Noncognitive Abilities and Financial Distress: Evidence from a Representative Household Panel

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Abstract

This paper provides evidence for how noncognitive abilities affect financial distress. In a representative panel of households, we find that people in the bottom quintile of noncognitive abilities are ten times more likely to experience financial distress than those in the top quintile. We provide evidence that this relation arises largely from worse financial choices and lack of financial insight by low-ability individuals, and only to a lesser degree reflects differential exposure to income shocks. We mitigate endogeneity concerns using an IV approach and an extensive set of controls. Implications for policy and finance research are discussed.

Keywords: Noncognitive abilities, financial distress, financial choices, behavioral finance, psychology and economics
JEL classification: D10; D14; G41

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Economists have accumulated abundant evidence indicating that noncognitive abilities—besides cognitive skills—matter for a large set of economic behaviors.[1] Recent research finds that noncognitive abilities have implications for labor income (Heckman, Stixrud, and Urzua (2006)), health-related habits (Heckman, Humphries, and Veramendi (2017)), educational attainment (Cunha, Heckman, and Schennach (2010)), and corporate policies (Gow, Kaplan, Larcker, and Zakolyukina (2016)). Yet, in financial economics, there is relatively little empirical evidence on the role that noncognitive abilities play in influencing household exposure to financial distress.

A better understanding of the determinants of financial fragility is critically important. According to a survey conducted by the Federal Reserve Board, almost half of U.S. households are at risk of financial distress: An unexpected expense of $400 would prompt many to borrow money, sell something, or simply not pay at all (Federal Reserve Board (2016)). Traditional economic theories, however, have a hard time explaining the observed heterogeneity in financial choices and outcomes. In this paper, we attempt to identify a causal effect of noncognitive abilities on financial distress and quantify the importance of the different channels through which this relation works.

The measurement of noncognitive abilities is itself a challenge (Heckman and Rubinstein (2001)). Heckman, Pinto, and Savelyev (2013) state that the most influential taxonomy for measuring noncognitive abilities is a framework developed in psychology that is commonly referred to as the Big Five personality traits. Following that framework, we obtain measures of *emotional stability* and *conscientiousness*—the two of the five traits that relate to economic outcomes—using the 20 standard survey questions developed in the seminal paper by Goldberg (1992).[2] Emotional sta-

[1]The term *noncognitive abilities* is rather standard in the literature; however, some clarification regarding our terminology is in order. As highlighted by Borghans, Duckworth, Heckman, and Ter Weel (2008), the term *noncognitive* is often juxtaposed with *cognitive*. However, it should not be interpreted as referring to traits devoid of cognition. Alternatives names for noncognitive abilities are *noncognitive skills*, *soft abilities*, *personality traits*, and *character skills*. See Almlund, Duckworth, Heckman, and Kautz (2011) for a review of the literature.

[2]In our analysis, we focus mostly on emotional stability and conscientiousness because the literature shows that

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bility refers to a person's ability to remain calm when faced with pressure or stress and to not easily become anxious. Conscientiousness describes the tendency to be organized, practical, dependable, and self-disciplined.

We obtain the information needed to construct these measures and a rich set of variables of interest and controls from the Longitudinal Internet Studies for the Social Sciences (LISS). This panel comprises a representative sample of more than 7,000 individuals in the Netherlands who were regularly surveyed from 2008 to 2017.

The richness of the data allows us to quantify the effect of noncognitive abilities on financial distress and identify the importance of different channels underlying this relation. We provide evidence that people in the lowest quintiles of both emotional stability and conscientiousness have a ten times higher probability of experiencing distress compared to people in the highest quintiles. Using a Fairlie-Blinder-Oaxaca decomposition, we find that financial choices explain more than one third of the aforementioned differential in the distress probability between low- and high-ability individuals, and financial insight explains another one third. By contrast, the income channel explains a relatively smaller part (23%) of the higher likelihood of low-skill individuals to experience distress.

We further disentangle these economic channels by estimating the relative importance of specific choices and behaviors. Among the financial choices, we find that having unsecured debt and lacking a financial wealth buffer are the most important factors explaining the differential exposure to distress between low- and high-ability people. Regarding the financial insight channel,

these two traits matter most frequently for economic choices and outcomes. Furthermore, intuitively, these two traits can be interpreted as "abilities" since they consistently have a *beneficial* influence on financial choices, labor income, financial insight, health outcomes, and criminal behavior (our own estimates and see, for instance, Almlund, Duckworth, Heckman, and Kautz (2011)). By contrast, the other three traits have detrimental effects in some domains and beneficial effects in others. The choice of the main explanatory variables is discussed further in Section I.

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impulsive buying behaviors explain one third of the entire differential in distress exposure. Finally, focusing on the income channel, being on disability and health status are overall the most relevant determinants of the distress differential. We find that the income level *per se* is of secondary importance.

To alleviate potential endogeneity concerns, we perform three additional sets of tests. First, to address the presence of confounding factors, we include a battery of controls including preferences and behavioral traits. Furthermore, we establish that noncognitive abilities still have a sizable influence on financial distress when controlling for income variables. Second, to mitigate potential reverse causality issues, we exploit the panel dimension of our data. This allows us, for instance, to show that noncognitive abilities predict financial distress five years later. Third, we instrument emotional stability in adulthood using childhood trauma. The rationale behind this test is that traumatic experiences during childhood affect emotional stability, but are arguably exogenous to financial outcomes in adulthood. Overall, the empirical evidence supports a causal interpretation of our findings.

The role of noncognitive abilities has sparked mounting interest in the economic and psychology literature alike. Closely related to our paper, Xu, Beller, Roberts, and Brown (2015) find a contemporaneous correlation between noncognitive abilities and measures of financial distress in a cross section of young adults. However, the authors acknowledge that their conclusions are potentially affected by reverse causality, as financial distress may influence respondents' emotional stability. Furthermore, in a contemporaneous paper, Kuhnen and Melzer (2017) examine the influence of the self-efficacy of young adults on their financial delinquency behavior.[3] Donnellan,

[3]We run a similar analysis as that conducted by Kuhnen and Melzer (2017) by using a closely related measure of self-efficacy, locus of control, and we find similar results. Interestingly, when we include our measures of emotional stability and conscientiousness, locus of control becomes insignificant. This is possibly because locus of control is subsumed by conscientiousness.

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Conger, McAdams, and Neppl (2009) find a significant relation between noncognitive abilities and economic hardship among young adults and Rustichini, DeYoung, Anderson, and Burks (2016) map survey questions onto the Big Five traits and show a relation with the credit scores of trucker trainees.[4]

Our paper differs from previous literature in its research objective, scope, and overall data quality and representativeness. Specifically, we are the first to quantify the importance of the different economic channels through which noncognitive abilities affect financial distress. Second, our data allow us to account for the effect of important covariates that are often overlooked by related papers, such as cognitive abilities, preferences, and income. We thus provide a precise estimation of both the aggregate effect of noncognitive abilities on distress and the net effect after accounting for income and preferences. Third, we are the first to use an instrumental variable (IV) approach to establish a causal effect of noncognitive abilities on financial distress. Finally, our representative sample of adults allows us to mitigate selection bias concerns that limit the scope of several related papers.

Our paper makes a number of contributions to the literature. A growing number of papers focus specifically on the importance of *cognitive* abilities in explaining stock market participation

[4]In addition, several papers posit that economic choices and outcomes are correlated with noncognitive abilities. A number of papers in psychology and economics show a link between indebtness and self-control (Gathergood (2012b)), psychological health (Gathergood (2012a)), and noncognitive abilities (Brown and Taylor (2014)). The latter two papers use the British Household Panel Survey (BHPS). This survey is composed of several waves and samples a representative set of individuals. However, the BHPS lacks information on important control variables (such as financial literacy, numeracy, and preferences), noncognitive abilities are asked only in one wave, and the data do not allow to rule out reverse causality concerns (see the discussion in Brown and Taylor (2014)). Relatedly, a number of papers link personality features to economic outcomes, such as receiving financial assistance (Gillen and Kim (2014)), and savings and wealth accumulation (e.g., Cobb-Clark, Kassenboehmer, and Sinning (2016); Duckworth and Weir (2010); Letkiewicz and Fox (2014); Mosca and McCrory (2016); and Nyhus and Webley (2001)). Furthermore, Otero-López and Pol (2013) and Thompson and Prendergast (2015) document a relation between personality traits and compulsive buying. In labor economics, several papers show that noncognitive abilities relate to labor income, such as Carneiro, Crawford, and Goodman (2007) and Gensowski (2018). Almlund, Duckworth, Heckman, and Kautz (2011) and Borghans, Duckworth, Heckman, and Ter Weel (2008) provide a more extensive review of the literature.

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and financial mistakes.[5] In this paper, by contrast, we emphasize the importance of *noncognitive* abilities. We find that these abilities are particularly relevant for households and possibly explain more of the variation in financial distress than cognitive abilities do.

Furthermore, our paper relates to the empirical literature exploring the determinants of financial outcomes and decisions.[6] Recent research shows that important sources of financial distress are health shocks (Gross and Notowidigdo (2011)), employment shocks (Elul, Souleles, Chomsisengphet, Glennon, and Hunt (2010)), and unsecured debt (e.g., Carrell and Zinman (2014) and Skiba and Tobacman (2015)). In addition, a recent series of papers posit that genes play a role in explaining the heterogeneity in financial behaviors (e.g., Cesarini, Johannesson, Lichtenstein, Sandewall, and Wallace (2010); Cronqvist and Siegel (2014); Cronqvist and Siegel (2015); and Cronqvist, Previtero, Siegel, and White (2016)). By documenting the relation between financial choices and noncognitive abilities, which are to some degree genetically determined, we provide a potential connection between genetic heritage and financial wellbeing, as also argued in Xu, Briley, Brown, and Roberts (2017).[7]

To understand the role of noncognitive abilities is important from a policy perspective. We give four examples. First, while it is difficult to alter noncognitive abilities after childhood, these

[5] Grinblatt, Keloharju, and Linnainmaa (2011) relate cognitive abilities to stock market participation, diversification, and Sharpe ratios and Grinblatt, Ikäheimo, Keloharju, and Knüpfer (2015) show that high-IQ investors avoid funds with high management fees. Furthermore, Agarwal and Mazumder (2013) analyze the effect of cognitive abilities on the propensity to make financial mistakes regarding the optimal usage of credit cards and home equity loan applications. Both Grinblatt, Keloharju, and Linnainmaa (2011) and Agarwal and Mazumder (2013) obtain their measures for cognitive ability from military test scores. Furthermore, there is a vast literature emphasizing the importance of financial literacy for households' financial choices (e.g., Behrman, Mitchell, Soo, and Bravo (2012); Lusardi and Mitchell (2008); Lusardi and Mitchell (2011); Lusardi and Mitchell (2014); and van Rooij, Lusardi, and Alessie (2011)).

[6] Previous papers argue that financial choices are influenced by trust (Guiso, Sapienza, and Zingales (2008)), optimism (Puri and Robinson (2007)), ambiguity attitudes (Dimmock, Kouwenberg, Mitchell, and Peijnenburg (2016)), political preferences (Kaustia and Torstila (2011)), health status (Rosen and Wu (2004)), and obesity (Guthrie and Sokolowsky (2017)).

[7] Using a data set of young adults and a short version of our personality survey, Xu, Briley, Brown, and Roberts (2017) show that half of the variation in financial distress is genetically influenced and argues that personality is associated with financial distress through the genetic endowment.

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abilities could be nurtured at an early stage of life with targeted school programs (e.g., Chetty, Friedman, Hilger, Saez, Whitemore Schanzenbach, and Yagan (2011) and Heckman, Moon, Pinto, Savelyev, and Yavitz (2010b)). Second, assessing noncognitive abilities could help identifying which individuals are more exposed to the risk of financial distress (e.g., using online surveys).[8] Third, targeted policy interventions aimed at stimulating greater financial knowledge could prove more effective than subsidies, as we find that noncognitive abilities influence distress relatively more through poor financial awareness/choices than through income shocks. Finally, our analysis may provide insight for bankruptcy law design. Specifically, if financial distress is mostly caused by adverse shocks (e.g., bad luck), a policy favoring forbearance measures will potentially be welfare improving, as the likelihood of recurrence is low. However, we find that noncognitive abilities, which are mostly persistent in adulthood, are an economically significant source of financial distress. If the financial distress of a person stems from low noncognitive abilities, debt forgiveness policies will potentially be less effective, as the likelihood of recurrence may be high. More research on the sources and persistence of financial distress is however necessary before providing definitive policy recommendations.

I. Measuring noncognitive abilities

The economics literature provides evidence on the influence of cognitive and noncognitive abilities on labor income, employment, health behaviors, and educational attainment. In finance, while a

[8] An assessment of noncognitive abilities is becoming increasingly popular among providers of financial services. For instance, Barclays uses an online module, which is called "Financial Personality Assessment," to determine the investment profile of clients. The module asks four questions aimed at measuring emotional stability. In particular, respondents need to rank how much they agree with the following statements: I fear for the worst; I am not easily bothered by things; I get stressed easily; Uncertainty makes me uneasy, anxious or stressed (see `https://wealth.barclays.com/en_gb/home/others/understanding-your-financial-personality.html`).

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few papers explore the role of cognitive abilities, noncognitive abilities have largely been ignored. In this section, we survey the related literature in economics, as this provides guidance on which measures should be used in our analysis. Furthermore, we provide details on our measurement of noncognitive abilities.

A. *Measures of noncognitive abilities in the literature*

There is broad agreement on using personality traits to measure noncognitive abilities. However, previous literature uses a variety of different traits. This lack of uniformity largely stems from limited data availability. Our goal in this section is twofold. First, we make the case that our two measures of noncognitive abilities, emotional stability and conscientiousness, are the appropriate measures to use. Second, we highlight the close relation between these measures and alternatives used in the literature.

The framework that we use was originally developed in psychology and is increasingly used in economics. In a paper assessing the long-term consequences of improving noncognitive abilities on labor market outcomes, Heckman, Pinto, and Savelyev (2013) write that "the most influential taxonomy of personality skills is the Big Five personality inventory (...). The Big Five was codified long after the Perry experiment[9] was conducted. We only have access to psychological measures of personality skills developed before the Big Five was codified." Unlike Heckman, Pinto, and Savelyev (2013), we are able to extract the Big Five personality traits from our data.

[9]The Perry Preschool Study is an experimental intervention carried out from 1962 to 1967, providing high-quality preschool education to low-IQ African-American children aged three to four living in poverty and assessed to be at high risk of school failure. Borghans, Duckworth, Heckman, and Ter Weel (2008) state that "the power of traits other than cognitive ability for success in life is vividly demonstrated by the Perry Preschool study." Conti, Heckman, and Pinto (2016), Heckman, Moon, Pinto, Savelyev, and Yavitz (2010a), Heckman, Moon, Pinto, Savelyev, and Yavitz (2010b), and Heckman, Pinto, and Savelyev (2013) show that altering the noncognitive abilities of these preschoolers improved their life outcomes, including education, employment, earnings, and health, and reduced the likelihood of criminal behaviors.

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In our analysis, we consider two of the Big Five personality traits as measures of noncognitive abilities, and the remaining three as controls. The reason for focusing on conscientiousness and emotional stability is twofold. First, the literature shows that these are the traits that matter most frequently for economic choices and outcomes. In their review of the literature on noncognitive abilities and economic outcomes, Almlund, Duckworth, Heckman, and Kautz (2011) state that "a growing body of evidence suggests that personality measures—especially those related to conscientiousness, and, to a lesser extent, neuroticism—predict a wide range of outcomes."[10] Second, conscientiousness and emotional stability can both be interpreted as "abilities" rather than just personality features. Higher scores in conscientiousness and emotional stability are unequivocally better for most economic outcomes. By contrast, higher scores in, for instance, extraversion might not be advantagous in all domains. Intuitively, extraverted people are likely better at networking on the job but possibly less restrained in their consumption behavior. This intuition is supported by the data since several papers show that conscientiousness and emotional stability consistently have a *beneficial* influence in a number of domains, such as financial outcomes and choices, labor income, financial insight, educational achievements, health outcomes, and criminal behavior (see, for instance, Almlund, Duckworth, Heckman, and Kautz (2011); Borghans, Duckworth, Heckman, and Ter Weel (2008); and Xu, Beller, Roberts, and Brown (2015)). By contrast, depending on the domain, the other three traits can have beneficial or detrimental effects (or no effect at all). People that score high on agreeableness tend to exhibit *better* financial insight (e.g., Donnelly, Iyer, and Howell (2012) and Otero-López and Pol (2013)), but make *worse* financial choices (e.g., Brown and Taylor (2014); Duckworth and Weir (2010)), have *lower* income, and are more often unemployed or disabled (e.g., Becker, Deckers, Dohmen, Falk, and Kosse (2012) and Gensowski

[10]Neuroticism is the negative pole of emotional stability.

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(2018)). This is confirmed using our own data set, see Tables A14, A15, and A16 in Online Appendix F. Therefore, the interpretation of the other three traits as abilities appears problematic.

Instead of using the Big Five personality traits, several papers in economics employ available survey questions and relate them to emotional stability and conscientiousness. For instance, Heckman, Pinto, and Savelyev (2013) obtain 43 different personality measures for children in the Perry Preschool Study, which, using factor analysis, are summarized into three abilities: cognition, externalizing behavior, and academic motivation. Externalizing behavior is mostly related to our measure of emotional stability, while academic motivation is related to conscientiousness. Furthermore, Rustichini, DeYoung, Anderson, and Burks (2016) use a data set of trucker trainees to show the predictive power of noncognitive abilities for credit score, job persistence, and healthy behaviors. The authors do not have direct measures of the Big Five personality traits but explicitly map the available survey questions onto these traits.[11] Overall, there is a general consensus on measuring noncognitive abilities on the basis of emotional stability and conscientiousness or, alternatively, related measures when these two personality traits are not available.

B. Construction of the measures of noncognitive abilities

The intuition behind what our measures capture is best illustrated using trait adjectives describing individuals who score high (low) on each trait. These are shown in Table A3 of Online Appendix

[11] As further examples, another widely used data set to study the influence of noncognitive abilities on economic outcomes is the National Longitudinal Survey of Youth of 1979 (NLSY79). The NLSY79 asks mothers to answer a questionnaire about their children between the ages of three and six (Cunha, Heckman, and Schennach (2010)). Among other traits, they use a child's tendency to be anxious and depressed as a proxy for noncognitive ability. This measure is tightly linked to our emotional stability measure. Using Swedish data, Lindqvist and Vestman (2011) provide evidence that emotional stability affects wages and the probability of unemployment by using data from interviews conducted by psychologists with individuals enlisted in the military. Furthermore, Lindqvist and Vestman (2017), using similar data, focus on investment behaviors. Additionally, Kuhnen, Samanez-Larkin, and Knutson (2013) show in a lab experiment on 60 individuals that the part of emotional stability that is shaped by genes relates to hypothetical financial choices.

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A. Emotional stability refers to a person's ability to remain calm when faced with pressure or stress and to not be inclined to anxiety or to act impulsively. Conscientiousness describes the tendency to be organized, practical, persistent, self-disciplined, and achievement oriented (e.g., McAdams (2013)).

In our sample, emotional stability and conscientiousness are measured using the 20 standard questions developed in the seminal paper by Goldberg (1992) reported in Table VI of the Appendix. Importantly, these questions are asked without reference to any context, which limits the risk of mechanical correlations. For example, a respondent would be more likely to answer that she gets stressed easily *about her financial situation* if her financial situation is bad, thereby inducing a mechanical correlation in the data. Respondents receive the following instruction: "Please use the rating scale below to describe how accurately each statement describes you: (1) very inaccurate, (2) moderately inaccurate, (3) neither inaccurate nor accurate, (4) moderately accurate, (5) very accurate." The respondents are not informed what the questions are intended to measure and the order of the questions is random. We summarize the 10 questions related to conscientiousness into one measure by using factor analysis. We do the same for emotional stability.

There is evidence that these traits describe to a certain degree permanent characteristics reflecting early life experiences and genetic endowments. Some studies find that the heritable part of noncognitive abilities is greater than 50% and that the influence of the external environment after childhood is limited (e.g., Bouchard and Loehlin (2001) and Bouchard and Matt (2003)). The exact fraction of noncognitive abilities that is determined by genetics is however still an ongoing topic of research. Important for our study is the stability of noncognitive abilities during adulthood, as it mitigates reverse causality concerns. In a review of over 150 longitudinal studies, Roberts and DelVecchio (2000) show that noncognitive abilities tend to become increasingly stable with age.

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Abilities measured for the same set of individuals from six to 30 years later display correlations between 60% and 80% with the original measurement (Costa Jr and McCrae (1994)).

Using our data, we confirm that individuals' noncognitive abilities are remarkably stable over time. For conscientiousness, serial correlations range between 0.66 and 0.88 (depending on the combination of years) and those for emotional stability range between 0.66 and 0.81. These correlations appear sizeable, especially taking into account the likely presence of noise in the measurement. To provide additional evidence on the persistence of noncognitive abilities, we show that, on average, the rank of the respondents sorted by noncognitive abilities in 2008 is preserved over time (see Figure A1 in Online Appendix B).

As noncognitive abilities are largely stable during adulthood, we take averages over time for each individual in our sample. The use of averages increases the number of available observations because, e.g., the same respondent might answer the noncognitive abilities questions in 2009 and 2011 but not in 2010. More importantly, the use of averages attenuates minor fluctuations over the years due to reporting error and isolates the core fundamental differences across individuals. Results obtained without averaging noncognitive abilities are reported in Online Appendix B. The exact value of these variables has no specific interpretation other than providing a ranking among individuals. We therefore standardize our two measures to make the interpretation of the regression coefficients more intuitive.

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II. Data

A. *Description of the LISS dataset*

The data source for this study is the LISS panel (Longitudinal Internet Study for the Social Sciences), a representative household survey conducted by CentERdata at Tilburg University, in the Netherlands. Several papers in economics are based on the same data (e.g., Cherchye, De Rock, and Vermeulen (2012); Dimmock, Kouwenberg, and Wakker (2015); and Noussair, Trautmann, and van de Kuilen (2014)). The panel has been operational since October 2007 and we use data from 2008 to 2017. Our sample comprises 13,145 individuals drawn randomly from the population register by Statistics Netherlands. Due to attrition and the subsequent addition of new individuals, at each point in time our cross section includes around 7,000 individuals.

The survey is computer based and subjects can participate from home. To limit selection bias, individuals who cannot otherwise participate are provided with a computer and an Internet connection. To encourage participation and retention, subjects are paid for each survey they complete. This data set is particularly suited for our research, since one of the annual survey modules asks standard questions aimed at measuring noncognitive abilities following the Big Five personality framework. The data set also contains several measures of financial distress along with an extensive set of demographic controls and variables related to preferences and cognitive abilities. Furthermore, we have fielded our own custom-designed survey module to obtain additional outcome and control variables. Online Appendix A provides further details on the LISS panel.

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B. *Outcome variables*

The variables are described in Table VII of the Appendix and Table VIII presents the summary statistics. Several of the variables of interest are measured annually. However, the response rates vary over time. Furthermore, some of the surveys are not asked every year, which decreases the number of available observations.

Importantly, most of the variables we consider in our analysis are obtained by combining different surveys (modules) of the LISS panel. For some of the variables of interest, we have only one or two years of data, as the corresponding survey has not been fielded regularly. This is, for instance, the case for *Unsecured debt*, *Bad credit score*, *Overview financial situation*, and *Automatic payments*. We report the years in which each variable is available in Table A1 of Online Appendix A.

C. *Control variables and instrument*

Noncognitive abilities are rather stable and to a certain degree determined before birth or at an early stage of life (see the discussion in Section I.B). This suggests that these traits are likely exogenous to most external factors. Nonetheless, in our baseline analyses, we include a battery of controls to provide a cleaner estimation of the effect on financial distress when other covariates are accounted for. Table VII in the Appendix defines all the control variables and Table VIII reports the summary statistics.

It is important to acknowledge that noncognitive and cognitive abilities are likely correlated. For instance, the numeracy score obtained in the survey can be influenced by anxiety (Borghans, Duckworth, Heckman, and Ter Weel (2008)). We mitigate this concern by including proxies for

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cognitive ability and educational attainment (dummy variables *High school* and *College*). Furthermore, we use nine numeracy questions to obtain a numeracy score and we measure financial literacy as the number of correct responses to three standard financial literacy questions (see Online Appendix C for details).

Preferences and noncognitive abilities are also potentially correlated. In our analysis, we control for risk aversion inferred using quantitative questions, following Noussair, Trautmann, and van de Kuilen (2014). In addition, we add a qualitative self-reported measure of risk aversion and a quantitative measure for ambiguity aversion. Furthermore, we control for several behavioral traits: trust, optimism, and the other three Big Five personality traits: agreeableness, extraversion, and openness.

Demographics are updated each year (see Table A1 in Online Appendix A), hence we do not have to impute the related variables. However, several questions eliciting behavioral traits and preferences are not frequently asked as they are not part of a core survey module. In particular, numeracy, financial literacy, risk aversion, and ambiguity aversion are based on custom-designed surveys by groups of researchers and are therefore only available for a couple of years. We use two methods to impute missing observations: first, we use backward/forward imputation and, second, we use group median imputation. Using backward/forward imputation, we fill in the existing gaps by carrying backward and forward in time the available values for an individual (under the assumption that these variables are rather stable over time). Column N_2 in Table VIII of the Appendix shows the resulting number of observations. In a second step, if a person never reports a value for a particular variable, we use group median imputation. The missing numbers are replaced by medians from individuals in the same demographic group. Groups are based on gender, education, and income categories. This is a standard way of dealing with missing observations in

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household surveys (a similar approach is used in, e.g., the Survey of Consumer Finances (SCF) sponsored by the Federal Reserve Board) and allows us to expand the analysis to the entire data set. Column N_3 in Table VIII of the Appendix shows the resulting number of observations. We furthermore add missing data dummy variables in all specifications. Importantly, we never impute outcome variables and noncognitive abilities. Our main results are similar when using different methods to deal with missing observations (see Table A2 in Online Appendix A). Online Appendix A provides further details on the imputation method and the LISS panel in general.

III. Empirical results

In this section, we explore the relation between noncognitive abilities and financial distress, and the channels behind this relation. For all models, we report robust standard errors clustered at the household level. Furthermore, when indicated, we include time fixed effects to control for fluctuations in the outcome variables at an aggregate level.

A. Household financial distress

A simple graphical representation shows that people in the bottom quintile of both emotional stability and conscientiousness have an almost tenfold higher probability of being in financial distress compared to those in the top quintile (see Figure 1). Table I presents the estimates from a multivariate framework (marginal effects are reported); the number of observation is kept constant across specifications to facilitate the comparison of coefficients. Consistent with Figure 1, we find that noncognitive abilities are negatively related to the probability of being in financial distress when no other covariates are included (see Column (1)). These results are consistent with Donnellan,

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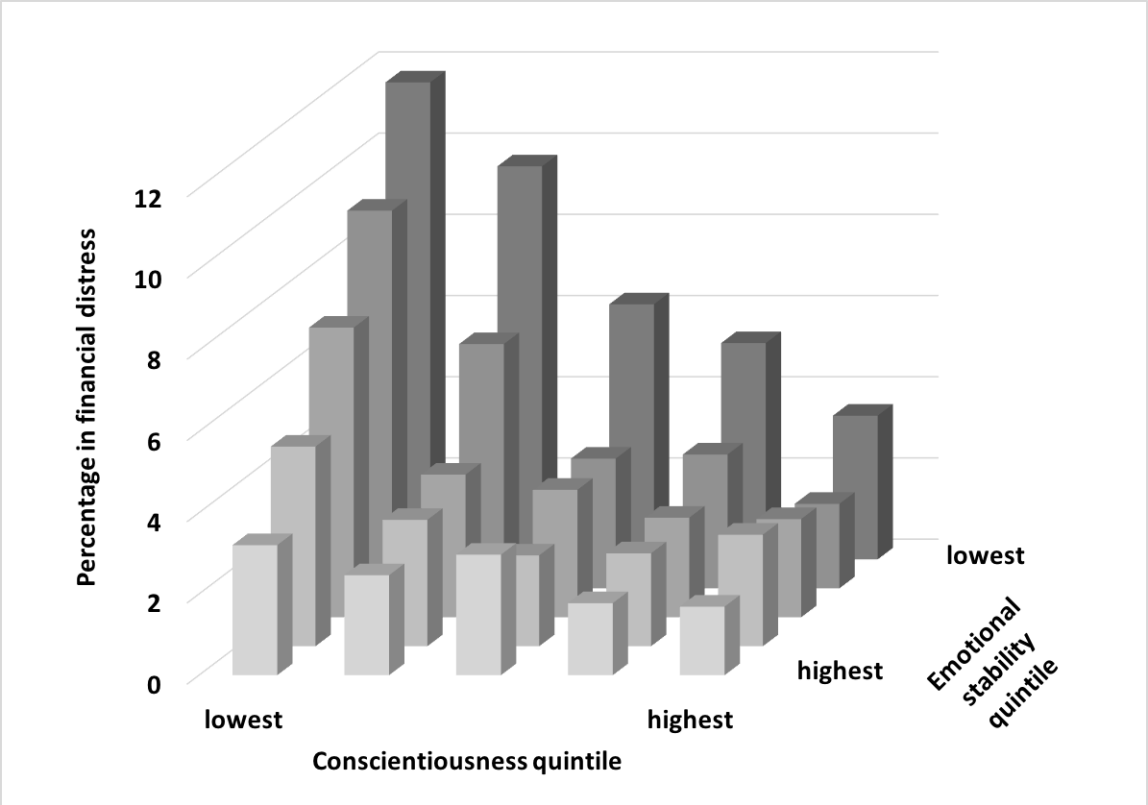
Conger, McAdams, and Neppl (2009) and Xu, Beller, Roberts, and Brown (2015).

Figure 1: Financial distress by quintile of emotional stability and conscientiousness
Percentage of households in financial distress by quintile of emotional stability and conscientiousness. Financial distress is measured as being delinquent on mortgage payments, rent payments, utility bills, or other bills.



The results in Column (2) report the effect of cognitive abilities and education (high school dummy, college dummy, financial literacy, and numeracy) on distress, while excluding our two measures of noncognitive abilities. As expected, the signs of the coefficients are all negative. In Column (3) we document the relation between financial distress and preferences and behavioral traits.[12]

[12]A direct comparison of the pseudo R-squared estimates is problematic. However, we rerun our analysis using a linear probability model (without using group median imputation) to obtain the adjusted R-squared values. These estimates indicate that the explanatory power of noncognitive abilities in our sample is three times that of cognitive abilities and education and twice that of preferences and behavioral traits.

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Table I: Noncognitive abilities and financial distress

This table shows marginal effect estimates from probit regressions. The dependent variable is equal to one if the respondent is in financial distress, measured as being delinquent on mortgage payments, rent payments, utility bills, or other bills. Column (1) includes our two measures of noncognitive abilities. Column (2) includes education, financial literacy, and numeracy. Column (3) includes risk aversion (from lottery choices and self-reported), ambiguity aversion, trust, and optimism. Column (4) includes our two measures of noncognitive abilities, education, financial literacy, numeracy, risk aversion (from lottery choices and self-reported), ambiguity aversion, trust, optimism, other personality traits (agreeableness, extraversion, and openness), other demographics (male, children living at home, age, age squared, home ownership, partner, and residence in a rural area), time fixed effects, and missing data dummies. In addition to the independent variables in Column (4), Column (5) includes income variables: income, percentage drop in income (if any), unemployed, on disability, and health status. Column (6) includes the same variables as Column (5) except that noncognitive abilities are lagged and not averaged. The income variables are not imputed (neither by backward/forward imputation nor by group median imputation). All models include a constant term. The sample is identical in all specifications to facilitate comparison of the coefficients. Standard errors are clustered by household and appear in parentheses. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Noncognitive abilities						
Emotional stability	-0.0134***			-0.0065***	-0.0041***	
	(0.0019)			(0.0015)	(0.0014)	
Conscientiousness	-0.0111***			-0.0074***	-0.0068***	
	(0.0019)			(0.0014)	(0.0014)	
Lagged emotional stability						-0.0039***
						(0.0012)
Lagged conscientiousness						-0.0061***
						(0.0012)
Cognitive abilities						
Financial literacy		-0.0110***		-0.0057***	-0.0053***	-0.0054***
		(0.0025)		(0.0018)	(0.0018)	(0.0018)
Numeracy		-0.0038***		-0.0029***	-0.0025***	-0.0025***
		(0.0010)		(0.0007)	(0.0007)	(0.0007)
High school		0.0046		0.0034	0.0035	0.0035
		(0.0074)		(0.0051)	(0.0050)	(0.0050)
College		0.0078		0.0049	0.0062	0.0062
		(0.0071)		(0.0051)	(0.0049)	(0.0049)
Preferences and behavioral traits						
Risk aversion			-0.0001	-0.0041	-0.0041	-0.0043
			(0.0042)	(0.0030)	(0.0029)	(0.0030)
Risk aversion self-assessed			-0.0019**	-0.0015**	-0.0016***	-0.0016***
			(0.0009)	(0.0006)	(0.0006)	(0.0006)
Trust			-0.0066***	-0.0024***	-0.0020***	-0.0020***
			(0.0007)	(0.0006)	(0.0005)	(0.0005)
Optimism			0.0131**	0.0059	0.0079*	0.0075*
			(0.0065)	(0.0041)	(0.0043)	(0.0043)
Ambiguity aversion			-0.0019	-0.0047	-0.0051	-0.0051
			(0.0041)	(0.0033)	(0.0032)	(0.0032)
Income variables						
Income					-0.0029***	-0.0030***
					(0.0011)	(0.0011)

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% Negative income shock					0.0339	0.0317
					(0.0207)	(0.0208)
Unemployed					0.0214**	0.0214**
					(0.0085)	(0.0085)
On disability					0.0084	0.0085
					(0.0058)	(0.0058)
Health status					-0.0062***	-0.0066***
					(0.0016)	(0.0016)
Other variables						
Agreeableness				0.0011	0.0007	0.0004
				(0.0014)	(0.0014)	(0.0014)
Extraversion				-0.0029*	-0.0026*	-0.0026*
				(0.0016)	(0.0015)	(0.0015)
Openness				0.0072***	0.0065***	0.0063***
				(0.0016)	(0.0015)	(0.0015)
Male				0.0090***	0.0098***	0.0096***
				(0.0028)	(0.0029)	(0.0029)
Children				0.0079**	0.0084**	0.0082**
				(0.0036)	(0.0035)	(0.0035)
Age				0.0022***	0.0017***	0.0017***
				(0.0006)	(0.0006)	(0.0006)
Age squared				-0.0000***	-0.0000***	-0.0000***
				(0.0000)	(0.0000)	(0.0000)
Partner				-0.0102***	-0.0105***	-0.0107***
				(0.0033)	(0.0034)	(0.0034)
Home ownership				-0.0271***	-0.0234***	-0.0239***
				(0.0048)	(0.0046)	(0.0046)
Rural				-0.0020*	-0.0020*	-0.0020*
				(0.0011)	(0.0011)	(0.0011)
Time fixed effects	no	no	no	yes	yes	yes
Observations	17,676	17,676	17,676	17,676	17,676	17,676
Pseudo R-squared	0.0419	0.0204	0.0266	0.161	0.174	0.174

A number of different covariates could, however, explain the relation between noncognitive abilities and financial distress. For instance, noncognitive abilities might be related to risk aversion and other preference parameters. In our baseline specification reported in Column (4), we control for cognitive abilities, preferences, demographics, and the other three personality traits.[13] This

[13]One concern with our result is that lower emotional stability could be associated with higher risk aversion and that our two related proxies do not fully account for this possibility. However, this seems ex ante unlikely. The correlation between our measures of risk aversion and emotional stability is rather low in our sample. More importantly, the estimated direction of the effect of emotional stability on a household's distress seems inconsistent with this measure capturing risk aversion. Specifically, lower emotional stability is associated with a higher probability of financial distress, whereas, if lower emotional stability were capturing higher risk aversion, the associated probability of being in financial distress should be lower. It would seem reasonable to expect a negative relation between risk aversion and financial distress, for instance, because risk-averse individuals should be more reluctant to engage in behaviors that increase their risk of distress. Therefore, it appears implausible that low emotional stability works as a proxy for high risk aversion.

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specification identifies an effect that is still statistically significant and economically large. Our estimates indicate that a one standard deviation increase in emotional stability results in a 0.65 percentage point decrease in the probability of being in financial distress (18.1% relative to the baseline rate of 3.6% in this sample), while a one standard deviation increase in conscientiousness is associated with a 0.74 percentage point decrease in the probability of being in financial distress (20.1% relative to the same baseline).

We also estimate the effect of noncognitive abilities on distress net of the effect through income variables. In labor economics, a large number of papers show that noncognitive abilities influence labor income (e.g., Heckman, Stixrud, and Urzua (2006) and Lindqvist and Vestman (2011)). In turn, income likely influences the probability of facing financial distress. When we do not control for income variables in specifications (1)-(4), we confound the direct effect of noncognitive abilities on financial distress with the indirect effect via income. In Column (5), we control for income by including proxies for the level of net income, the annual percentage drop in income (if any), and unemployment, disability, and health status (none of these variables are imputed). The estimated coefficients indicate that a one standard deviation increase in emotional stability is associated with a 0.41 percentage point decrease in the probability of financial distress (11.4% relative to the baseline rate of 3.6%) and a one standard deviation increase in conscientiousness is associated with a 0.68 percentage point decrease (18.9% relative to the baseline rate of 3.6%). Comparing Columns (4) and (5), we see that the coefficients of emotional stability and conscientiousness are respectively 37% and 8% lower when controlling for income. This suggests that part of the relation between noncognitive abilities and financial distress goes through an income channel. However, even when accounting for income variables, noncognitive abilities have a significant and economically large effect on financial distress. In Section III.B, we estimate the relative importance of income and other channels in explaining this relation.[14]

Column (6) reports the estimated coefficients when using *lagged* noncognitive abilities. Fur-

[14]Column (5) in Table I also highlights that income has overall a large impact on financial distress. In particular, a one standard deviation increase in the log of net income decreases the probability of being in distress by 0.25 percentage points (6.9% relative to the baseline of 3.6%). Furthermore, being unemployed raises the probability of distress by 2.1 percentage points (58.3% relative to the same baseline).

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thermore, in Table A4 of Online Appendix B we regress financial distress on noncognitive abilities, control variables, and income variables at different lags. While the number of available observations decreases, the results remain qualitatively similar even when we include noncognitive abilities with a lag of five years and controls for income variables for every year in the $t-1$ to $t-4$ range. Overall, this alleviates the potential concerns that distress influences noncognitive abilities rather than the other way around. Furthermore, this indicates that the income channel is not the most relevant channel in explaining the effect of noncognitive abilities on distress. In Table A5 of Online Appendix B, we also show that our results are robust to using alternative transformations of our noncognitive ability measures (rank transformations, above-median dummies, and dummies for the 10th and 90th percentiles).

Finally, we show that noncognitive abilities are also associated with proxies of more severe financial distress (see Table IX in the Appendix). We find that noncognitive abilities significantly affect the probability of being in arrears on rent or mortgage and utility bills for three months or more, the probability of having had a debt collector at the door, not being able to pay €500 of unexpected expenses without borrowing, and having a bad credit score.[15] The coefficients are smaller than those reported in Column (4) of Table I. This is partly due to the fact that *severe* distress is less prevalent with respect to our main distress measure. However, even accounting for that, we find that the effect of noncognitive abilities on proxies of severe financial distress is economically smaller than that on our main measure of distress. Overall, we conclude that noncognitive abilities strongly relate to financial distress.

B. Channels: financial choices, income (shocks), and financial insight

In this section, we explore the channels governing the relation between noncognitive abilities and financial distress. We conjecture that noncognitive abilities may give rise to distress via three main channels: i) financial choices, ii) income and income shocks, and iii) (lack of) financial insight.

[15] We have data on debt restructuring and asset repossession in 2017, but too few respondents experience this type of financial distress in 2017 to conduct a meaningful multivariate analysis.

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In the following, we first document the relation with noncognitive abilities; then, we estimate the relative importance of each channel in determining the higher exposure to distress of low- versus high-skilled individuals.[16]

Regarding the first channel, we focus on the following financial choices: financial wealth buffer, saving, unsecured borrowing, and mortgage-to-income ratio. Even though specific decisions in these domains are not unambiguously good or bad, previous research finds that, for instance, unsecured debt dramatically increases the probability of financial distress (e.g., Carrell and Zinman (2014); and Skiba and Tobacman (2015)). This suggests that poor financial choices likely influence the propensity of distress, thus providing a potential channel for our previous findings. Panel A of Table II presents the results from OLS and probit regressions. We find that people with lower noncognitive abilities tend to have a lower financial wealth buffer, a lower propensity to save out of their income[17], are more likely to have an unsecured loan, and have a higher mortgage-to-income ratio.[18] To increase readability, Table II only reports the main coefficients of interest. We show the full tables with all coefficients in Online Appendix F.

Panel B of Table II reports the relation between noncognitive abilities and income (shocks). We find that people with lower abilities tend to earn lower incomes and face larger negative income shocks (Columns (1) and (2)). Furthermore, we establish a negative relation between noncognitive abilities and the propensity to be unemployed or on disability, and a positive relation with health status (which is related to earning capacity). In Table A8 of Online Appendix B, we also show that noncognitive abilities relate to the number of years a person is unemployed or on disability.

[16] A number of results in the first step of the estimation (Table II) replicate previous findings in the literature (see, for instance, Donnelly, Iyer, and Howell (2012); Duckworth, Weir, Tsukayama, and Kwok (2012); Heckman, Stixrud, and Urzua (2006); Heckman, Humphries, and Veramendi (2017); and Kausel, Hansen, and Tapia (2016)). Our novel contribution lies in estimating the relative importance of the different channels in explaining financial distress (see Table III).

[17] We use a dummy variable instead of a continuous measure of savings. Börsch-Supan and Lusardi (2003) argue that "wealth, consumption, and income data are severely affected by measurement error and taking first differences (as when using wealth) makes the measurement error problem even more dramatic." Instead, our dummy measure of saving is easily interpretable, directly communicated by the individual, and similar to the measurements used by Puri and Robinson (2007) and in the Survey of Household Economics and Decision-making conducted by the Federal Reserve Board. In any case, our results are robust to using a continuous savings rate measure (results available upon request).

[18] In Online Appendix E, we show that noncognitive abilities relate significantly to the propensity to ask for advice.

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Table II: Noncognitive abilities and financial choices, income (shocks), and financial insight

Panel A shows the results of OLS regressions (Columns (1) and (4)), and probit regressions (Columns (2) and (3)). In Column (1), the dependent variable is the log of financial wealth. In Column (2), the dependent variable is equal to one if the respondent consumes less than her income. In Column (3), the dependent variable is equal to one if the respondent has one or more of the following: a loan from a family member, debit card debt, credit card debt, a personal loan, a student loan, or some other unsecured loan. In Column (4), the dependent variable is the mortgage-to-income ratio (this analyses is run on home owners only). Panel B shows the results of OLS regressions (Columns (1) and (2)), probit regressions (Columns (3) and (4)), and an ordered probit regression (Column (5)). In Column (1), the dependent variable is the log of net income. In Column (2), the dependent variable is the percentage decrease in income (if any). In Column (3), the dependent variable equals one if the respondent is unemployed. In Column (4), the dependent variable equals one if the respondent is on disability. In Column (5), the dependent variable is an ordinal variable ranging from one to five that measures the self-reported health condition. Panel C shows the results of ordered probit regressions (Columns (1) to (3)) and a probit regression (Column (4)). In Column (1), the dependent variable measures to what degree the respondent has an overview of her current financial situation. In Column (2), the dependent variable measures to what degree the respondent is inclined to buy impulsively. In Column (3), the dependent variable measures to what degree the respondent finds it easy to stick to a spending plan. In Column (4), the dependent variable is equal to one if the respondent uses automatic payments for bills. All models include a constant term and controls for risk aversion (lottery and self-reported), ambiguity aversion, numeracy, trust, optimism, financial literacy, agreeableness, openness, extraversion, male, children living at home, age, age squared, home ownership, education, partner, residence in a rural area, missing data dummies, and year dummies when indicated. The controls are suppressed for brevity. The table reports marginal effects. Standard errors are clustered by household and appear in parentheses. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Financial choices

	Financial wealth buffer	Saving	Unsecured debt	Mortgage-to-income ratio
	(1)	(2)	(3)	(4)
Emotional stability	0.0469	0.0380***	-0.0203***	-0.2499**
	(0.0379)	(0.0047)	(0.0059)	(0.1111)
Conscientiousness	0.2237***	0.0405***	-0.0366***	-0.1387
	(0.0367)	(0.0047)	(0.0058)	(0.0991)
Controls and constant	yes	yes	yes	yes
Time fixed effects	yes	yes	yes	yes
Observations	24,306	47,918	10,695	12,014
R-squared	0.2183	0.0563	0.111	0.2442

Panel B: Income (shocks)

	Income	% Negative income shock	Unemployed	On disability	Health status
	(1)	(2)	(3)	(4)	(5)
Emotional stability	0.0692***	-0.0015***	-0.0046***	-0.0113***	0.0225***
	(0.0210)	(0.0003)	(0.0009)	(0.0011)	(0.0011)
Conscientiousness	0.0681***	-0.0006*	-0.0034***	-0.0033***	0.0051***
	(0.0197)	(0.0003)	(0.0009)	(0.0010)	(0.0008)
Controls and constant	yes	yes	yes	yes	yes
Time fixed effects	yes	yes	yes	yes	yes
Observations	73,117	54,803	76,945	77,001	49,248
R-squared	0.2476	0.0084	0.0826	0.183	0.1007

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Table II: Noncognitive abilities and financial choices, income (shocks), and financial insight - Continued

Panel C: Financial insight

	Overview financial situation	Impulsive buying	Stick to plan	Automatic payments
	(1)	(2)	(3)	(4)
Emotional stability	0.0384***	-0.0024***	0.0392***	0.0161**
	(0.0059)	(0.0003)	(0.0059)	(0.0068)
Conscientiousness	0.1308***	-0.0041***	0.0848***	0.0107
	(0.0059)	(0.0005)	(0.0058)	(0.0067)
Controls and constant	yes	yes	yes	yes
Time fixed effects	yes	yes	no	no
Observations	10,711	10,705	5,456	5,456
R-squared	0.0731	0.0941	0.0501	0.0149

We find that, conditional on being unemployed, noncognitive abilities are negatively related to the number of consecutive years of unemployment. This indicates that, after losing their jobs, people with lower noncognitive abilities tend to remain unemployed for longer periods. We find similar results for the number of consecutive years on disability.

The third channel focuses on the degree of financial insight, referring to a person's tendency to plan for future financial needs as well as her awarness of her own current financial situation. Ameriks, Caplin, and Leahy (2003) argue that the propensity to plan is a crucial determinant of financial well-being. Panel C of Table II reports a positive relation between noncognitive abilities and a person's overview of her current financial situation and the use of external commitment devices such as automatic payments for bills. Furthermore, noncognitive abilities increase the propensity to stick to a financial plan, and reduce the impulse to buy without previous planning.[19] Related to our results, Vissing-Jørgensen (2012) finds that the default rates on consumer credit are higher when the purchased products are luxury goods, which suggests that the decision to buy luxuries is made impulsively and without careful assessment of its financial feasibility. Furthermore, the author reports that, when including person fixed effects, the influence of product type on delinquency diminishes significantly. In light of our findings, Vissing-Jørgensen (2012)'s evidence

[19]The latter result is consistent with previous research in psychology (see, e.g., Thompson and Prendergast (2015)). We are thankful to Annette Vissing-Jørgensen for her suggestion to look into impulsive buying.

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seems to suggest that person fixed effects capture the effect of noncognitive abilities.[20]

Overall, the results above indicate that noncognitive abilities influence financial choices, income (shocks), and financial insight. Yet, these findings offer no clear indication of the relative importance of each channel in determining the difference in exposure to financial distress between low- and high-ability individuals. In the following, we assess the contribution of each channel. Table III presents results from a decomposition developed in Blinder (1973), Oaxaca (1973), Fairlie (1999), and Fairlie (2005). Grinblatt, Keloharju, and Linnainmaa (2011) use the same technique to assess the influence of IQ on stock market participation via different channels.

To perform the decomposition, we generate two groups based on their noncognitive abilities. The first group (low-ability group) comprises individuals that are in the *lowest* quintile of both emotional stability and conscientiousness. The second group (high-ability group) consists of individuals that are in the *highest* quintile of both emotional stability and conscientiousness. In Panel A of Table III, we report the probabilities of facing distress for individuals in the two groups. The low-ability group has a 10.81% probability of facing distress, compared to a probability of only 1.13% for the high-ability group. The first step of the methodology consists of regressing *Distress* on all the channel variables of both groups combined, while omitting noncognitive abilities. These coefficient estimates allow us to calculate the independent contribution of each channel variable in explaining the difference in distress between the two groups. For instance, the independent contribution of the difference in financial wealth to the difference in distress is approximately equal to: $Distress^{la} - Distress^{ha} \approx \frac{1}{N}\sum_{i=1}^{N}\left[F(\hat{\alpha} + Financial\ wealth_i^{la}\hat{\beta}_1 + Other\ channel\ vars_i^{la}\hat{\beta}_2) - F(\hat{\alpha} + Financial\ wealth_i^{ha}\hat{\beta}_1 + Other\ channel\ vars_i^{la}\hat{\beta}_2)\right]$. The size of the smallest group is denoted by N (the size of the two groups differ as an effect of sorting on two variables), F is the cu-

[20]The Big Five framework presents personality traits at the most comprehensive level. Notably, each trait can be further decomposed into lower-level facets that capture different aspects of the overarching trait. Following the Costa and McCrae (1992) inventory, we decompose emotional stability in its lower-level facets *Non-anxious*, *Non-depressed*, and *Non-angry*, and conscientiousness into *Dutiful*, *Self-disciplined*, and *Orderly*. Results for the relation between the facets, financial distress, and the channel variables are discussed in Online Appendix D. Most facets are economically significant in these analyses and there is no discernible pattern that emerges in terms of certain facets being clearly more important than others (see Table A12). The fact that all facets of conscientiousness and emotional stability have a similar association with proxies of financial distress, financial choices, income, and financial insight, supports our choice of conducting the main analysis on the highest-level traits rather than on the lower-level facets.

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mulative distribution function of the standard normal distribution, i indexes a matched pair consisting of one high-ability and one low-ability individual, $Financial\ wealth_i^{la}$ ($Financial\ wealth_i^{ha}$) is the financial wealth of the low- (high-) ability individual in pair i, and $Other\ channel\ vars_i^{la}$ are the values of the other channel variables of the low-ability individual in pair i.

Intuitively, the contribution of each channel variable to the difference in distress rates is thus equal to the change in the average predicted probability obtained from replacing its distribution in the high-ability group with that of the low-ability group, while holding the distributions of the other variables constant. In the equation, each high- and low-ability observation is matched according to its rank in terms of predicted distress, e.g., the individual in the high-ability group with the *lowest* predicted probability of distress is matched with the individual in the low-ability group with the *lowest* predicted probability of distress. In our analysis, the high- and low-ability groups are not of equal size, hence we draw a random sample from the largest group equal to the size of the smallest group. We repeat this procedure 1,000 times as the specific random sample can influence the decomposition estimates. Furthermore, we randomize the sequencing of the changes in the channel variables, because the results may be sensitive to the specific order due to the nonlinearity of the decomposition equation (see Fairlie (2005) for details on the methodology).

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Table III: Relative importance of financial choices, income (shocks), and financial insight in explaining the relation between noncognitive abilities and financial distress

This table reports Fairlie-Blinder-Oaxaca decompositions. This analysis measures how much of the difference in the propensity to be in financial distress between a group of individuals with high noncognitive abilities and a group of individuals with low noncognitive abilities is explained by differences in (1) financial choices, (2) income (shocks), and (3) financial insight. The low-ability group consists of individuals that are in the lowest quintile of both emotional stability and conscientiousness. The high-ability group consists of individuals that are in the highest quintile of both emotional stability and conscientiousness. The financial choice variables are *Financial wealth buffer*, *Saving*, *Unsecured debt*, and *Mortgage-to-income ratio*. The income (shock) variables are *Income*, *% Negative income shock*, *Unemployed*, *On disability*, and *Health status*. The financial insight variables are *Overview financial situation*, *Impulsive buying*, *Automatic payments*, and *Stick to plan*. Some of these variables are only available in one year (*Stick to plan* and *Automatic payments*) or two years (*Overview financial situation*, *Impulsive buying*, and *Unsecured debt*). Therefore, we fill in missing observations by carrying backward/forward the available values, thereby ensuring that we have sufficient observations to conduct this analysis. The sample size in this analysis is 2,736. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Probability of distress by ability group

	Coefficient
Low noncognitive abilities group	*0.1081*
High noncognitive abilities group	*0.0113*
Difference Low - High ability group	*0.0969*

Panel B: Fairlie-Blinder-Oaxaca decompositions

Model:	Baseline		Income Channel		Income & Fin. Choice Channels		Income & Fin. Insight Channels	
	Coefficient (1)	% (2)	Coefficient (3)	% (4)	Coefficient (5)	% (6)	Coefficient (7)	% (8)
Contribution from differences in:								
Financial choices	***0.0315******	***32.5***			***0.0423******	***43.7***		
Financial wealth buffer	0.0114***	11.8			0.0148***	15.3		
Saving	0.0054***	5.6			0.0085***	8.8		
Unsecured debt	0.0117***	12.1			0.0146***	15.1		
Mortgage-to-income ratio	0.0027	2.8			0.0039	4.0		
Income (shocks)	***0.0223******	***23.0***	***0.0326******	***33.7***	***0.0254******	***26.2***	***0.0245******	***25.3***
Income	-0.0009	-0.9	0.0007	0.7	-0.0002	-0.2	-0.0003	-0.3
% Negative income shock	0.0000	0.0	-0.0001	-0.1	0.0000	0.0	-0.0001	-0.1
Unemployed	0.0015*	1.6	0.0031***	3.2	0.0022**	2.2	0.0018*	1.8
On disability	0.0104**	10.7	0.0193***	19.9	0.0144***	14.9	0.0126***	13.0
Health status	0.0113*	11.7	0.0096	9.9	0.0094	9.7	0.0107*	11.0
Financial insight	***0.0325******	***33.6***					***0.0544******	***56.2***
Overview financial situation	0.0078	8.0					0.0145**	15.0
Impulsive buying	0.0329***	34.0					0.0436***	45.0
Automatic payments	0.0028	2.9					0.0022*	2.3
Stick to plan	-0.0109	-11.3					-0.0061	-6.2
Total contribution of channels	***0.0863******	***89.1***	***0.0326******	***33.7***	***0.0677******	***69.9***	***0.0789******	***81.5***

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Focusing on Columns (1) and (2) in Panel B of Table III, we find that more than 89.1% (8.63%/9.69%) of the difference in distress exposure between the two groups can be explained by differences in financial choices, income (shocks), and financial insight. Specifically, differences in financial choices by low- versus high-ability individuals explain 32.5% (3.15%/9.69%) of the difference in the likelihood of experiencing financial distress. Equally important, financial insight accounts for 33.6% of the difference, while differential income and income shocks between the two groups are relatively less important (explain 23.0%). The remaining 11.0% of the effect of noncognitive abilities on financial distress is not explained by any of these channels. Note that the majority of income variables are not carried backward and forward as they are updated every time a person answers a new survey. By contrast, we need to use backward/forward imputation significantly to expand the coverage of our financial insight variables. Notably, this increases the noise in the measurement of these variables, which, if anything, should lead us to understate the relative importance of this channel vis-à-vis the income channel.[21]

We also explore the relative importance of the different sub-components of each channel. *Impulsive buying* accounts by itself for one third of the difference in financial distress between the two groups, making it the most important component overall. Also economically important are *Unsecured debt* and *Financial wealth buffer*, which explain respectively 12.1% and 11.8% of the difference in exposure to financial distress. Notably, *Being on disability* and *Health status* also explain a large part of the relation between noncognitive abilities and financial distress (10.7% and 11.7%, respectively).

We further explore why income variables are relatively less important with respect to the other two channels. This appears to be driven by two (related) considerations. First, we find income

[21] When carrying backward and forward the financial insight variables, we are implicitly assuming that the related values stay rather constant over time. To assess whether this is the case, we perform two tests. First, we find in unreported results that the Spearman's rank correlation between *Impulsive buying* in 2010 and 2017 is high (44%). We find a similarly high correlation (46%) for the *Overview financial situation* variable in 2010 and 2017. Second, we test whether financial distress, income levels, or financial choices predict a change in the financial insight variables, thereby raising endogeneity concerns. To that end, we regress the change in *Impulsive buying* and *Overview of financial situation* between 2017 and 2010 on lagged financial distress, lagged income variables, and lagged financial choice variables. None of the coefficients are significant. Overall, this suggests that financial insight variables are highly persistent over time and that the imputation is unlikely to bias our coefficients of interest.

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variables to be correlated with financial insight and financial choices. Running the decomposition including only income variables leads to (erroneously) infer that the income channel explains 33.7% of the differential probability of distress between low- and high-skilled individuals (see Column (4)). However, including variables from the other channels reduces the economic importance of the income channel by one third (the estimate falls to 23%). This suggests that income variables capture to a large extent the effect of financial choices and financial insight when these other channels are not accounted for. Second, impulsive buying and poor financial choices are economically more important than income variables (see Panel B of Table III). Hence, it is how individuals manage and spend their income that matters the most. To give an example, an income-rich individual that tends to buy impulsively can be more at risk of distress than an income-poor individual that carefully plans her buying behavior. All in all, this suggests that low income *per se* does not trigger the distress of low-skilled individuals.

Additionally, we find that the two noncognitive traits each affect the likelihood of facing distress via different channels. We replicate the Fairlie-Blinder-Oaxaca decomposition sorting individuals *separately* on emotional stability and conscientiousness. In this way, we aim at estimating which channels explain the effect of emotional stability on distress and which channels explain the effect of conscientiousness on distress. The results are presented in Table A9 of Online Appendix B. The financial choice, income, and financial insight channels explain respectively 29.9%, 32.0%, and 23.0% of the difference in the propensity to face distress between people with low emotional stability and people with high emotional stability. For conscientiousness, the percentage explained by the financial choice, income, and financial insight channels are 31.7%, 9.9%, and 32.4%, respectively. Hence, the income channel is the most important for explaining distress stemming from differences in *emotional stability*. By contrast, the income variables have little importance in explaining the differential probability of experiencing distress due to differences in *conscientiousness*. This appears to be driven by the finding that the economic magnitude of the effect of conscientiousness on income variables is quite limited in the first place compared with that of emotional stability (see Panel B of Table II).

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A concern might be that the importance of the income variables is understated as in some cases the values of *% Negative income shock* and *Health status* are imputed. Furthermore, a worry might be that financial distress influences noncognitive abilities and not vice versa.[22] To alleviate these concerns we perform a number of robustness tests. In Table A10 of Online Appendix B, we replicate the decomposition using noncognitive abilities lagged by one year and using only non-missing observations for the income variables. Furthermore, in Table A11 we lag noncognitive abilities by two years, we lag all channel variables by one year, and we only use non-missing observations for the channel variables. In this case, we cannot use all channel variables as the specific structure of our panel does not allow it. For instance, we only have the financial insight variables *Stick to plan* and *Automatic payments* in 2017 making it impossible to lag these variables, as we do not have financial distress in 2018. Hence, we use the two most important variables for each channel. In both alternative specifications, the financial insight and financial choices channels explain relatively more of the difference in the propensity to face distress between people with low and high noncognitive abilities compared to the income channel.

The results in this section also have implications for studies on the determinants of financial distress that overlook noncognitive abilities. A number of previous papers posit that impulsive buying, excess borrowing, or limited financial knowledge determine financial distress (e.g., Brown, Grigsby, van der Klaauw, Wen, and Zafar (2016) and Vissing-Jørgensen (2012)). Our results indicate that by omitting noncognitive abilities from models that study financial distress, the importance of these channels is likely overstated or should be interpreted differently, as these behaviors are all highly correlated with noncognitive traits. Our results also suggest that the effects of income shocks on personal distress may be overstated if financial choices and insight are not accounted for.

[22] In Tables A6 and A7 of Online Appendix B, we use the panel structure of our data to mitigate reverse causality concerns regarding the results in Tables II and IX.

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C. *Discussion: Incorporating noncognitive abilities in a theoretical framework*

The evidence in the previous sections points to an important role for noncognitive abilities in explaining the heterogeneity in financial choices and outcomes. However, it remains unclear how classical economic models should account for their role. A way to incorporate noncognitive abilities into theoretical models could be that of assuming a relation with traditional preference parameters. This approach finds however little support in the data, as recent empirical evidence suggests that noncognitive abilities and preferences have a complementary role in explaining important outcomes and behaviors (Becker, Deckers, Dohmen, Falk, and Kosse (2012)). Furthermore, the correlation between classical preference parameters and noncognitive abilities estimated empirically is low (according to both Becker, Deckers, Dohmen, Falk, and Kosse (2012) and our own estimates).

The literature modeling the economic mechanism through which noncognitive abilities affect choices is in its infancy. We are, however, able to provide some guidance by building upon Borghans, Duckworth, Heckman, and Ter Weel (2008), Chiteji (2010), and Heckman, Stixrud, and Urzua (2006). In particular, a possible way to incorporate noncognitive abilities into conventional economic models is as factors that influence the cost of effort and the productivity of effort.

The idea of cost of effort is closely related to the work of Sims. In particular, Sims posits that while people have access to a wealth of information, they have limited capacity in terms of processing ability. This, in turn, induces inertia in observed economic behavior (see, e.g., Reis (2006); Sims (1998); Sims (2003); and Sims (2006)). In financial economics, limits to the acquisition of information have been shown to be important in explaining seemingly "sub-optimal" behaviors such as over-exposure to one's own company risk, under-diversification, and home bias (Van Nieuwerburgh and Veldkamp (2006); Van Nieuwerburgh and Veldkamp (2009); and Van Nieuwerburgh and Veldkamp (2010)).

In the context of this paper, individuals might face *effort costs* as they find it boring or frustrating to spend time on financial tasks and keeping track of their financial situation (see Reis (2006)). In addition, the amount of capacity (effort) allocated to a financial task depends on the return from

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allocating capacity, i.e., *productivity of effort*. Individuals with low noncognitive abilities may allocate less capacity to financial tasks because their return for each unit of allocated capacity is lower.

This economic framework fits well in our setting. Consider a particular individual with certain noncognitive abilities who must decide how to handle her finances. The financial decisions she must make are time-consuming and arise from a combination of different tasks, such as keeping track of expenditures, gathering financial information, and meeting with financial advisers. Each of these tasks requires the allocation of some capacity in terms of time and effort. The success or failure in accomplishing all of these tasks jointly is going to determine an individual's financial situation. We posit that noncognitive abilities are important in determining how costly and rewarding it is to allocate time to these financial tasks. For instance, less emotionally stable people may find it more frustrating or boring to spend time making sound financial choices, thereby facing higher cost of effort, while less conscientious people are potentially worse at solving financial problems by gathering and efficiently processing information, thereby facing lower productivity of effort.

We attempt to find evidence consistent with these mechanisms using proxies for the cost of effort and the quantity of effort put towards financial tasks. Specifically, we use as a proxy for the cost of effort a measure of how boring and/or frustrating a person finds spending time on her financial administration (this is in line with Reis (2006), as the author suggests that the cost of planning reduces utility since people may find the process "annoying or frustrating").[23] The results reported in Column (1) of Table IV indicate that, consistent with the framework outlined in this section, higher noncognitive abilities are associated with lower cost of effort. Notably, a one standard deviation increase in conscientiousness is associated with a reduction in the cost of effort which is almost three time that of an analogous increase in emotional stability.

We also measure the *quantity* of effort exerted toward financial tasks by employing a dummy variable equal to one if a person spends more than one hour per month on her financial administration (unreported results with half an hour or one and a half hours are similar). The results

[23] Alternative approaches to measure attention costs are devised in Caplin, Dean, and Leahy (2017) and Caplin, Csaba, and Leahy (2018).

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Table IV: Noncognitive abilities in a theoretical framework: Cost of effort and productivity of effort

This table reports estimates from an ordered probit regression (Column (1)) and a probit regression (Column (2)). In Column (1), the dependent variable is an ordinal variable ranging from one to six that measures the degree to which the respondent finds it boring and/or frustrating to spend time on her financial administration. In Column (2), the dependent variable is equal to one if the respondent spends more than one hour per month on her financial administration. All models include a constant term and controls for risk aversion (lottery and self-reported), ambiguity aversion, numeracy, trust, optimism, financial literacy, agreeableness, openness, extraversion, male, children living at home, age, age squared, home ownership, education, partner, residence in a rural area, missing data dummies, and year dummies. The controls are suppressed for brevity. Standard errors are clustered by household and appear in parentheses. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Cost of effort	Quantity of effort
	(1)	(2)
Noncognitive ability: emotional stability	-0.0088***	-0.0129***
	(0.0015)	(0.0050)
Noncognitive ability: conscientiousness	-0.0230***	0.0142***
	(0.0018)	(0.0051)
Controls and constant	yes	yes
Time fixed effects	no	yes
Observations	5,456	16,511
Pseudo R-squared	0.0404	0.0506

in Column (2) indicate that more emotionally stable individuals spend less time on their financial administration, while conscientious individuals spend more time. In light of our previous results, this suggests that the time spent on financial matters by emotionally stable individuals is more productive, as they make better decisions in less time. When focusing on the possible inferences drawn from the results for conscientiousness, our interpretation is more tentative. We find that more conscientious people spend more time on their financial administration. However, we cannot disentangle whether it is this higher effort or a greater productivity (or both) that leads to better financial choices. Overall, our evidence points to the fact that noncognitive abilities could potentially be incorporated in an economic framework as factors influencing the cost of effort and the productivity of effort.

IV. Instrumental variable approach

Gutman and Schoon (2013), Heckman, Humphries, and Veramendi (2017), and Kautz, Heckman, Diris, Ter Weel, and Borghans (2014) emphasize the importance of building evidence for a *causal*

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relation between noncognitive abilities and economic behaviors. In this section, we perform additional tests to support a causal interpretation of previous results. A potential threat to our identification strategy arises because measurement error and unobserved factors could affect the estimates. To mitigate this concern, we instrument emotional stability in adulthood using childhood trauma. In Online Appendix B, we use the panel structure of the data to further alleviate reverse causality concerns.

Exposure to a traumatic event during childhood likely satisfies the requirements for a valid instrument. Several papers in psychology document that children who experience a trauma are more likely to suffer from emotional instability, depression, and anxiety in adulthood (e.g., Browne and Finkelhor (1986); and Fletcher and Schurer (2017)). At the same time, a traumatic event during childhood is not likely to have a *direct* effect on delinquency on payment obligations in adulthood, once we control for probable confounding effects, such as education and income.

It is, however, important to note that potentially other factors that we do not consider in our main analysis may correlate with both financial distress in adulthood and childhood trauma, thus violating the exclusion restriction. A first factor is the family background. Children from poor families may be more exposed to both traumatic experiences in childhood and financial distress in adulthood. A second factor is the relationship with the parents in adulthood. For example, parents who have neglected or abused their children in the past are arguably less willing or able to provide financial support to them in the future. A third factor is the external environment in which the person grew up: a child who is raised in a bad neighborhood is potentially more likely to experience a trauma *and* become insolvent at a later age.

We mitigate concerns about confounding effects by including a battery of additional controls. First, we add to our main specification several controls for the family background during childhood. These controls include proxies for the financial situation of the household during childhood, the exposure to financial distress in the household during childhood, the education level of the mother, and the education level of the father. Second, we control for whether a person receives financial help during adulthood using as proxies whether the parents are currently alive, the current

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relation with parents, whether a person is currently receiving help from the mother, and whether a person is currently receiving help from the father. Third, to address concerns about confounding effects due to the external environment, we also include two control variables for the characteristics of the neighborhood in which the person was raised: neighborhood safety during childhood and neighborhood prosperity during childhood.

We perform a number of tests to make sure that our instrument strongly correlates with emotional stability (while the exclusion restriction is not directly testable). The first-stage regression indicates that the effect of trauma on emotional stability is negative and significant at the 1% level (see Table V, Column (2)). Exposure to a traumatic event during childhood is associated with a decrease of emotional stability in adulthood of more than one third of one standard deviation. In addition, the Cragg–Donald Wald F-statistic is 618.8, which exceeds the rule of thumb for strong instruments ($F > 10$) proposed by Staiger and Stock (1997), as well as the 10% critical threshold value of Stock and Yogo (2005). Taken together, these results suggest that weak identification is unlikely to be a relevant concern in our setting.

The results from our IV probit analysis are presented in Table V. The IV coefficient is negative and statistically significant both for our baseline specification (Column (1)) and when additionally controlling for proxies for the family background during childhood, receiving help from parents in adulthood, and the neighborhood safety and prosperity during childhood (Column (3)). Comparing Columns (1) and (3), we find that the main coefficient of interest barely changes, thereby mitigating potential concerns about violations of the exclusion restriction. Under the assumption of a valid instrument, the coefficient measures the causal impact of emotional stability on financial distress. The coefficient is roughly six times larger in magnitude than that obtained using our baseline specification (3.58% versus 0.65%). The bias toward zero of our baseline estimate could be related to measurement error. For instance, individuals with low noncognitive abilities may be less likely to recall being delinquent on payment obligations, more likely to understate the severity of their financial situation, or more reluctant to disclose it (see, e.g., Bound, Brown, and Mathiowetz (2001)), thereby inducing a downward bias in our main coefficient of interest. Furthermore, the IV

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estimate measures a "local" effect that might be larger than the average treatment effect (see, e.g., Jiang (2017)). For instance, if people with lower noncognitive abilities are more likely to experience trauma, then the IV coefficient is inflated, as we find in untabulated results that the relation between noncognitive abilities and financial distress is stronger in this subsample. Overall, while the results in this section support our main conclusions, the IV coefficient potentially overstates the magnitude of the effect of noncognitive abilities on distress.

Table V: Childhood trauma as an instrument for emotional stability

This table shows the results from IV probit regressions (Columns (1) and (3)) and OLS regressions (Columns (2) and (4)). In Columns (1) and (3), the dependent variable is equal to one if the respondent is in financial distress, as measured by being delinquent on mortgage payments, rent payments, utility bills, or other bills. In Columns (2) and (4), the dependent variable is our measure of noncognitive ability: emotional stability. Childhood trauma is equal to one if the respondent was physically, psychologically, or sexually abused before the age of 18. All models include a constant term and controls for risk aversion (lottery and self-reported), ambiguity aversion, numeracy, trust, optimism, financial literacy, agreeableness, openness, extraversion, male, children living at home, age, age squared, home ownership, education, partner, residence in a rural area, missing data dummies, and year dummies. The models in Columns (3) and (4) include three sets of additional controls. First, controls for the family background during childhood: financial situation of the household during childhood, financial distress of the household during childhood, education level of the mother, and education level of the father. Second, controls for receiving help by parents in adulthood: parents currently alive, current relation with parents, currently receiving help from the mother, and currently receiving help from the father. Third, controls for the neighborhood during childhood: safety of neighborhood during childhood and prosperity of neighborhood during childhood. The *F*-statistics are estimated using a linear version of the model. The table reports marginal effects. Standard errors are clustered by household and appear in brackets. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	IV probit	OLS (first stage)	IV probit	OLS (first stage)
	Financial distress	Emotional stability	Financial distress	Emotional stability
	(1)	(2)	(3)	(4)
Noncognitive ability: emotional stability	-0.0353**		-0.0358**	
	(0.0147)		(0.0159)	
Childhood trauma		-0.4014***		-0.3812***
		(0.0423)		(0.0431)
Controls and constant	yes	yes	yes	yes
Controls for family background during childhood	no	no	yes	yes
Controls for help by parents in adulthood	no	no	yes	yes
Controls for neighborhood during childhood	no	no	yes	yes
Time fixed effects	yes	yes	yes	yes
Observations	33,520	33,520	33,520	33,520
Cragg–Donald Wald F-statistic	618.8		577.0	

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V. Conclusions

This paper provides evidence for how noncognitive abilities affect financial distress using a panel of more than 7,000 Dutch individuals surveyed over ten years. A number of empirical facts emerge from the data. First, individuals with lower noncognitive abilities face a significantly higher likelihood of being in financial distress (defined in several ways). Second, almost 90% of this relation can be explained by the influence that noncognitive abilities have on financial choices, income (shocks), and financial insight. In particular, people with lower noncognitive abilities make worse financial choices and have worse financial insight, each accounting for about one third of their higher probability of facing financial distress. The income channel is relatively less important, as it explains less than a quarter of the difference in the propensity to face distress between low- and high-ability individuals. To provide further support for a causal interpretation of our findings, we instrument emotional stability in adulthood with childhood trauma and, furthermore, establish that past noncognitive abilities predict future distress.

Our results have tentative policy implications. Unlike many behavioral traits, noncognitive abilities can be nurtured at an early stage of life when the personality of an individual is malleable. Educating young individuals to develop noncognitive abilities at school could decrease significantly the incidence of financial distress among adults. Furthermore, to alleviate adult financial distress, policy institutions could assess noncognitive abilities in the population and target those individuals that are more at risk of financial mistakes with financial education programs. In particular, our results stress the importance of reducing impulsive buying behavior and educating low-ability individuals on the consequences of poor financial choices. Finally, our results suggest that forbearance policies might be less effective if distress is due to low noncognitive abilities (instead of random negative shocks), as the likelihood of recurrence is high. More research on the role of noncognitive abilities and other factors influencing distress is however necessary to formulate precise policy recommendations.

We believe that there is scope for further work that builds on the results of this paper. Noncognitive abilities are likely to be important determinants of asset allocation decisions and may explain

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common financial mistakes such as under-diversification or trading too much or too little. Furthermore, this paper offers some guidance on how to incorporate noncognitive abilities into economic frameworks. Yet, more work is needed to corroborate and build on this set of results. In short, we believe that more research on the role played by noncognitive abilities could broaden our understanding of several aspects of financial economics.

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VI. Appendix

Table VI: Survey questions to measure noncognitive abilities and facets

The survey comprises 10 questions per noncognitive trait. A minus sign (-) after an item indicates that the question has a negative factor loading. The third column shows the facet associated with each question (if any).

Instruction for respondent: Please use the rating scale below to describe how accurately each statement describes you: (1) very inaccurate, (2) moderately inaccurate, (3) neither inaccurate nor accurate, (4) moderately accurate, (5) very accurate

Noncognitive ability	Survey question	Facet
(1)	(2)	(3)
Emotional stability	Get stressed out easily (-)	*Anxiety*
	Am relaxed most of the time	*Anxiety*
	Worry about things (-)	*Anxiety*
	Seldom feel blue	*Depression*
	Am easily disturbed (-)	*Anxiety*
	Get upset easily (-)	*Anger*
	Change my mood a lot (-)	*Depression*
	Have frequent mood swings (-)	*Depression*
	Get irritated easily (-)	*Anger*
	Often feel blue (-)	*Depression*
Conscientiousness	Am always prepared	*Self-discipline*
	Leave my belongings around (-)	*Orderliness*
	Pay attention to details	
	Make a mess of things (-)	
	Often forget to put things back in their proper place (-)	*Orderliness*
	Like order	*Orderliness*
	Shirk my duties (-)	*Dutifulness*
	Follow a schedule	
	Am exacting in my work	
	Get chores done right away	*Self-discipline*

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Table VII: Variable definitions

Variables in the LISS panel.

Outcome variables	
Financial distress: consumer delinquency	Indicator equal to one if the respondent is delinquent on payment obligations for rent, mortgage, utilities, or other bills
Arrears rent/mortgage 3 months or more	Indicator equal to one if the respondent is in arrears for 3 months or more on rent or mortgage payments in the last year
Arrears utilities 3 months or more	Indicator equal to one if the respondent is in arrears for 3 months or more on utility payments in the last year
Debt collector at the door	Indicator equal to one if the respondent has had a debt collector at the door in the last month
Not able to pay €500	Ordinal variable measuring to what degree the respondent would not be able to pay unexpected expenses equal to €500: 1 corresponds to very easy, 7 very hard
Bad credit score	Indicator equal to one if the respondent has a bad credit score with the Dutch Individual Credit Registry
Financial wealth buffer	Log of household financial wealth (bank account plus investments)
Saving	Indicator if the respondent's expenses are less than her income
Unsecured debt	Indicator if the respondent has any unsecured debt
Mortgage-to-income ratio	Ratio of mortgage debt to net annual income
Income	Log of monthly income net of taxes
% Negative income shock	Minimum between 0 and the percentage change in income from the previous year
Unemployed	Indicator if the respondent is unemployed
On disability	Indicator if the respondent is on disability
Health status	Self-reported health status ranging from 1 (poor) to 5 (excellent)
Overview financial situation	Ordinal variable measuring to what degree the respondent has an overview of her financial situation: 1 corresponds to don't pay attention to it, 5 good overview
Impulsive buying	Ordinal variable measuring to what degree the respondent is inclined to buy impulsively: 1 corresponds to disagree entirely, 6 corresponds to agree entirely
Stick to plan	Ordinal variable measuring to what degree the respondent finds it easy to stick to a spending plan
Automatic payments	Indicator if the respondent uses automatic payments for bills
Cost of effort	Ordinal variable measuring to what degree the respondent finds it boring and frustrating to spend time on her financial administration
Quantity of effort	Indicator if the respondent spends more than one hour a month on her financial administration
Control variables	
Age	Age in years
Male	Indicator for male
Married	Indicator if the respondent is married or living with a partner
Children	Number of children living at home
No high school	Indicator if the respondent has no high school education
High school	Indicator if the respondent has a high school education
College	Indicator if the respondent has a college education
Home ownership	Indicator if the respondent owns her own home
Rural	Area of residence ranging from 1 (not rural) to 5 (extremely rural)
Openness	Continuous measure of the respondent's tendency to be intellectually curious, open to emotion, sensitive to beauty
Extraversion	Continuous measure of the respondent's tendency to be social, assertive, enthusiastic
Agreeableness	Continuous measure of the respondent's tendency to cooperate, be considerate, kind
Trust	Ranges from 0 to 10, answer to the question: Generally speaking, would you say that most people can be trusted or that you have to be very careful in dealing with people?
Numeracy	Number of numeracy questions answered correctly (out of 10 total; see Appendix C)
Financial literacy	Number of financial literacy questions answered correctly (out of 3 total; see Appendix C)
Risk aversion	Indicator if the respondent is risk averse (see Appendix C)
Risk aversion, self-reported	Ranges from 0 to 10, 0 corresponding to fully prepared to take risks and 10 corresponding to highly risk averse
Ambiguity aversion	Indicator if the respondent is ambiguity averse (see Appendix C)
Optimism	Indicator if the respondent rates her chances of living beyond 80 years as 9 or 10 out of 10, where 10 denotes absolutely certain (see Appendix C)
Instrument	
Childhood trauma	Indicator if the respondent was physically, psychologically, or sexually abused before the age of 18

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Table VIII: Summary statistics

This table reports summary statistics for the noncognitive ability measures, outcome variables, control variables, and instrument used in this study. The variables are defined in Table VII of the Appendix. Several control variables have missing observations in our sample. The summary statistics below are based on non-imputed observations. N_1 reports the number of non-missing observations, N_2 reports the number of observations when missing observations have been imputed by carrying backward and forward non-missing values for the same individual, and N_3 reports the number of observations when missing observations have been imputed by carrying backward and forward non-missing values and have been replaced with the median group value if a variable is always missing for an individual (groups are based on gender, education, and income categories). Missing values of variables used as dependent variables are not imputed and measures of noncognitive abilities are not imputed. The data cover the years from 2008 to 2017. *While noncognitive abilities are never imputed, we take averages over time for each individual in our sample, which attenuates minor reporting errors and increases the sample size (details are in Section I.B).

	Mean	Std	Min	Max	N_1	N_2	N_3
Noncognitive ability measures							
Noncognitive ability: emotional stability	0	1	-3.653	2.219	37,776	77,683*	
Noncognitive ability: conscientiousness	0	1	-4.820	2.342	37,776	77,683*	
Outcome variables							
Financial distress: consumer delinquency	0.042	0.200	0	1	47,755		
Arrears rent/mortgage 3 months or more	0.009	0.095	0	1	47,756		
Arrears utility 3 months or more	0.008	0.087	0	1	47,758		
Debt collector at door	0.009	0.096	0	1	48,001		
Not able to pay € 500	2.949	2.012	1	7	28,365		
Bad credit score	0.054	0.227	0	1	5,124		
Financial wealth buffer	53,102	210,564	0	8,389,443	24,338		
Saving	0.367	0.482	0	1	47,995		
Unsecured debt	0.339	0.473	0	1	10,723		
Mortgage-to-income ratio	2.355	4.478	0	25	33,119		
Income	1,568	4,125	0	469,350	73,254		
% Negative income shock	0.016	0.045	0	1	54,873		
Unemployed	0.029	0.168	0	1	77,454		
On disability	0.038	0.192	0	1	77,153		
Health status	3.106	0.766	1	5	49,328		
Overview financial situation	4.354	0.844	1	5	10,739		
Impulsive buying	1.826	1.219	1	6	10,763		
Stick to plan	4.647	1.316	1	6	5,478		
Automatic payments	4.701	1.484	1	6	5,478		
Cost of effort	2.692	1.519	1	6	5,478		
Quantity of effort	0.267	0.442	0	1	16,524		
Control variables							
Age	48.781	17.268	18	104	77,683		
Male	0.464	0.499	0	1	77,679		
Partner	0.742	0.438	0	1	77,759		
Children	0.439	0.496	0	1	77,679		
No high school	0.082	0.274	0	1	77,587		
High school	0.357	0.479	0	1	77,587		
College	0.561	0.496	0	1	77,587		
Home ownership	0.728	0.445	0	1	77,547		
Rural	2.962	1.286	1	5	77,295		
Openness	0	1	-4.760	2.980	37,776	77,683	
Extraversion	0	1	-3.596	3.418	37,776	77,683	
Agreeableness	0	1	-4.924	2.117	37,776	77,683	
Trust	6.044	2.139	0	10	51,555	77,440	77,683
Numeracy	7.435	2.321	0	10	5,613	43,389	77,683

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Financial literacy	2.169	0.860	0	3	6,653	45,546	77,683
Risk aversion	0.716	0.452	0	1	7,301	42,202	77,683
Risk aversion, self-assessed	5.955	2.404	0	10	10,210	50,497	77,683
Ambiguity aversion	0.630	0.483	0	1	1,885	15,769	77,683
Optimism	0.091	0.288	0	1	42,241	70,301	77,683
Instrument							
Childhood trauma	0.123	0.329	0	1	9,908	44,964	

Table IX: Noncognitive abilities and severe financial distress

This table shows the results of probit regressions (Columns (1), (2), (3), and (5)) and an ordered probit regression (Column (4)). In Column (1), the dependent variable is equal to one if the respondent has been in arrears for three months or more on rent or mortgage payments. In Column (2), the dependent variable is equal to one if the respondent has been in arrears for three months or more on utility payments. In Column (3), the dependent variable is equal to one if the respondent has had a debt collector at the door in the last month. In Column (4), the dependent variable is an ordinal variable ranging from one to seven that measures the degree to which the respondent would be unable to pay an unexpected expense of 500 euros. In Column (5), the dependent variable is equal to one if the respondent has a bad credit score with the Dutch Individual Credit Registry (Bureau Krediet Registratie). All models include a constant term and controls for risk aversion (lottery and self-reported), ambiguity aversion, numeracy, trust, optimism, financial literacy, agreeableness, openness, extraversion, male, children living at home, age, age squared, home ownership, education, partner, residence in a rural area, missing data dummies, and year dummies. The controls are suppressed for brevity. Standard errors are clustered by household and appear in parentheses. The superscripts *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Arrears rent/mortgage 3 months or more	Arrears utility 3 months or more	Debt collector at the door	Not able to pay €500	Bad credit score
	(1)	(2)	(3)	(4)	(5)
Emotional stability	-0.0011***	-0.0011***	-0.0004*	-0.0129***	0.0014
	(0.0003)	(0.0003)	(0.0002)	(0.0016)	(0.0029)
Conscientiousness	-0.0017***	-0.0012***	-0.0013***	-0.0139***	-0.0113***
	(0.0004)	(0.0003)	(0.0003)	(0.0016)	(0.0031)
Controls and constant	yes	yes	yes	yes	yes
Time fixed effects	yes	yes	yes	yes	no
Observations	47,679	47,681	47,924	28,295	5,099
Pseudo R-squared	0.131	0.178	0.228	0.0816	0.0711

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