tag{5}$$

where SC is self-control of the respondent measured by the BSCS. Equation (5) is a linear regression model as it predicts a continuous measure of financial fragility and β_2 is the parameter of interest. A

positive estimate indicates that self-control is associated with a higher level of liquid assets relative to income, and a lower level of financial fragility.

3.5.1 Treating self-control as an endogenous regressor

Lewbel 2SLS approach

Equation (5) is our preferred model as it predicts a less restrictive measure of financial fragility and uses the BSCS as a more rigorous measure of self-control. However, self-control may arise endogenously with financial fragility through unobserved factors. We address this potential issue in two ways. Our first approach uses an instrumental variable method suggested by Lewbel (2012), where an instrument is constructed by exploiting heteroskedasticity in the data. The instrument is used in a two-stage least squares (2SLS) framework to obtain a consistent estimate for the self-control regressor. The 2SLS model is given by:

$$FF_i^* = \alpha + \beta_1 \mathbf{X'}_i + \beta_2 SC_i^* + \epsilon_i$$
$$SC_i^* = \alpha + \beta_1 \mathbf{X'}_i + \beta_2 Z_i + \epsilon_i$$

$$(6)$$

where Z is the instrument constructed using the Lewbel (2012) approach, and SC^* is the predicted self-control measure from the first-stage regression.[10]

Fixed-effects model

Our second approach exploits the panel structure of the HILDA survey by estimating a fixed-effects regression model to control time-invariant heterogeneity. The primary issue with this approach is that the BSCS is only available in the 2018 wave. A possible solution is to assume self-control is stable, in which case any effect is absorbed by the model intercept and gives little insight into the relationship between self-control and financial fragility over time.[11] An alternative solution is to predict self-control with a model estimated on the 2018 wave and extrapolate the predicted

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[10]Specifically, we use log net worth to construct the instrument. As noted by Lewbel (2012), the instrument can be constructed from a subset of $\mathbf{X'}$ (p. 67). We utilize the REndo R package (Gui et al. 2023) to estimate this model.

[11]Self-control is often considered a stable behavioral tendency (relative to others) and is established in childhood (Gottfredson & Hirschi 1990, Vazsonyi & Huang 2010). Therefore, one could argue that the time-invariant assumption is not completely unfounded.

self-control values to all waves. We choose to employ the latter approach by taking the following steps. First, we use 2018 wave to construct an OLS model to predict self-control.[12] Second, we use the predicted self-control values given by the model to impute self-control in the 2010, 2014, and 2018 waves. Finally, we estimate a fixed-effects model to predict liquid assets using the imputed self-control values from the model above. The fixed-effects model is given by:

$$FF_{it}^* = \alpha + \beta_1 \mathbf{X}'_{it} + \beta_2 SC_{it}^* + \gamma_i + \epsilon_{it} \tag{7}$$

where i indexes the individual, t indexes the time period, γ_i is the individual fixed effect, and SC^* is the imputed self-control value from the OLS model described above.

4   Summary statistics

Table 1 shows the summary statistics of the sample. The average age is 44, while 52 percent are female, 60 percent are married, 54 percent have children, and 18 percent are foreign-born. Approximately 35 percent hold a bachelors degree or above. Regarding financial characteristics, the average household net worth is \$800,754 and the average household income is \$129,024. The majority of the sample are also home-owners with 56 percent holding mortgage debt. The behavioural factors show that a minority of the sample (43 percent) are risk averse, indicating they are not willing to take any financial risks. A relatively high proportion of the sample (65 percent) answered all five financial literacy questions correctly and are coded as financially literate, while 6 percent are coded as inattentive to their finances. The sample has an average planning horizon score of 3, which corresponds to a planning horizon approximately 1 year ahead. The present bias measure used in prior studies (impulsive and overspending) shows that 4 percent of the sample are coded as present-biased, however decomposing this measure reveals that 28 percent are impulsive but only 21 percent are overspending.

The non-cognitive traits show that the average self-control score is 9.14 from a possible range

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[12]Table A7 presents the estimates for the model which predicts self-control. The explanatory power of the model ($R^2 \approx 0.37$) is comparable to similar models, such as Cobb-Clark et al. (2019).

between 1 - 13. Regarding the degree of control one feels they have over their life, 34 percent are coded as having low mastery (i.e. low control), and the average motivation score is 6.45 from a possible range of 1 - 9. Lastly, the average conscientiousness score is 5.18 from a possible range of 1 - 7.

[Insert Table 1 about here]

4.0.1 Financial fragility statistics

Figure 1 shows the distribution of each financial fragility measure. Most of the sample are not financially fragile according to the first measure, which shows that 64 percent hold liquid assets equal or greater than one month of income. This proportion is broadly comparable to Gathergood & Wylie (2018), who found approximately 52 percent of UK households would use their savings to raise this amount, although they use a survey response rather than reported liquid assets. Our second measure of financial fragility, the log ratio of liquid assets to income, has an average of 0.83, which is approximately ten and a half months of household income. Respondents thus holds more liquid assets than financial fragility thresholds used in prior studies, on average.

[Insert Figure 1 about here]

Table 2 presents summary statistics split by holding liquid assets equal or greater than one month of income (our first financial fragility measure). There are notable patterns in our sample. Financially fragile respondents are typically younger, foreign-born, do not hold bachelor degrees and are poorer overall. Risk averse respondents are also more likely to be financially fragile, as are those not financially literate and with shorter planning horizons. Regarding non-cognitive traits, financially fragile respondents tend to have low mastery, motivation and conscientiousness scores. Looking at the variables of interest in this study, financially fragile respondents are more likely to be impulsive and overspending (i.e. present biased). However, when examining each component separately, financially fragile respondents have *lower* impulsivity but higher overspending. Financially fragile respondents also have lower self-control as measured by the BSCS.

5 Results

5.1 Baseline regression results

Table 3 presents the regression estimates for the relationship between the single present bias measure (impulsive and overspending) and holding at least 1-month of income in liquid assets. Model 1 shows estimates for the baseline model including demographic variables only. Age and education are both positive and statistically significant, confirming that older and more educated respondents are less likely to be financially fragile. Other demographic factors show no relationship to financial fragility. Model 2 includes financial characteristics, and highlights the importance of financial circumstances (e.g. net worth) in mitigating financial fragility. Income is not related to financial fragility, while holding mortgage debt is negatively related.[13] The latter result supports the findings by Brunetti et al. (2016) that financial fragility is related to the illiquidity of housing as a financial asset. In our model, the marginal effects imply that holding a mortgage reduces the probability of holding liquid assets greater than one-month of income by 10 percentage points.

Model 3 further includes behavioural characteristics. Risk averse respondents are more likely to be financially fragile. The coefficient estimate is large, implying that the likelihood of holding 1-month of income in liquid assets decreases by 8 percentage points in the presence of risk-aversion. Planning horizon shows a positive coefficient estimate, which is consistent with the theoretical expectation that low time preferences reduce saving. Model 4 is the full model specification which includes non-cognitive traits. The estimates show that low mastery decreases the probability of holding liquid assets equal to at least one-month of income by 4 percentage points, and supports Kleimeier et al. (2023), who find a similar relationship between financial fragility and the external locus of control. Conscientiousness also slightly lowers the probability of financial fragility.

The parameter of interest for our study captures impulsivity and overspending (i.e. present bias),

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[13]The income estimate partly reflects how the proxy is calculated, as liquid-assets to income increases when income *reduces.*

which at -0.35 is negative and statistically significant at the 1 percent level. The marginal effects imply that present bias decreases the probability of holding one-month of income in liquid assets by 11 percentage points. This estimate is smaller than reported by Gathergood & Wylie (2018) who find a 25.4 percentage point likelihood reduction using a UK sample.[14] There are at least two plausible explanations for this difference. First, our measure of financial fragility is based on reported liquid assets, which may be less affected by measurement error. Second, the survey question in Gathergood & Wylie (2018) asks respondents to specify the "main" way they would cover a financial shock, which leaves open the possibility that a respondent would use savings to cover only part of the shock.

[Insert Table 3 about here]

5.2   Present bias - impulsivity or overspending?

The baseline regression estimates indicate that present bias decreases the likelihood of holding 1-month of income in liquid-assets (i.e. increases the likelihood of financial fragility). As discussed earlier in this paper, the present bias measure can be decomposed in to two parts: impulsivity and overspending and examined separately. We substitute these two parts for the single measure used in the baseline model.

Table 4 presents the results for the model specified in Equation (4). Model 1 includes impulsivity only. The estimates fail to show that impulsivity is related to financial fragility. In fact, the sign is positive indicating that impulsivity increases the likelihood of holding 1-month of income in liquid assets, although the relationship is not statistically significant. Model 2 adds the overspending dummy to the model. Here, overspending expectedly decreases the likelihood of holding 1-month of income in liquid assets by approximately 18 percentage points based on the marginal effects. The variable may be endogenous, however, as financially fragile households are also more likely to overspend which is not addressed in this model specification. The opposite coefficient signs for impulsivity and overspending suggests that each is related differently to financial fragility. The

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[14]We compare our results to Table 3 (Gathergood & Wylie 2018) as our financial fragility measure is based on reported savings.

impulsivity estimate is especially counter-intuitive given the positive sign.

[Insert Table 4 about here]

In Model 3 we explore this relationship further by also adding an interaction term in the model. This term allows us to examine if overspending is a channel in which impulsivity relates to financial fragility. Here, the interaction term measures the change in the effect of impulsivity on holding 1-month of liquid assets for overspending respondents. The interaction term is similarly counter-intuitive as the positive sign implies that impulsivity and overspending interact to *further* increase the likelihood of holding 1-month of income in liquid assets.[15]

5.3   Are underlying self-control problems important?

Our study has failed to find evidence of a relationship between impulsivity and financial fragility, but the shortcomings of the measures used so far prompt us to substitute them with more rigorous and less restrictive proxies. The BSCS may serve as a more suitable proxy for present bias, given the bias reflects underlying self-control issues (Gathergood & Weber 2017). The summary statistics also show a lower average self-control score in the sample with less than \$3,000 in liquid assets and suggests a possible relationship to financial fragility. Therefore, for our next exercise, we substitute the previous present bias proxy with the BSCS (Tangney & Baumeister 2004).[16] Regarding financial fragility, we substitute the 1-month income threshold with log liquid-assets to income, which is a less restrictive measure of financial fragility.

Table 5 presents the estimates for the model given in Equation (5).[17] We expect the coefficient sign for self-control to be positive, indicating that higher self-control is related to liquid-assets. We present three models for this analysis. Model 1 presents baseline OLS estimates, Model 2 presents

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[15]Table A2 presents correlation coefficients for the impulsivity dummy and shows that it does not correlate in an intuitive way to other variables in the model. For comparison, the table also present the correlation coefficients for the self-control variable (BSCS).

[16]The BSCS also contains items related to impulsivity such as "Sometimes I can't stop myself from doing something, even if I know it is wrong". Maloney et al. (2012) find the BSCS measures two factors: restraint and impulsivity which we consider in our robustness checks.

[17]We note the dependent variable and variable of interest are substituted for this regression. We also present probit regression estimates for the relationship between self-control and holding 1-month of income in liquid-assets (as in previous models) in Table A3. The estimates show similar results to those presented in this section.

2SLS estimates using the Lewbel (2012) IV approach to address potential endogeneity of the self-control regressor, and Model 3 presents estimates from a fixed-effects panel regression using three waves of the HILDA Survey. Full regression results are presented in Table A4 for completeness.

[Insert Table 5 about here]

The OLS estimates presented in Model 1 show a very small positive estimate for self-control, which is not statistically significant. The 2SLS estimates in Model 2 show a larger positive coefficient which is also not statistically significant. The choice to rely on the OLS or IV estimates is informed by the following diagnostics. The F statistic is 12.61 and above the standard threshold of 10 indicating the instrument is sufficiently related to self-control in the first stage (Stock & Yogo 2002). The Wu-Hausman test, however, fails to reject the null hypothesis that the IV estimates are equally consistent to the OLS estimates, therefore the OLS estimates are preferred to the IV estimates for their relative efficiency. Lastly, Model 3 presents the fixed-effects panel regression estimates and shows a similarly weak coefficient. In this model, the coefficient is slightly negative and is also not statistically significant.

Figure 3 shows regression paths for selected variables. This figure provides a visual display by which to compare the effect of self-control on liquid assets, to other variables in the model. Each plot represents the effect by calculating predicted values across values of each predictor, holding everything else in the model equal (Fox & Weisberg 2018). Self-control is displayed as the variable of interest, despite not showing a statistically significant relationship. For comparison, regression paths are also displayed for net worth (log), mortgage debt, risk aversion, planning horizon, low mastery, motivation, financial literacy, and conscientiousness. The figure demonstrates the weak relationship between self-control and financial fragility when compared to other variables. Net-worth, planning horizon, motivation, financial literacy, and conscientiousness are positively related to liquid-assets. On the other hand, risk aversion, mortgage debt, and low mastery are negatively related. The flatness of the self-control regression path demonstrates that self-control is not a strong predictor of financial fragility.

[Insert Figure 3 about here]

5.4 Robustness checks

In this section, we estimate additional models to check the robustness of our main finding that self-control (the underling driver of present bias) is weakly related to liquid assets and financial fragility. Our first checks employ alternative measures of financial fragility used by prior studies based on survey questions and different threshold amounts. Our second set of checks estimate the model on sub-samples where the relationship between self-control and financial fragility may be stronger. For this check, we examine sub-samples based on net worth, home-ownership, and age. Finally, we split the BSCS into two factors based on impulsivity and restraint as proposed by Maloney et al. (2012) and examine the relationship between each factor and financial fragility. We also test if the results hold for a shortened version of the BSCS used by Strömbäck et al. (2017).[18]

5.4.1 Alternative financial fragility measures

We use the reported wealth of households to construct the financial fragility measures in our analysis. Prior studies, however, also measure financial fragility using a survey question asking respondents how difficult it would be to raise a small amount of funds on short-notice. In this section, we test the robustness of our results to this type of measure, along with two additional measures used in the literature.

The first measure we construct from a survey item which asks: "Suppose you had only one week to raise $3000 for an emergency. Which of the following best describes how hard it would be for you to get that money". A similar survey question is used in several prior studies (Lusardi et al. 2011, Clark et al. 2021, Kleimeier et al. 2023, Worthington 2004). Available responses are: (a) I could easily raise the money, (b) I could raise the money but it would involve some sacrifices, (c) I would have to do something drastic to raise the money, and (d) I don't think I could raise the money. Respondents are then asked a follow-up question about where they would get this money from. Answers available to the respondent are: (a) use savings, (b) borrow from a relative that lives with you, (c) borrow from a relative that lives else where, (d) borrow from a friend, (e) borrow

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[18]We also include results for an extreme bounds analysis (Leamer 1985) in Table A8. The extreme bounds analysis is a type of uncertainty analysis that examines the sensitivity of the self-control estimate to the inclusion (and exclusion) of other covariates in the model. The results show that the self-control estimate is not robust.

from a financial institution or use credit, (f) sell an asset, and (g) use some other method to find the money. We code a dummy variable as 1 if the respondent selected (a) or (b) for the first item and selected only (a) for the second item. This dummy represents a respondent who finds it easy (or with some sacrifices) to raise $3,000 and would use savings as the only source of this money.[19]

The second measure is based on the reported liquid assets of the household. This measure is similar to the variable in the main analysis, but has the lower threshold of at least $3,000 in liquid assets (which matches the survey question above). A similar measure is used by Brunetti et al. (2016). The third measure we construct is based on the higher threshold of whether the household has liquid assets exceeding 3-months income to measure financial fragility. We construct this measure as it is simple to calculate, and closely resembles the amount financial planners typically recommend clients hold as emergency funds.[20]

Table 6 presents probit regression estimates of the relationship between self-control and each financial fragility measure described above.[21]. Model 1 uses the survey response as the dependent variable and shows a positive self-control estimate which is statistically significant. The estimate of 0.04 remains small, however. The marginal effects imply a 1 unit increase in the self-control score raises the likelihood of being able to access $3,000 from savings (based on the survey response) by approximately 1 percentage point.[22] By contrast, a 1 unit increase in the planning horizon score raises the likelihood by about 8 percentage points (See Table A5). We find similarly small effects for the two measures based on liquid assets. Interestingly, Model 2 shows a smaller estimate than Model 1 and is not statistically significant. These estimates should be similar given the threshold amount of $3,000 is equal, and is suggestive of potential underlying biases affecting the survey response (Bertrand & Mullainathan 2001).[23] Model 3, based on the higher threshold amount of 3-months income, also shows a statistically significant relationship but it is weaker than the estimate in Model 1.

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[19]This variable could be coded in other ways, we choose this configuration to best match our analysis which relies on liquid assets.

[20]The low dollar threshold used (i.e., a few thousand dollars) is a limitation also noted by Lusardi et al. (2011).

[21]Full results are provided in Table A5 and A6.

[22]Note that we scale the BSCS to 1 - 13 for simpler interpretation. In the original BSCS, between 13 - 65, this effect corresponds to a *5-point* increase.

[23]An alternative explanation is that liquid assets includes other assets than just savings. We also find a similar result when we restrict this measure to cash and bank accounts only.

5.4.2   Sub-sample analysis

We next check the robustness of our results when the model is estimated on different sub-samples. Here, we perform three checks. First, Ameriks et al. (2007) find self-control has a stronger positive relationship on wealth accumulation for younger households. We therefore examine if our results hold for a sample of respondents aged 35 or younger. Second, we check if estimates are meaningfully different for low wealth households. This check is normatively important as financial fragility could be mitigated by self-control in low wealth households that are more likely to be financially fragile (see Table 3 and Table A4). For this check, we keep observations where net worth is in the bottom quartile of the distribution. Finally, we check if results are robust to the exclusion of those with mortgage debt. We perform this check as housing liquidity has been related to financial fragility in prior work (Brunetti et al. 2016). By removing observations with mortgage debt we effectively reduce the sample to non-homeowners, or those with fully paid off homes.

Table 7 presents the results for the model estimates on the sub-samples outlined above. Model 1 is the baseline estimate from the main analysis. Model 2 shows a statistically significant relationship when the sample is restricted to young households only, and supports Ameriks et al. (2007) by showing self control is more important to wealth accumulation in young households. The estimate, however, is still small and only significant at the ten percent level. We observe a similarly weak estimate in Model 3 which excludes higher net worth households. The estimate increases but is not statistically significant. Lastly, removing home-owners from the sample (Model 4) provides an even weaker estimate that is very similar to the baseline model.

5.4.3   Alternative self-control measures

In addition to the tests above, we also check our results using different versions of the BSCS. First, the BSCS is reported to have a two-factor structure measuring restraint and impulsivity separately (Maloney et al. 2012). Splitting the BSCS in this way allows us to examine the impulsive factor more precisely. The single survey item used in prior studies emphasises impulsivity, which could imply

that self-control is too general to reflect the underlying driver of present bias. Second, Strömbäck et al. (2017) use a shortened 5-item version of the BSCS and find it is positively related to saving money from every pay check. We therefore check if our results change for the 5-item BSCS.

Table 8 presents the self-control estimates for different configurations of the BSCS as described above. The impulsive factor, in Model 2, shows a larger estimate that suggests impulsivity is more important to liquid assets. Compared to Model 3, which is the restraint factor, the estimate is approximately twice as large. However, the estimates for both factors remain small and are not statistically significant. The 5-item version of the BSCS, in Model 3, also shows a slightly larger estimate but is also not statistically significant. Overall, the robustness checks confirm our main finding that self-control is not strongly related to liquid assets and financial fragility.

6   Conclusion

A straightforward theoretical implication of a standard lifecycle model with present bias, is that the bias reduces wealth accumulation (Laibson 1997). It is therefore plausible that present bias would also increase the likelihood of financial fragility if the latter is measured by short-term savings. This paper examined this exact relationship, between present-bias and financial fragility, in a large representative sample of Australian households. Our key finding is that the effect of present bias, for which we use a similar proxy as prior observational studies, is weaker than previously reported. We assert that the proxy used by prior studies may capture overspending (which can occur for other reasons) rather than present bias *per se*. Our primary evidence to support this assertion is a failure to find a relationship between financial fragility and the underlying drivers commonly attributed to present bias, namely impulsivity and self-control.

While not the focus of our paper, there are several other factors that more conclusively explain financial fragility in households according to our empirical models. These factors mostly support findings by prior studies. For example, we find financial fragility can be explained by financial circumstances and certain demographic characteristics (Lusardi et al. 2011), time-preferences (Gathergood & Wylie 2018), low perceived control over one's life (Kleimeier et al. 2023), mortgage debt (Brunetti et al. 2016), and financial literacy (Clark et al. 2021). In our view, future studies should ensure models

include these factors when predicting financial fragility as each likely have more explanatory power than self-control. Moreover, we note that self-control did show a small positive relationship when we proxied financial fragility using a subjective survey question based on the ability to raise $3,000. This measure is used by several prior studies. The effect is still weak, however, and could be plausibly explained by confounding factors which are more likely to affect subjective survey responses (Bertrand & Mullainathan 2001).

Our paper is subject to some limitations. First, our study is not an experiment, and the ability to establish (or not establish) causality is therefore limited. While our approach takes this issue seriously by employing instrumental variables and fixed-effect regression models along with a set of robustness checks, we cannot entirely rule out the possibility that confounding factors exist. Second, we note that studies in developed countries outside of the US indicate fewer households are financially fragile (Gathergood & Wylie 2018, Worthington 2004, Brunetti et al. 2016), and suggest that institutional factors could also be important which are not measured directly in our study. Finally, while we find little evidence to show that self-control is related to financial fragility, we do not rule out the possibility that self-control is important to explaining other financial behaviours and outcomes among households.

References

Acemoglu, D., Ozdaglar, A. & Tahbaz-Salehi, A. (2015), 'Systemic risk and stability in financial networks', *American Economic Review* **105**(2), 564–608.

Ameriks, J., Caplin, A., Leahy, J. & Tyler, T. (2007), 'Measuring self-control problems', *American Economic Review* **97**(3), 966–972.

Ampudia, M., Van Vlokhoven, H. & Żochowski, D. (2016), 'Financial fragility of Euro area households', *Journal of Financial Stability* **27**, 250–262.

Angeletos, G.-M., Laibson, D., Repetto, A., Tobacman, J. & Weinberg, S. (2001), 'The hyperbolic consumption model: Calibration, simulation, and empirical evaluation', *Journal of Economic Perspectives* **15**(3), 47–68.

Battistin, E., Brugiavini, A., Rettore, E. & Weber, G. (2009), 'The retirement consumption puzzle: evidence from a regression discontinuity approach', *American Economic Review* **99**(5), 2209–2226.

Bertrand, M. & Mullainathan, S. (2001), 'Do people mean what they say? implications for subjective survey data', *American Economic Review* **91**(2), 67–72.

Bialowolski, P., Weziak-Bialowolska, D. & McNeely, E. (2021), 'The role of financial fragility and financial control for well-being', *Social Indicators Research* **155**, 1137–1157.

Blundell, R., Pistaferri, L. & Preston, I. (2008), 'Consumption inequality and partial insurance', *American Economic Review* **98**(5), 1887–1921.

Brunetti, M., Giarda, E. & Torricelli, C. (2016), 'Is financial fragility a matter of illiquidity? An appraisal for Italian households', *Review of Income and Wealth* **62**(4), 628–649.

Butterworth, P., Rodgers, B. & Windsor, T. D. (2009), 'Financial hardship, socio-economic position and depression: Results from the path through life survey', *Social Science & Medicine* **69**(2), 229–237.

Campbell, J. Y. (2006), 'Household Finance', *Journal of Finance* **61**(4), 1553–1604.

Carroll, C. D. (1997), 'Buffer-stock saving and the life cycle/permanent income hypothesis', *The Quarterly Journal of Economics* **112**(1), 1–55.

Carroll, C. D. & Samwick, A. A. (1998), 'How important is precautionary saving?', *Review of Economics and Statistics* **80**(3), 410–419.

Christelis, D., Jappelli, T., Paccagnella, O. & Weber, G. (2009), 'Income, wealth and financial fragility in Europe', *Journal of European Social Policy* **19**(4), 359–376.

Clark, R. L., Lusardi, A. & Mitchell, O. S. (2021), Financial fragility during the COVID-19 pandemic, *in* 'AEA Papers and Proceedings', Vol. 111, American Economic Association, pp. 292–296.

Cobb-Clark, D. A., Dahmann, S. C., Kamhöfer, D. A. & Schildberg-Hörisch, H. (2019), Self-control: Determinants, life outcomes and intergenerational implications, Technical report, DICE Discussion Paper.

Cochrane, J. H. (1991), 'A simple test of consumption insurance', *Journal of Political Economy* **99**(5), 957–976.

Crowe, L., Butterworth, P. & Leach, L. (2016), 'Financial hardship, mastery and social support: Explaining poor mental health amongst the inadequately employed using data from the hilda survey', *SSM-Population Health* **2**, 407–415.

Davis, E. P. (1995), *Debt, financial fragility, and systemic risk*, Oxford University Press.

Deaton, A. (1991), 'Saving and liquidiy constraints', *Econometrica* **59**(5), 1221–1248.

Fox, J. & Weisberg, S. (2018), 'Visualizing fit and lack of fit in complex regression models with predictor effect plots and partial residuals', *Journal of Statistical Software* **87**, 1–27.

Frankham, C., Richardson, T. & Maguire, N. (2020), 'Psychological factors associated with financial hardship and mental health: A systematic review', *Clinical Psychology Review* **77**, 101832.

Gathergood, J. (2012), 'Self-control, financial literacy and consumer over-indebtedness', *Journal of Economic Psychology* **33**(3), 590–602.

Gathergood, J. & Weber, J. (2014), 'Self-control, financial literacy & the co-holding puzzle', *Journal of Economic Behavior & Organization* **107**, 455–469.

Gathergood, J. & Weber, J. (2017), 'Financial literacy, present bias and alternative mortgage products', *Journal of Banking & Finance* **78**, 58–83.

Gathergood, J. & Wylie, D. (2018), 'Why are some households so poorly insured?', *Journal of Economic Behavior & Organization* **156**, 1–12.

Goldberg, L. R. (1990), 'An alternative description of personality: The big-five factor structure', *Journal of Personality and Social Psychology* **59**(6), 1216.

Gottfredson, M. R. & Hirschi, T. (1990), *A general theory of crime*, Stanford University Press.

Gui, R., Meierer, M., Schilter, P. & Algesheimer, R. (2023), 'REndo: internal instrumental variables to address endogeneity', *Journal of Statistical Software* **107**, 1–43.

Hlavac, M. (2016), 'Extremebounds: Extreme bounds analysis in R', *Journal of Statistical Software* **72**.

Inzlicht, M., Werner, K. M., Briskin, J. L. & Roberts, B. W. (2021), 'Integrating models of self-regulation', *Annual Review of Psychology* **72**, 319–345.

Jahedi, S. & Méndez, F. (2014), 'On the advantages and disadvantages of subjective measures', *Journal of Economic Behavior & Organization* **98**, 97–114.

Jappelli, T., Pagano, M. & Di Maggio, M. (2013), 'Households' indebtedness and financial fragility', *Journal of Financial Management, Markets and Institutions* **1**(1), 23–46.

Kempson, E., Perotti, V. & Scott, K. (2013), 'Measuring financial capability: A new instrument and results from low-and middle-income countries'.

Kimball, M. S. (1990), 'Precautionary saving in the small and in the large', *Econometrica* **58**(1), 53–73.

Kleimeier, S., Hoffmann, A. O., Broihanne, M.-H., Plotkina, D. & Göritz, A. S. (2023), 'Determinants of individuals' objective and subjective financial fragility during the COVID-19 pandemic', *Journal of Banking & Finance* **153**, 106881.

Krosnick, J. A. (2018), Questionnaire design, *in* P. Marsden & J. Wright, eds, 'The Palgrave Handbook of Survey Research', Emerald Group Publishing, Bingley, UK, pp. 263–313.

Kuchler, T. & Pagel, M. (2021), 'Sticking to your plan: The role of present bias for credit card paydown', *Journal of Financial Economics* **139**(2), 359–388.

Lahelma, E., Laaksonen, M., Martikainen, P., Rahkonen, O. & Sarlio-Lähteenkorva, S. (2006), 'Multiple measures of socioeconomic circumstances and common mental disorders', *Social Science & Medicine* **63**(5), 1383–1399.

Laibson, D. (1997), 'Golden eggs and hyperbolic discounting', *The Quarterly Journal of Economics* **112**(2), 443–478.

Leamer, E. E. (1985), 'Sensitivity analyses would help', *American Economic Review* **75**(3), 308–313.

Lewbel, A. (2012), 'Using heteroscedasticity to identify and estimate mismeasured and endogenous regressor models', *Journal of Business & Economic Statistics* **30**(1), 67–80.

Lusardi, A. & Mitchell, O. S. (2014), 'The economic importance of financial literacy: Theory and evidence', *Journal of Economic Literature* **52**(1), 5–44.

Lusardi, A., Schneider, D. & Tufano, P. (2011), 'Financially Fragile Households: Evidence and Implications', *Brookings Papers on Economic Activity* **2011**(1), 83–134.

Maloney, P. W., Grawitch, M. J. & Barber, L. K. (2012), 'The multi-factor structure of the brief self-control scale: Discriminant validity of restraint and impulsivity', *Journal of Research in Personality* **46**(1), 111–115.

Meier, S. & Sprenger, C. (2010), 'Present-biased preferences and credit card borrowing', *American Economic Journal: Applied Economics* **2**(1), 193–210.

Mian, A. & Sufi, A. (2010), 'Household leverage and the recession of 2007 to 2009', *The Quarterly Journal of Economics* **125**(1), 1–46.

Mirowsky, J. & Ross, C. E. (1999), 'Economic hardship across the life course', *American Sociological Review* pp. 548–569.

Netemeyer, R. G., Warmath, D., Fernandes, D. & Lynch Jr, J. G. (2018), 'How am I doing? Perceived financial well-being, its potential antecedents, and its relation to overall well-being', *Journal of Consumer Research* **45**(1), 68–89.

O'Donoghue, T. & Rabin, M. (2015), 'Present bias: Lessons learned and to be learned', *American Economic Review* **105**(5), 273–79.

Pearlin, L. I. & Schooler, C. (1978), 'The structure of coping', *Journal of Health and Social Behavior* pp. 2–21.

Preston, A. C. & Wright, R. E. (2019), 'Understanding the gender gap in financial literacy: Evidence from Australia', *Economic Record* **95**, 1–29.

Rohde, N., Tang, K. K., Osberg, L. & Rao, P. (2016), 'The effect of economic insecurity on mental health: Recent evidence from Australian panel data', *Social Science & Medicine* **151**, 250–258.

Shefrin, H. M. & Thaler, R. H. (1988), 'The behavioral life-cycle hypothesis', *Economic Inquiry* **26**(4), 609–643.

Stock, J. H. & Yogo, M. (2002), Testing for weak instruments in linear IV regression, Technical Report 284, National Bureau of Economic Research.

Strömbäck, C., Lind, T., Skagerlund, K., Västfjäll, D. & Tinghög, G. (2017), 'Does self-control predict financial behavior and financial well-being?', *Journal of Behavioral and Experimental Finance* **14**, 30–38.

Summerfield, M., Freidin, S., Hahn, M., Ittak, P., Li, N., Macalalad, N., Watson, N., Wilkins, R. & Wooden, M. (2021), *HILDA User Manual - Release 20*, Melbourne Institute of Applied Economic and Social Research, University of Melbourne.

Tangney, B. & Baumeister, R. (2004), 'High self-control predicts good adjustment, less pathology, better grades, and interpersonal success', *Journal of Personality* **72**(2), 272–322.

Tsomocos, D. P. (2003), 'Equilibrium analysis, banking and financial instability', *Journal of Mathematical Economics* **39**(5-6), 619–655.

Vazsonyi, A. T. & Huang, L. (2010), 'Where self-control comes from: on the development of self-control and its relationship to deviance over time.', *Developmental Psychology* **46**(1), 245.

Wooden, M. & Watson, N. (2007), 'The HILDA Survey and its contribution to economic and social research so far', *Economic Record* **83**(261), 208–231.

Worthington, A. C. (2004), 'Emergency Funds in Australian Households: An Empirical Analysis of Capacity and Sources', *Journal of Financial Counseling and Planning* **15**(1), 21–30.

Tables and Figures

Table 1: Summary statistics

	mean	sd	min	max
Demographics				
Age	44.18	12.68	20.00	65.00
Married (= 1)	0.56	0.50	0.00	1.00
Female (= 1)	0.51	0.50	0.00	1.00
Has children (= 1)	0.50	0.50	0.00	1.00
Foreign-born (= 1)	0.19	0.39	0.00	1.00
Has bachelors degree (= 1)	0.36	0.48	0.00	1.00
Finances				
Net worth ($)	915584.41	944790.02	1.00	5225000.00
Household income ($)	138710.07	79836.61	400.00	447240.00
Has mortgage debt (= 1)	0.52	0.50	0.00	1.00
Behavioural				
Risk averse (= 1)	0.44	0.50	0.00	1.00
Financial literacy (= 1)	0.60	0.49	0.00	1.00
Inattentive (= 1)	0.06	0.24	0.00	1.00
Planning horizon (1 - 6)	2.99	1.53	1.00	6.00
Impulsive (= 1)	0.25	0.43	0.00	1.00
Overspending (= 1)	0.19	0.39	0.00	1.00
Impulsive and overspending (= 1)	0.04	0.19	0.00	1.00
Non-cognitive traits				
Self-control (1 - 13)	9.00	1.67	2.60	13.00
Low mastery (= 1)	0.36	0.48	0.00	1.00
Motivation (1 - 9)	6.35	1.14	1.44	9.00
Conscientiousness (1 - 7)	5.12	1.02	1.00	7.00

Note: This table presents the summary statistics of the sample. Details for each variable are discussed in the main text. The sample includes 6,692 respondents.

Figure 1: Distributions of financial fragility indicators

Panel A: Has 1-month income in liquid-assets

Panel B: Ratio of liquid-assets to income (log)
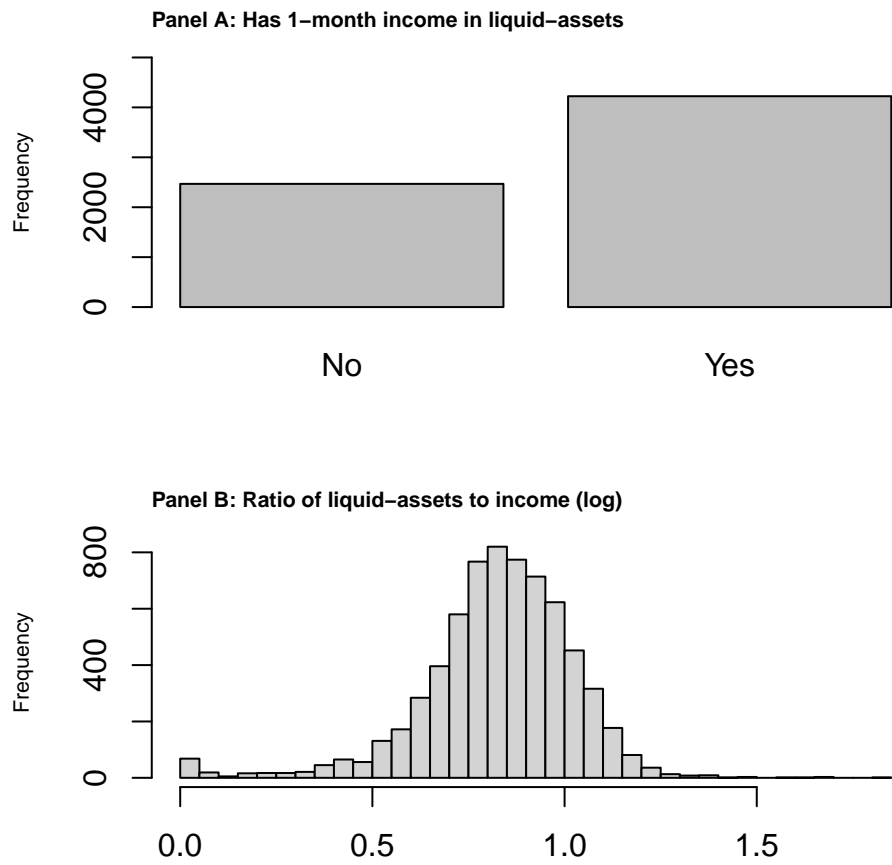
Note: This figure shows the distribution of each financial fragility indicator.

Table 2: Summary statistics by financial fragility

	Has 1-month income in liquid assets	
	Yes	No
Demographics		
Age	44.99	42.80
Married (= 1)	0.58	0.53
Female (= 1)	0.51	0.51
Has children (= 1)	0.47	0.51
Foreign born (= 1)	0.20	0.55
Has bachelors degree (= 1)	0.40	0.18
Finances		
Net worth ($)	1139494	532361
Household income ($)	148159	122538
Mortgage debt (= 1)	0.51	0.53
Behavioural		
Risk averse (= 1)	0.37	0.55
Financial literacy (= 1)	0.64	0.52
Inattentive (= 1)	0.05	0.08
Planning horizon (1 - 6)	3.33	2.42
Impulsive (= 1)	0.27	0.22
Overspending (= 1)	0.11	0.33
Impulsive and overspending (= 1)	0.03	0.06
Non-cognitive traits		
Self-control (1 - 13)	9.13	8.79
Low mastery (= 1)	0.32	0.42
Motivation (1 - 9)	6.45	6.19
Conscientiousness (1 - 7)	5.21	4.96
Num. obs.	4224	2468

Note: This table presents the summary statistics of the sample split by holding at least 1-month of income in liquid-assets.

Figure 2: Distributions of present bias indicators

Panel A: Impulsive

Panel B: Overspending

Panel C: Impulsive and overspending

Panel D: Self−control
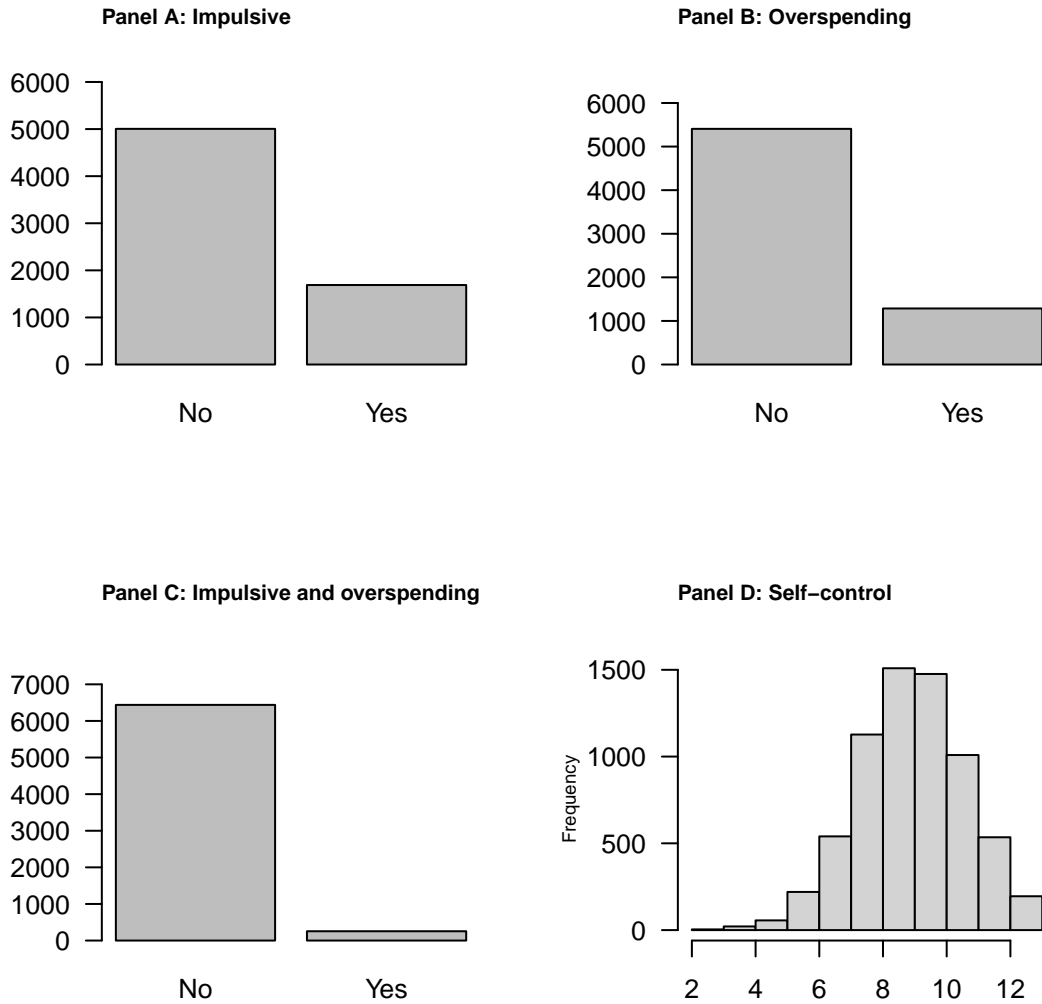
Note: This figure shows the distributions of the present bias indicators used in the study. Panel A is a dummy coded 1 if the respondent agrees or strongly agrees with the statement "I am impulsive". Panel B is a dummy coded 1 if the respondent spends all or more than their income. Panel C is a dummy if the respondent is positively coded as impulsive and overspending. Panel D is the Brief Self-Control Scale (BSCS) rescaled to a value between 1 - 13.

Table 3: Results - holds at least 1-month of income in liquid assets

	(1)	(2)	(3)	(4)
	β / SE	β / SE	β / SE	β / SE
Impulsive and overspending (= 1)	−0.594***	−0.485***	−0.338***	−0.354***
	(0.082)	(0.084)	(0.086)	(0.087)
Age	0.008***	−0.001	−0.001	−0.002
	(0.001)	(0.001)	(0.002)	(0.002)
Female (= 1)	0.003	0.016	0.048	0.031
	(0.032)	(0.033)	(0.034)	(0.035)
Married (= 1)	0.156***	0.020	−0.024	−0.036
	(0.036)	(0.039)	(0.040)	(0.040)
Has children (= 1)	−0.254***	−0.262***	−0.231***	−0.226***
	(0.035)	(0.037)	(0.038)	(0.038)
Foreign-born (= 1)	−0.023	−0.001	0.006	0.007
	(0.041)	(0.042)	(0.044)	(0.044)
Has bachelors degree (= 1)	0.350***	0.282***	0.117***	0.109***
	(0.034)	(0.036)	(0.038)	(0.038)
Log net worth ($)		0.151***	0.135***	0.134***
		(0.009)	(0.009)	(0.009)
Log household income ($)		0.090***	0.013	−0.001
		(0.029)	(0.030)	(0.030)
Has mortgage debt (= 1)		−0.325***	−0.312***	−0.320***
		(0.036)	(0.037)	(0.037)
Financial literacy (= 1)			0.138***	0.140***
			(0.035)	(0.035)
Risk averse (= 1)			−0.250***	−0.248***
			(0.035)	(0.036)
Inattentive (= 1)			−0.197***	−0.153**
			(0.068)	(0.069)
Planning horizon (1 - 6)			0.188***	0.182***
			(0.012)	(0.012)
Motivation (1 - 9)				−0.002
				(0.016)
Conscientiousness (1 - 7)				0.084***
				(0.018)
Low mastery (= 1)				−0.108***
				(0.036)
Log Likelihood	−4270.935	−3993.585	−3803.971	−3784.720
Num. obs.	6692	6692	6692	6692

Note: This table shows the probit model coefficient estimates for all variables and holding at least 1-month of income in liquid assets. The variable of interest is impulsive and overspending, which is used as a proxy for present bias. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Results - holds at least 1-month of income in liquid assets (impulsive and overspending)

	(1)	(2)	(3)
	β / SE	β / SE	β / SE
Impulsive ($= 1$)	0.065	0.057	0.047
	(0.042)	(0.042)	(0.046)
Overspending ($= 1$)		-0.558^{***}	-0.571^{***}
		(0.045)	(0.050)
Impulsive $\times$ Overspending			0.059
			(0.103)
Controls	Yes	Yes	Yes
Log Likelihood	-3791.825	-3713.270	-3713.103
Num. obs.	6692	6692	6692

Note: This table shows the probit model coefficient estimates for impulsivity, overspending and holding at least 1-month of income in liquid assets. All controls in Table 3 are included. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Results - OLS, IV and FE estimates for log liquid-assets to income

	(1)	(2)	(3)
	OLS	Lewbel IV	FE (panel)
Self-control (1 - 13)	0.001	0.023	-0.001
	(0.001)	(0.035)	(0.007)
Controls	Yes	Yes	Yes
F-stat		12.61	
Wu-Hausman p-value		0.52	
R^2	0.267	0.243	0.075
Num. obs.	6692	6692	9030

Note: This table shows the regression model estimates for the relationship between self-control and log liquid assets to income (to proxy financial fragility). Model 1 presents OLS model estimates. Model 2 uses a 2SLS IV estimator recommended by Lewbel (2012). Model 3 is a fixed-effects panel regression using 2010, 2014, and 2018 waves of the HILDA survey, where self-control is predicted using 2018 data (See Table A7). All controls in Table 3 are included. Full results are presented in Table A4. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Figure 3: OLS regression paths - log liquid-assets to income
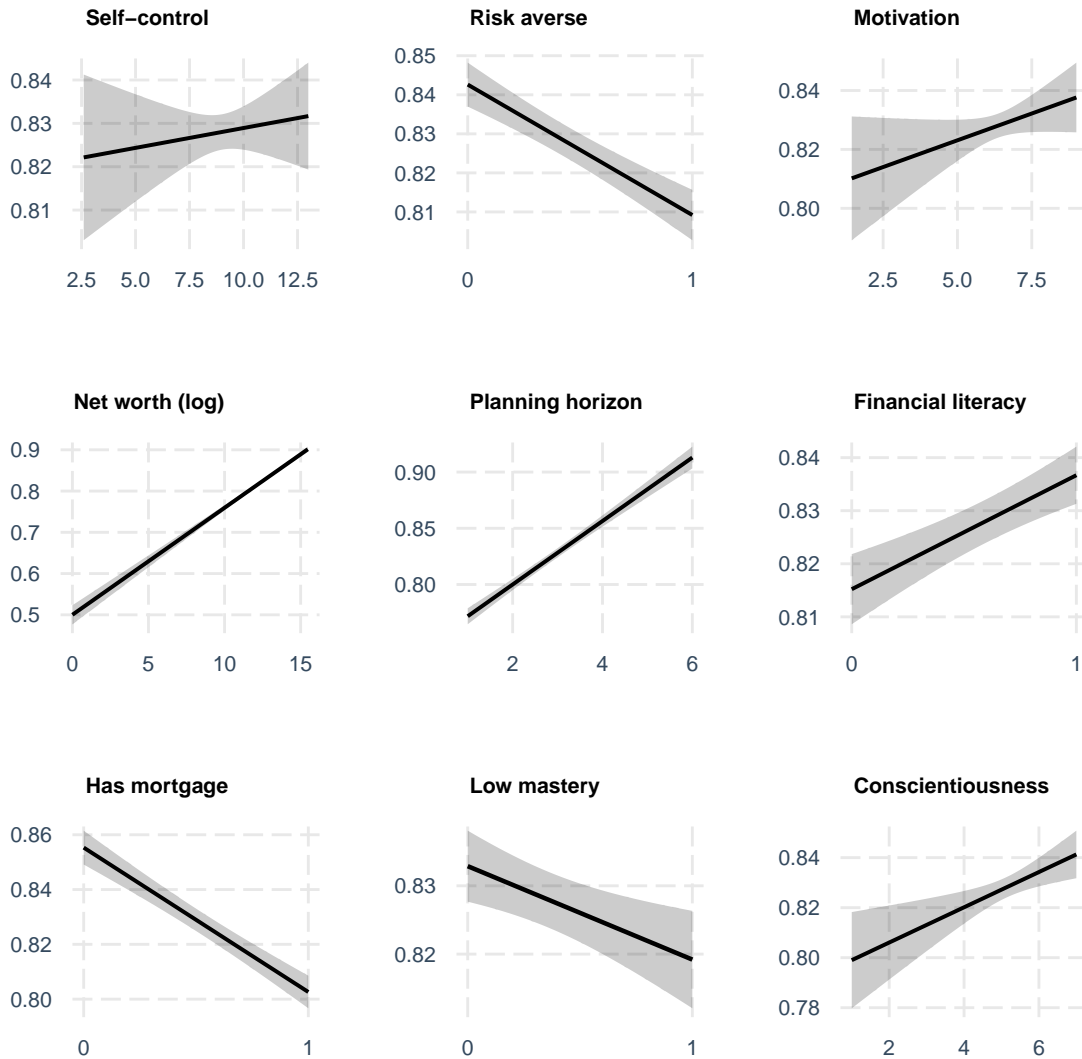
Note: This figure shows the regression paths for variables included in the OLS regression model given in Equation (5). Financial fragility is proxied by log liquid-assets to income. Variables displayed are selected based on their significance in the model (i.e. $p < 0.05$), except for self-control which is included as the variable of interest.

Table 6: Results - robustness models (alternative financial fragility measures)

	(1)	(2)	(3)
	Could raise $3000	$3000 in liquid assets	3-months income in liquid assets
Self-control (1 - 13)	0.038***	0.017	0.026**
	(0.013)	(0.014)	(0.012)
Controls	Yes	Yes	Yes
Log Likelihood	-3155.183	-2456.769	-3814.434
Num. obs.	6692	6692	6692

Note: This table shows robustness model estimates for alternative measures of financial fragility. The estimates are from probit regression models for dummy variables representing alternative measures of financial fragility. Model 1 is based on a survey question, and Models 2 and 3 use reported wealth. All controls in Table 3 are included. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: Results - robustness models (sub-samples)

	(1)	(2)	(3)	(4)
	Baseline	Under 35 only	Low net worth	Excluding home-owners
Self-control (1 - 13)	0.001	0.005*	0.005	0.000
	(0.001)	(0.003)	(0.003)	(0.002)
Controls	Yes	Yes	Yes	Yes
R^2	0.267	0.267	0.233	0.348
Num. obs.	6692	1839	1673	3226

Note: This table shows robustness model estimates for different sub-samples. Low net worth includes only households in the bottom quartile of net worth. The dependent variable is log liquid-assets to income. All controls in Table 3 are included. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: Results - robustness models (alternative self-control measures)

	(1)	(2)	(3)	(4)
	Baseline	Impulsive factor	Restraint factor	5-item version
Self-control (1 - 13)	0.001			
	(0.001)			
Impulsive factor (1 - 4)		0.006		
		(0.004)		
Restraint factor (1 - 4)			0.003	
			(0.004)	
5-item version (1 - 5)				0.003
				(0.003)
Controls	Yes	Yes	Yes	Yes
R^2	0.267	0.267	0.267	0.267
Num. obs.	6692	6692	6692	6692

Note: This table shows robustness model estimates for alternative measures of the self-control scale (BSCS). The dependent variable is log liquid-assets to income. Model 1 is the baseline estimate. Models 2 and 3 are the two factors (impulsive and restraint) identified in the BSCS by Maloney et al. (2012). Model 4 is the 5-item BSCS version used by Strömbäck et al. (2017). All controls in Table 3 are included. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Online Appendices for "Present bias, self-control, and financial fragility"

Table A1: Sample selection

		2010	2014	2018
Full sample		17,855	23,114	23,267
No missing responses		5,154	8,223	8,849
No outliers (income)		5,026	7,997	8,463
Respondents aged between 18 and 65		4,428	6,703	6,692
Observed in three panels		3,010	3,010	3,010
Num. obs.	9,030			
Num. respondents	3,010			

Note: This table shows the number of observations eliminated at each stage of the sample selection process to construct the sample. Outliers are removed from each panel if household income was more than 3 standard deviations from the mean.

Table A2: Correlation coefficients for impulsivity and self-control

	Impulsive	Self-control
Self-control (1 - 13)	0.24	
Risk averse (= 1)	0.00	0.00
Inattentive (= 1)	−0.05	−0.12
Planning horizon (1 - 6)	0.07	0.15
Motivation (1 - 9)	0.36	0.42
Conscientiousness (1 - 7)	0.16	0.41
Overspending (= 1)	−0.06	−0.15

Note: This table shows Pearson's correlation coefficients for the impulsivity dummy variable, the self-control variable, and other behavioural and non-cognitive variables. Impulsive is measured using a 7-point Likert scale where a dummy takes a value of 1 if the respondent agrees or strongly agrees with the statement "I am impulsive". Self-control is the Brief Self-Control Scale (BSCS) rescaled to a value between 1 - 13.

Table A3: Results - holds at least 1-month of income in liquid assets

	(1) β / SE	(2) β / SE	(3) β / SE	(4) β / SE
Self-control (1 - 13)	0.059***	0.052***	0.037***	0.018
	(0.010)	(0.010)	(0.010)	(0.012)
Age	0.006***	−0.002	−0.003*	−0.003*
	(0.001)	(0.001)	(0.002)	(0.002)
Female (= 1)	−0.017	−0.002	0.036	0.026
	(0.032)	(0.033)	(0.034)	(0.034)
Married (= 1)	0.142***	0.005	−0.035	−0.040
	(0.036)	(0.039)	(0.040)	(0.040)
Has children (= 1)	−0.265***	−0.273***	−0.238***	−0.233***
	(0.035)	(0.037)	(0.037)	(0.038)
Foreign-born (= 1)	−0.024	−0.002	0.006	0.010
	(0.041)	(0.042)	(0.044)	(0.044)
Has bachelors degree (= 1)	0.335***	0.268***	0.105***	0.105***
	(0.034)	(0.036)	(0.038)	(0.038)
Log net worth ($)		0.152***	0.135***	0.134***
		(0.009)	(0.009)	(0.009)
Log household income ($)		0.096***	0.017	0.006
		(0.029)	(0.030)	(0.030)
Has mortgage debt (= 1)		−0.330***	−0.316***	−0.321***
		(0.036)	(0.037)	(0.037)
Financial literacy (= 1)			0.137***	0.140***
			(0.035)	(0.035)
Risk averse (= 1)			−0.258***	−0.255***
			(0.035)	(0.036)
Inattentive (= 1)			−0.164**	−0.149**
			(0.069)	(0.069)
Planning horizon (1 - 6)			0.188***	0.187***
			(0.012)	(0.012)
Motivation (1 - 9)				−0.018
				(0.017)
Conscientiousness (1 - 7)				0.075***
				(0.019)
Low mastery (= 1)				−0.104***
				(0.037)
AIC	8573.359	8015.797	7640.447	7619.715
Log Likelihood	−4278.679	−3996.899	−3805.223	−3791.857
Num. obs.	6692	6692	6692	6692

Note: This table shows the probit model coefficient estimates for the relationship between all variables and financial fragility. The dependent variable is a dummy indicating the household holds at least 1-month of income in liquid assets. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A4: Results - log liquid assets to income

	(1) β / SE	(2) β / SE	(3) β / SE	(4) β / SE
Self-control (1 - 13)	0.009***	0.007***	0.004***	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Age	0.001***	−0.000**	−0.001***	−0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
Female (= 1)	−0.005	−0.002	0.003	0.002
	(0.005)	(0.004)	(0.004)	(0.004)
Married (= 1)	0.043***	0.018***	0.012**	0.011**
	(0.005)	(0.005)	(0.005)	(0.005)
Has children (= 1)	−0.040***	−0.035***	−0.028***	−0.028***
	(0.005)	(0.005)	(0.005)	(0.005)
Foreign-born (= 1)	−0.006	−0.002	−0.001	0.000
	(0.006)	(0.006)	(0.005)	(0.005)
Has bachelors degree (= 1)	0.067***	0.052***	0.026***	0.025***
	(0.005)	(0.005)	(0.005)	(0.005)
Log net worth ($)		0.029***	0.026***	0.026***
		(0.001)	(0.001)	(0.001)
Log household income ($)		0.007*	−0.005	−0.006*
		(0.004)	(0.004)	(0.004)
Has mortgage debt (= 1)		−0.058***	−0.052***	−0.053***
		(0.005)	(0.005)	(0.005)
Financial literacy (= 1)			0.022***	0.021***
			(0.004)	(0.004)
Risk averse (= 1)			−0.035***	−0.033***
			(0.005)	(0.005)
Inattentive (= 1)			−0.016*	−0.012
			(0.009)	(0.009)
Planning horizon (1 - 6)			0.029***	0.028***
			(0.001)	(0.001)
Motivation (1 - 9)				0.004*
				(0.002)
Conscientiousness (1 - 7)				0.007***
				(0.002)
Low mastery (= 1)				−0.014***
				(0.005)
R^2	0.062	0.203	0.264	0.267
Adj. R^2	0.061	0.202	0.263	0.265
Num. obs.	6692	6692	6692	6692

Note: This table shows the OLS model coefficient estimates for the relationship between all variables and financial fragility. The dependent variable is the log of the ratio of liquid assets to income. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A5: Results - could access $3,000 from savings (survey)

	(1)	(2)	(3)	(4)
	β / SE	β / SE	β / SE	β / SE
Self-control (1 - 13)	0.092***	0.087***	0.071***	0.038***
	(0.010)	(0.011)	(0.011)	(0.013)
Age	0.008***	0.006***	0.006***	0.007***
	(0.001)	(0.002)	(0.002)	(0.002)
Female (= 1)	−0.178***	−0.152***	−0.124***	−0.132***
	(0.034)	(0.035)	(0.037)	(0.038)
Married (= 1)	0.464***	0.262***	0.222***	0.213***
	(0.038)	(0.041)	(0.043)	(0.043)
Has children (= 1)	−0.263***	−0.352***	−0.318***	−0.313***
	(0.037)	(0.039)	(0.041)	(0.041)
Foreign-born (= 1)	−0.124***	−0.090**	−0.092*	−0.075
	(0.044)	(0.045)	(0.047)	(0.048)
Has bachelors degree (= 1)	0.573***	0.458***	0.251***	0.248***
	(0.037)	(0.039)	(0.042)	(0.042)
Log net worth ($)		0.097***	0.075***	0.073***
		(0.008)	(0.008)	(0.008)
Log household income ($)		0.336***	0.264***	0.242***
		(0.030)	(0.031)	(0.032)
Has mortgage debt (= 1)		−0.081**	−0.060	−0.065
		(0.038)	(0.040)	(0.040)
Financial literacy (= 1)			0.211***	0.210***
			(0.037)	(0.038)
Risk averse (= 1)			−0.330***	−0.316***
			(0.038)	(0.038)
Inattentive (= 1)			−0.205***	−0.173**
			(0.073)	(0.074)
Planning horizon (1 - 6)			0.282***	0.278***
			(0.014)	(0.014)
Motivation (1 - 9)				0.009
				(0.018)
Conscientiousness (1 - 7)				0.055***
				(0.020)
Low mastery (= 1)				−0.287***
				(0.039)
AIC	7575.010	7073.884	6410.302	6346.366
Log Likelihood	−3779.505	−3525.942	−3190.151	−3155.183
Num. obs.	6692	6692	6692	6692

Note: This table shows the probit model coefficient estimates for the relationship between all variables and financial fragility. The dependent variable is a dummy variable indicating the household could access $3,000 and would use only their savings, and is based on survey responses (Lusardi et al. 2011). Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A6: Results - holds \$3,000 in liquid assets

	(1) β / SE	(2) β / SE	(3) β / SE	(4) β / SE
Self-control (1 - 13)	0.068***	0.058***	0.044***	0.017
	(0.011)	(0.012)	(0.013)	(0.014)
Age	0.000	−0.005***	−0.005***	−0.005***
	(0.001)	(0.002)	(0.002)	(0.002)
Female (= 1)	−0.062*	−0.004	0.018	0.006
	(0.037)	(0.040)	(0.042)	(0.042)
Married (= 1)	0.482***	0.170***	0.136***	0.129***
	(0.041)	(0.046)	(0.047)	(0.047)
Has children (= 1)	−0.060	−0.207***	−0.162***	−0.157***
	(0.040)	(0.044)	(0.045)	(0.045)
Foreign-born (= 1)	−0.062	−0.000	0.002	0.009
	(0.048)	(0.052)	(0.054)	(0.054)
Has bachelors degree (= 1)	0.558***	0.405***	0.238***	0.231***
	(0.042)	(0.046)	(0.049)	(0.049)
Log net worth (\$)		0.131***	0.115***	0.114***
		(0.008)	(0.008)	(0.008)
Log household income (\$)		0.509***	0.467***	0.455***
		(0.034)	(0.034)	(0.035)
Has mortgage debt (= 1)		−0.129***	−0.128***	−0.131***
		(0.044)	(0.045)	(0.045)
Financial literacy (= 1)			0.179***	0.177***
			(0.042)	(0.042)
Risk averse (= 1)			−0.211***	−0.206***
			(0.042)	(0.043)
Inattentive (= 1)			−0.140*	−0.111
			(0.079)	(0.080)
Planning horizon (1 - 6)			0.223***	0.218***
			(0.016)	(0.016)
Motivation (1 - 9)				0.013
				(0.020)
Conscientiousness (1 - 7)				0.072***
				(0.022)
Low mastery (= 1)				−0.117***
				(0.043)
AIC	6142.881	5267.184	4965.347	4949.538
Log Likelihood	−3063.441	−2622.592	−2467.674	−2456.769
Num. obs.	6692	6692	6692	6692

Note: This table shows the probit model coefficient estimates for the relationship between all variables and financial fragility. The dependent variable is a dummy variable indicating the household holds \$3,000 in liquid assets (Brunetti et al. 2016). Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A7: Results - self-control

	(1)
	β / SE
Age	0.017 (0.002)***
Female (= 1)	0.094 (0.035)***
Married (= 1)	0.079 (0.039)**
Has children (= 1)	0.039 (0.037)
Foreign-born (= 1)	0.123 (0.042)***
Has bachelors degree (= 1)	−0.010 (0.038)
Log net worth ($)	−0.005 (0.007)
Log household income ($)	−0.082 (0.029)***
Has mortgage debt (= 1)	0.052 (0.036)
Financial literacy (= 1)	−0.146 (0.035)***
Risk averse (= 1)	0.211 (0.035)***
Inattentive (= 1)	−0.213 (0.069)***
Planning horizon (1 - 6)	0.022 (0.012)*
Motivation (1 - 9)	0.372 (0.016)***
Conscientiousness (1 - 7)	0.314 (0.018)***
Agreeableness (1 - 7)	0.085 (0.021)***
Extraversion (1 - 7)	−0.044 (0.015)***
Emotional stability (1 - 7)	0.305 (0.018)***
Openness (1 - 7)	0.037 (0.018)**
Low mastery (= 1)	−0.162 (0.038)***
Body mass index	−0.034 (0.003)***
General health	2.069 (0.155)***
R^2	0.371
Adj. R^2	0.369
Num. obs.	6692

Note: This table shows the linear model coefficient estimates for variables related to self-control (BSCS). The estimates are used to predict self-control in each panel for the fixed effects model. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A8: Extreme bounds analysis - all variables

Variable	Avg. β	Avg. SE	Lower bound	Upper bound	CDF	Robust
Age	0.001	0.000	-0.001	0.003	0.898	FALSE
Married ($= 1$)	0.029	0.005	-0.02	0.075	0.903	FALSE
Female ($= 1$)	0	0.005	-0.021	0.024	0.513	FALSE
Has children ($= 1$)	-0.03	0.005	-0.066	-0.008	0	TRUE
Foreign-born ($= 1$)	0.008	0.006	-0.018	0.032	0.846	FALSE
Has bachelors degree ($= 1$)	0.053	0.005	0.017	0.082	1	TRUE
Log net worth (\$)	0.027	0.001	0.021	0.034	1	TRUE
Log income (\$)	0.035	0.004	-0.020	0.072	0.924	FALSE
Has mortgage debt ($= 1$)	-0.024	0.005	-0.071	0.009	0.02	FALSE
Financial literacy ($= 1$)	0.044	0.005	0.015	0.066	1	TRUE
Risk averse ($= 1$)	-0.065	0.005	-0.092	-0.026	0	TRUE
Inattentive ($= 1$)	-0.03	0.01	-0.064	0.004	0.004	FALSE
Planning horizon (1 - 6)	0.041	0.002	0.028	0.049	1	TRUE
Self-control (1 - 13)	0.008	0.001	-0.002	0.017	0.998	FALSE
Low mastery ($= 1$)	-0.033	0.005	-0.06	-0.007	0	TRUE
Motivation (1 - 9)	0.019	0.002	0.004	0.032	1.000	TRUE
Conscientiousness (1 - 7)	0.017	0.002	0.002	0.03	1	TRUE

Note: This table shows the results of the extreme bounds analysis (EBA) for regression model specified in Equation (5). The EBA checks the robustness of coefficient estimates to all possible combinations of variables included in the model (Leamer 1985, Hlavac 2016).