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ABSTRACT

Psychology of Debt in Rural South India*

The relationship between personal debt and cognition has received limited attention, especially, in developing countries. This study focuses on India and examines the relationship between Big Five personality traits, cognitive skills (math, literacy, and Raven scores), and financial decision-making, specifically debt negotiation and debt management, while considering the weight of social identity (i.e., caste and gender). Using a panel dataset built from an original household survey conducted in 2016-17 and 2020-21 in rural Tamil Nadu and employing multivariate correlation probit analysis, we find the following. Firstly, conscientiousness is an advantage in the negotiation and management of debt, particularly for non-Dalit women, suggesting that, in a rural patriarchal context, women leverage personality traits to overcome the constraints of social identity. Secondly, emotional stability is a disadvantage in both debt negotiation and management. Thirdly, the role of cognition and in particular the Raven score is ambiguous (negative correlation with debt negotiation but positive correlation with debt management). Our results suggest that training programmes designed to improve conscientiousness, when integrated into broader macroeconomic policies, could help individuals secure better loan conditions and avoid repayment difficulties.

JEL Classification: D14, D91, G51, O1

Keywords: Big Five, personality traits, cognitive skills, gender, caste, social identity

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1. Introduction

For more than a decade, there has been increasing interest in psychology economics literature regarding the interaction of personality traits, in particular those of the Big Five (McCrae & Costa, 1987), and cognitive skills with various economic choices (Borghans, Duckworth, Heckman, & Weel, 2008; Hanushek & Woessmann, 2008). Researchers have mainly investigated the relationship with the labour market (e.g., productivity or earnings) or education (Almlund, Duckworth, Heckman, & Kautz, 2011). Few researchers have investigated the relationship with indebtedness, despite the fact that, on the one hand, behaviour in debt markets has implications across many areas (Zinman, 2015) and rising household debt has major macroeconomic consequences, such as lower GDP growth (Mian, Sufi, & Verner, 2017). On the other hand, as a complement to broader macroeconomic policies, improved cognition can serve as a basis for various public policies aimed at improving credit information (see, e.g., Arráiz, Bruhn, & Stucchi, 2017).

Empirical studies focused on cognitive skills and household debt found that, in the USA, cognitive skills are often associated with dimensions of indebtedness (Tang, 2021). For instance, Agarwal & Mazumder (2013) observed that individuals with a higher level of cognitive skills are substantially less likely to exhibit financial distress. Furthermore, Angrisani, Burke, & Kapteyn (2023) noted that cognitive skills are an essential predictor of debt burden in older age. The authors also maintained that individuals with higher cognitive ability take on higher debt levels than individuals with lower cognitive ability.

Regarding the relationship between Big Five personality traits[1] and debt, studies mainly note that conscientiousness, meaning the capacity to enforce self-discipline, is most often associated with debt, especially in the USA, the UK, and the Netherlands. For example, Donnelly, Iyer, & Howell (2012) determined that a higher level of conscientiousness is

[1] The Big Five taxonomy of personality traits identifies five dimensions of personality: emotional stability (tendency to experience negative emotions), extraversion (capacity to experience positive emotions, the tendency to seek stimulation and company from others), openness to experience (capacity to be creative and unstructured), agreeableness (perceptions of others that are caring, compassionate, and altruistic), and conscientiousness (capacity to enforce self-discipline, act dutifully, and strive for achievement of certain measures or outside expectations).

associated with more active financial management, while Letkiewicz & Heckman (2019) found that more conscientious people are less likely to default on student loans. Additionally, Brown & Taylor (2014) observed that conscientiousness is negatively correlated with levels of unsecured debt and that extraversion, agreeableness, and openness to experience are generally associated with debt. For other Big Five personality traits, Nyhus & Webley (2001) highlighted that neuroticism (i.e., the opposite of emotional stability) is positively correlated with debt as individuals who score high on neuroticism are more likely to make impulsive purchases (Youn & Faber, 2000).

Thus far, to our knowledge, this research has always been conducted in developed countries, and no study has looked at the relationship between cognition, namely personality traits and cognitive skills, and indebtedness in developing countries. However, understanding these issues in developing countries is crucial. Firstly, microcredit as a route out of poverty (Burgess & Pande, 2005) or to empower women (Demirgüç-Kunt, Klapper, Singer, Ansar, & Hess, 2018) has been a strong argument in favour of financial inclusion policies, although the literature is mixed on its effects (Koker & Jentzsch, 2013). Secondly, research has indicated that most household debt in developing countries is informal (Badarinza, Balasubramaniam, & Ramadorai, 2019), meaning that it is negotiable, the negotiation process being conducive to the expression of individual cognition (Sharma, Bottom, & Elfenbein, 2013).

By considering the case of rural Tamil Nadu, in South India, this study attempts to fill this knowledge gap by analysing the extent to which cognition influence indebtedness. We use the NEEMSIS dataset (Nordman et al., 2024), a first-hand panel dataset collected in 10 villages that has at least two rare and valuable advantages over Indian national data and other micro-level data collections in developing countries (Michiels, Nordman, & Seetahul, 2021; Reboul, Guérin, & Nordman, 2021). Firstly, NEEMSIS includes a longitudinal measure of the Big Five personality traits. Secondly, this survey collects loans at the individual level. This specificity allows us to analyse the extent to which individuals negotiate their own debt and the extent to which they manage it individually, which is impossible to do when information on debt is collected at the household level.

We use descriptive statistics and econometrics (probit with lagged explanatory variables) to explore the relationship between negotiation and debt management, Big Five personality traits, and cognitive skills (math scores, literacy scores, and Raven matrices). We segment the analysis by caste (Dalit, non-Dalit) and gender to capture the weight of social

identity (caste and gender) in the expression of individual cognitive skills and to analyse the intersectionality between gender and castes (Kannabiran, 2022). In rural South India, literature indicates that interaction between cognition and social structures, namely the caste hierarchy and gender roles, matters for various outcomes, such as job access (Carswell & De Neve, 2024) and social mobility (Michiels, Nordman, & Seetahul, 2021). Thus, in our analyses and interpretations, we aim to combine parts of behaviourist literature (Brown & Taylor, 2014) with a more structuralist approach, wherein household and individual choices are embedded in various forms of power (caste) and domination (gender) (Guérin, Kumar, & Venkatasubramanian, 2023), that comprise the collective structure (Polanyi, 1944).

In this way, we contribute to economics literature on the understanding of indebtedness in rural India and, more broadly, to the understanding of household finances in developing countries. Moreover, we extend the psychology economics literature on the role of personality traits and cognitive skills on economic outcomes, especially indebtedness, as well as the role of personality traits and cognitive skills in the negotiation process. Finally, by capturing the weight of social identity in the expression of individual cognition, we contribute to economics literature on the role of social identity in preferences and economic choices.

After controlling for important covariates (e.g., income, shock exposure, or loan characteristics), our findings suggest that, firstly, a high level of conscientiousness is a strong advantage in negotiating and managing debt, particularly for non-Dalit women. Secondly, emotional stability is negatively correlated with debt negotiation and management, which contradicts existing literature. Thirdly, the Raven score is negatively correlated with debt negotiation but positively correlated with debt management.

The rest of the article is organised as follows. Section 2 presents the context and the data, while Section 3 reports the measures of personality traits and cognitive skills, indebtedness, and the econometric framework. Finally, Section 4 presents and discusses the results, and we conclude with Section 5.

2. Context and data

2.1. Context

The Indian context, especially in rural Tamil Nadu, is particularly interesting for studying the effect of cognitive skills on indebtedness due to its unique credit market.

First and foremost, in Tamil Nadu, households juggle a wide range of borrowing sources, and each serves particular purposes (Guérin, Roesch, Venkatasubramanian, & D'Espallier, 2012). Most loans are informal, and many are contracted from well-known persons. This term covers many types of creditors, including private lenders whose main activity is lending (e.g., village notables or influential people). Loans from well-known persons are often used for large expenditures, such as ceremonies, health, and education. Relatives, employers, friends, or shopkeepers also provide informal loans. These loans are not generally more associated with one expense than another. In addition, some loans are semi-formal, contracted from pawnbrokers, self-help groups (SHGs, the most common form of Indian microfinance) or *Thandal* (ambulant money lenders). Loans from pawnbrokers are mainly used to smooth consumption, while microcredits are used, in theory, for economic purposes. However, it is not uncommon for microcredits to be used for consumer spending. Loans from ambulant money lenders are used for everyday consumption expenditures. Lastly, banks often provide formal loans with higher amounts to finance investments.

Given the wide range of sources of borrowing, most individuals and households are indebted. All-India Debt and Investment Surveys (AIDIS) reported that 36.9% of households in rural Tamil Nadu were in debt in 2019 (NSSO, 2019). However, this figure likely underestimates the true extent of debt due to poor coverage of informal finance. Micro-surveys conducted in Uttar Pradesh and Tamil Nadu suggest that about 90% of households are actually in debt (Di Santolo et al., 2024; Himanshu, Lanjouw, & Stern, 2018).

There are significant differences by gender and caste. In rural India, caste shapes credit sources, segmenting local informal credit circuits and affecting access to formal finance (Kumar, 2013). For instance, Dalits (formerly called the "untouchables"), that is low-caste individuals, have a higher incidence of indebtedness but borrow smaller amounts (Guérin, D'Espallier, & Venkatasubramanian, 2013). Across genders, the relative amount of debt to income is higher for women than for men. Moreover, women in the poorest households have the highest borrowing responsibilities, and Dalit women tend to face a higher debt burden than non-Dalit women (Reboul, Guérin, & Nordman, 2021). Recent crises such as the microfinance crises of 2010 (Nair, 2011), the demonetisation of November 2016 (Guérin, Lanos, Michiels,

Nordman, & Venkatasubramanian, 2017),[2] or the pandemic lockdowns of 2020-21 (Guérin, Michiels, Natal, Nordman, & Venkatasubramanian, 2022) have exacerbated disparities between caste and gender.[3]

Lastly, in India, debt is not just a material transaction governed by its monetary aspects (e.g., amount of the loan, terms of repayment, interest rate), it represents a significant social link between the borrower and the lender (Guérin, Kumar, & Venkatasubramanian, 2023). Debt is accompanied by a set of rights and obligations (e.g., provide a service, honour the debt in good time, invite the lender to ceremonies) that form a strong bond between debtors and creditors, and which has consequences in terms of social belonging, status, and dignity in the village. Among the set of rights and obligations, services of debt count for a great deal. For example, following the loan, the debtor may have to do shopping or domestic work for the lender. This set and thus the social meaning of debt are not fixed but continuously bargained and negotiated between stakeholders. This can pave the way for the expression of individual cognition during negotiations (Sharma, Bottom, & Elfenbein, 2013).

2.2.Data

Our analyses are based on the NEEMSIS (Networks, Employment, dEbt, Mobilities, and Skills in India Survey), which was carried out in two waves in 2016-17 and 2020-21 and designed and implemented by the authors of this study (Nordman et al., 2024). The survey took place within two IRD-IFP research programmes located within the Observatory of Rural Dynamics and Inequalities in South India (ODRIIS – https://odriis.hypotheses.org/) hosted at the French Institute of Pondicherry, India. The NEEMSIS is a longitudinal data collection tool that builds on a household survey originally implemented in 2010 in 10 villages of Tamil Nadu.

[2] In November 2016, Narendra Modi, the prime minister of India, announced the ban of the 500 rupees and 1k rupees notes, the two highest value banknotes in circulation. Even if there were two previous instances of demonetisation in 1946 and 1978 in India, the 2016 Indian experience was unparalleled in its size, scope and suddenness (Guérin, Lanos, Michiels, Nordman, & Venkatasubramanian, 2017).

[3] On the evening of March 24, 2020, the Government of India ordered a nationwide lockdown for 21 days, starting on March 25, 2020, strictly limiting the movement of the entire population of India as a preventive measure against the COVID-19 pandemic in India. However, India and especially Tamil Nadu experienced the peak in disease in April 2021. Therefore, it pushed the Tamil Nadu government to implement a second lockdown to counter the second wave, a dramatic wave in terms of infections and death.

NEEMSIS-1 (2016-17) and NEEMSIS-2 (2020-21) are then a second and third wave constituting household and individual panel survey. Located in the Cuddalore and Kallakurichi districts, the 10 villages benefit from the proximity of two large industrial towns (Neyveli and Cuddalore) and a regional business centre (Panruti). The survey uses a stratified sample framework based on three dimensions: proximity to small towns (Panruti, Viluppuram, and Cuddalore), an agroecological criterion (i.e., half of the 10 villages have irrigated land, the other half is dry), and caste affiliation (i.e., within villages, half of the sample was selected from the upper and middle caste area of the village, called "Ur," while the other half comes from the "Colony" area, which is where Dalits live).

Of the 492 households surveyed in NEEMSIS-1, NEEMSIS-2 recovered 485 households (attrition rate of 1.42%). In addition, 147 new households were randomly added to the 2016-17 sample for a total of 632 households surveyed in 2020-21.

In NEEMSIS-1 and NEEMSIS-2, two household members, called "egos" (mostly the household questionnaire respondent and one younger household member randomly selected on a criterion of age[4]), are directly administered an individual questionnaire collecting a range of information on personality traits and cognitive skills, amongst other things (e.g., job satisfaction, social networks, etc.).

Compared to other Indian data sources, such as the AIDIS, NEEMSIS has the rare and valuable advantage of recording debt at the individual level by identifying the person who went to the lender and borrowed in their own name. In other words, we are able to associate each debt with a single individual. Furthermore, compared to the World Bank's STEP Skills Measurement Programme (Pierre, Sanchez Puerta, Valerio, & Rajadel, 2014) and many other studies (Hoeschler, Balestra, & Backes-Gellner, 2018) that use the short Big Five inventory (i.e., two or three questions for each Big Five personality trait, see, e.g., Rammstedt & John, 2007), NEEMSIS measures the Big Five personality traits with the long inventory of seven questions for each trait (John & Srivastava, 1999), which has a major advantage in terms of validity (Credé, Harms, Niehorster, & Gaye-Valentine, 2012). Moreover, NEEMSIS includes

[4] A member of the household aged between 18 and 25 years old, if no one is available, a member aged between 26 and 35 and if no one is available, a member aged over 35.

a longitudinal measure of the Big Five personality traits as they were measured in 2016-17 and 2020-21 on the same population, which is precious.

Regarding the reliability of the collected information, the expertise of the fieldwork team (e.g., some research team members are present in the region for numerous quantitative and qualitative surveys for more than 20 years) helped formulate questions appropriately. This involved, for instance, using less degrading terms than the generic term "debt," or asking indirect questions. As a result, data accuracy is reflected by an incidence of indebtedness that is higher than the estimates of the nationwide AIDIS. 99% of households are in debt in our case study, as opposed to 36.9% in rural Tamil Nadu in 2019 according to the AIDIS (NSSO, 2019). One of the reasons for this underestimation is that debt data are notoriously difficult to collect and prone to underreporting due to recall issues and social desirability biases (Karlan & Zinman, 2008). In addition, national data does not capture informal debt, which makes up the majority of household debt in rural South India. The moderate magnitude of the NEEMSIS, compared to nationally representative datasets, ensures high quality data. Finally, the tablet-based mode of data collection improved data quality by including constraints on answers to prevent inconsistencies.

In NEEMSIS-1, almost half of the sample (42%) was interviewed after the November 2016 demonetisation. While we do not study its impact, we do control for it in the analysis as the shock disrupted local financial circuits, with consequences potentially differentiated along gender and caste lines (Guérin, Lanos, Michiels, Nordman, & Venkatasubramanian, 2017).

3. Methodology

3.1. Construction of personality traits and cognitive skills variables

The NEEMSIS survey enables us to construct the personality traits and cognitive skills variables for both waves (2016-17 and 2020-21).

Cognitive skills

Measures of cognitive skills include three score variables: literacy, numeracy, and Raven coloured progressive matrices tests (i.e., a cognitive, visual and non-verbal test that does not require formal education and measures the ability to think and make sense of complex data and logical reasoning). Literacy and numeracy tests measure crystallised intelligence, meaning the

ability to deduce secondary relational abstractions by applying previously learned primary relational abstractions (i.e., the knowledge learned), while Raven's progressive matrices capture concepts of fluid intelligence, that is, the ability to solve novel reasoning problems (i.e., the rate at which people learn). These scores are constructed by summing up the correct answers for four questions for the literacy and numeracy tests and 36 for the Raven test (see Table A1 in the appendix).

Personality traits

NEEMSIS data allow us to construct Big Five personality traits from a set of 35 affirmative questions in 2016-17 and 2020-21, following the Big Five long taxonomy (John & Srivastava, 1999) (see Table A2 in the appendix). The Big Five taxonomy identifies five dimensions of personality: emotional stability (the tendency to experience negative emotions), extraversion (the capacity to experience positive emotions, the tendency to seek stimulation and company from others), openness to experience (capacity to be creative and unstructured), agreeableness (perceptions of others that are caring, compassionate, and altruistic), and conscientiousness (capacity to display self-discipline, act dutifully, and strive for achievement against measures or outside expectations).

As warned by Laajaj & Macours (2021), the Big Five taxonomy can be limited in developing countries because of the enumerator-respondent interactions in face-to-face interviews, which can induce bias. Additionally, the low level of education among the population makes the questions more difficult to understand and may induce a systematic response pattern, including the acquiescence bias (i.e., the tendency to answer more in one direction [agree or disagree] over the other). However, our intimate knowledge of the survey field and the fact that we used a relatively small, experienced, and well-trained team of interviewers minimised bias in the data due to a misunderstanding of the questions. Moreover, the language in the question set was adjusted to accommodate a low-literacy population. A careful translation to local Tamil was developed after numerous discussions and tests among the survey team, including local enumerators.

Analysis of the stability of personality traits over time for the 835 individuals surveyed in 2016-17 and 2020-21 reveals stability for a small proportion of individuals (see Natal & Nordman, 2024). To avoid endogeneity issues through reverse causality between personality

traits, cognitive skills, and debt, we estimate the effect of personality traits and cognitive skills measured in 2016-17 on debt measured in 2020-21 (Anger, Camehl, & Peter, 2017).

To construct the Big Five personality traits, we use the items corrected for the acquiescence bias and apply factor analysis by principal component on the set of 35 questions (Laajaj & Macours, 2021). To improve the factor's meaningfulness, we use an oblique rotation with quartimin procedures. We then assume that each item proxies only one factor. Thus, we assign items to the factor for which they have the highest factor loadings and set to zero the factor loadings of other items. We interpret factors based on the items with factor loadings higher than 0.30. The factors obtained are relatively similar to the Big Five taxonomy, and the internal consistency (i.e., the extent to which items within an instrument measure different aspects of the same characteristic or construct) is satisfactory (McDonald's ω higher than 0.6). Factor 1 is approximately emotional stability ($\omega = 0.88$), Factor 2 is approximately conscientiousness ($\omega = 0.84$), Factor 3 is openness-extraversion ($\omega = 0.81$), Factor 4 is weak emotional stability ($\alpha = 0.54$), and Factor 5 is approximately agreeableness ($\omega = 0.56$). Factor 3 (i.e., openness-extraversion) is interpreted in the same way as the "beta factor" of Digman (1997), representing the extent to which a person actively searches for new and rewarding intellectual and social experiences. As Factor 4 represents a weak measure in the sense that it captures only two items of emotional stability, we chose to exclude it from further analyses.

To remove the effect of age on the personality traits and cognitive skills measures, we run univariate OLS regressions with personality traits and cognitive skills as endogenous variables (vector $\mathbf{Y'_{i.}}$) and age as the exogenous variable (x).

$$\mathbf{Y'_{i.}} = \beta_1 + \beta_2 x_i + \varepsilon_i$$

Following Brown & Taylor (2014), we standardised in z-scores the resulting residuals ε for each individual i and each personality trait and cognitive skill belonging to the vector $\mathbf{Y'_{i.}}$. We use the standardised residuals as age-effect-free personality traits and cognitive skills in future estimates.

3.2.Debt related measures

To gain a more extensive view of the role of personality traits and cognitive skills in the process of indebtedness, we analyse two aspects of debt: negotiation and management.

Debt negotiation

We focus on debt negotiation between the lender and the borrower. We use the sample of main loans for which we have more details. In each household, the respondent selects the three most important loans, typically the largest informal ones. Of the 835 individuals in the panel, 488 have at least one main loan and the total sample of main loans amounts to 1084 loans. The negotiation measure is based on a dummy variable that takes the value one if the borrower does not need to provide services to the lender to obtain the loan, zero otherwise. As mentioned above, depending on the result of the negotiation process between the borrower and the lender, the borrower may have to offer services due to the loan, including numerous everyday services such as running errands or domestic work. Given that, firstly, providing services in exchange for loans is less systematic than paying interest; secondly, unlike services, repaying interest can be managed with additional borrowing (Guérin, Kumar, & Venkatasubramanian, 2023) and; thirdly, these services can be very time-consuming and therefore can represent a significant loss of income for the borrower as it may imply less working, not providing a service is effectively synonymous with good negotiating skills.

We expect that highly extraverted and agreeable individuals report more negative negotiation experiences (Barry & Friedman, 1998; Dimotakis, Conlon, & Ilies, 2012). Indeed, in a competitive negotiation, as may be the case in the negotiation of loan-related services,[5] strategy is more important than cooperation (a key elements of extraversion) and "negotiator interests are better served by the acquisition of information from one's opponent than by sharing information about one's own underlying interests" (Barry & Friedman, 1998, p. 347).

Regarding emotional stability, we expect that, individuals with a low level of emotional stability report more negative experiences in their negotiations following Elfenbein, Curhan, Eisenkraft, Shirako, & Baccaro (2008). Indeed, a low level of emotional stability is linked to

[5] A competitive negotiation is a type of negotiation in which the parties involved take an adversarial approach and focus primarily on achieving individual goals and maximising personal gains. When negotiating services that accompany a loan, since these can be very time consuming and may result in a significant loss of income, borrowers should negotiate as efficiently as possible, which may result in them negotiating in a manner more competitive.

sensitivity to threat, which predicts a greater probability of impasses and a lower joint value when the negotiation is threatening for the individual.

Regarding the contribution of conscientiousness, given that Jang, Elfenbein, & Bottom (2016) and Sharma, Bottom, & Elfenbein (2013) argue that this trait is consistent with behaviours theorised to be effective in negotiations, we expect to find a positive correlation between conscientiousness and negotiation.

However, the contribution of certain personality traits may be limited. Indeed, as the negotiation of services of debt is of considerable importance to borrowers (e.g., social belonging, status and dignity in the village), borrowers, and especially women, may have to take care of their appearance to give the best image of themselves to lenders (Guérin, Kumar, & Venkatasubramanian, 2023). Controlling this image can involve smoothing out personality traits that are visible to others, such as extraversion and agreeableness (Penton-Voak, Pound, Little, & Perrett, 2006).[6]

Debt management

For the last aspect, we are interested in the management of personal debt. Using the same sample of 1084 main loans, we use a dummy variable which takes one if, the borrower has a problem repaying the loan, zero otherwise.

Following Costa & McCrae (1980), Donnelly, Iyer, & Howell (2012), and Fan, Chatterjee, & Kim (2022), we expect individuals with a higher level of conscientiousness and emotional stability to have a greater capacity to manage their debt. Indeed, conscientious individuals are more organised and disciplined than others, and may therefore be more confident in their ability to manage financial matters (Costa & McCrae, 1980). Individuals with a lower emotional stability score are more likely to feel less secure, which may reduce their ability to manage money (Fan, Chatterjee, & Kim, 2022).

[6] Although there seems to be no consensus on which of the Big Five's personality traits are most apparent to outside observers (Alper, Bayrak, & Yilmaz, 2021).

3.3.Econometric framework

Reverse causality

The possibility of reverse causality is an essential concern in the relationship between personality traits, cognitive skills, and personal indebtedness. While an increase in personality trait scores may drive an increase in debt-related variables, over-indebtedness might also lead to increased personality trait scores. Even if the determination of causality is not our objective, we follow the most widely used strategy and replace the personality traits and cognitive skills variables with their lagged values to limit reverse causality. Although criticised in the literature (Reed, 2015), lagged explanatory variables are a first way of limiting simultaneity in what is, to our knowledge, the first study analysing the correlation between cognition and individual indebtedness in a developing country context.

Thus, we analyse the contribution of cognition measured in 2016-17 to debt measured in 2020-21.

This approach raises a well-known concern regarding the choice of a suitable temporal lag (Vaisey & Miles, 2017). However, given the structure of our data (two points in time separated by four years), we assume that personality traits and cognitive skills can affect financial decision-making four years later.

Specification

To analyse the multivariate correlations between personality traits, cognitive skills and personal indebtedness, we estimate the following probit models:

$$E(\mathbf{Y'_{i.}}|\mathbf{X1'_{i.}}, \mathbf{X2'_{i.}}, \mathbf{X3'_{i.}}, \mathbf{X4'_{i.}}) = \Phi(\mathbf{X1'_{i.}}\boldsymbol{\beta 1} + \mathbf{X2'_{i.}}\boldsymbol{\beta 2} + \mathbf{X3'_{i.}}\boldsymbol{\beta 3} + \mathbf{X4'_{i.}}\boldsymbol{\beta 4})$$

$\mathbf{Y'_{i.}}$ represents the vector of dependent variables measured in 2020-21: a dummy variable which takes one if the borrower does not need to provide services to the lender to obtain a specific loan, zero otherwise; a dummy variable which takes one if the borrower has difficulty repaying a specific loan, zero otherwise. $\mathbf{X1'_i}$ contains the age-effect-free personality traits and cognitive skills measured in 2016-17, that is, emotional stability, conscientiousness, openness-extraversion, agreeableness, numeracy score, literacy score, and Raven score. $\mathbf{X2'_{i.}}$ represents the vector of control variables measured in 2016-17 at the loan level. It includes

lender (formal, informal); whether or not there are any interests;[7] loan reason (economic, current expenditures, human capital, social expenses, housing); and loan amount (in logarithm). When we consider debt negotiation, we also add a dummy variable which takes one if the lender and borrower are of the same sex, zero otherwise; and a dummy variable which takes one if the lender and borrower are of the same caste, zero otherwise. Our intuition is that caste or gender solidarity can facilitate negotiation (see, e.g., Guérin, Mouchel, & Nordman, 2022). When considering debt management, we add the logarithm of the total amount of debt as a control variable. Our intuition is that the higher the debt, the more difficult it is to manage, especially in terms of repayment. $\mathbf{X3'_i}$. represents the vector of control variables measured in 2016-17 at the individual level. It includes age; sex; main occupation, defined as the most time-consuming activity (agricultural self-employed, agricultural casual worker, casual worker, regular worker, self-employed, MGNREGA worker[8]); a dummy variable which takes one if the individual received formal education through school, zero otherwise; and a dummy variable which takes one if the individual is married, zero otherwise. It also includes the indebtedness situation with a dummy variable that takes one if the individual is indebted in 2016-17, and zero otherwise. $\mathbf{X4'_i}$. represents the vector of control variables measured in 2016-17 at the household level. It includes caste (Dalit or not); logarithm of the monetary value of assets, which is a continuous variable proxying gold, land, house, livestock, agricultural equipment, and consumer goods; logarithm of the total annual income; household size; shock exposure with a dummy variable which takes one if the household experienced marriage of at least one of the household members between 2016-17 and 2020-21 and/or if the household has been surveyed after the demonetisation of November 2016, zero otherwise; and COVID-19 exposure

[7] Interest and services are traded almost simultaneously, which can introduce endogeneity. This issue could be addressed with a 2SLS estimator, but this method requires strong instruments and a large sample size. Due to the lack of suitable instruments and our small sample size, we did not correct for this endogeneity. To assess the consequence of this choice, we tested the stability of the estimates by deliberately creating an omitted variable bias by excluding the interest variable. The results remained consistent and are available upon request.

[8] The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) offers guaranteed employment in rural areas in the form of unskilled manual labour for at least 100 days per financial year.

with a dummy variable which takes one if the household had to sell assets to cope with the difficulties of the COVID-19 lockdown, zero otherwise.[9]

We cluster the standard errors at the individual level to consider that observations within each individual are not independent and identically distributed (we observe up to three loans per individual).

Given that in rural South India, the literature indicates an interaction between cognition and social structures (Carswell & De Neve, 2024; Michiels, Nordman, & Seetahul, 2021), we refine the results by estimating the model according to individuals' social identity, namely caste and gender. We establish an interaction between personality traits, cognitive skills and gender, then between cognition variables and caste. We also explore the intersectionality of caste and gender (Kannabiran, 2022) by adding an interaction between cognition variables, gender, and caste.

Interaction effects are difficult to interpret in nonlinear models because the magnitude of the coefficient depends on all the covariates in the model. Additionally, interaction effects can have different signs for different observations, making simple summary measures of the interaction effect challenging to interpret (Greene, 2010). Thus, we compute marginal effects at representative values of gender and caste and all other variables at the mean to determine how the effects of personality traits and cognitive skills vary according to individual characteristics. This allows us to create nine groups of marginal effects for each personality trait and cognitive skill variable: average individual (no interaction); average man and average woman (gender interaction); average Dalit and non-Dalit (caste interaction); and average non-Dalit man, Dalit man, non-Dalit woman and Dalit woman (gender and caste interaction).

[9] The whole sample was surveyed between December 2020 and September 2021, after the first lockdown of March to May 2020.

4. Results

4.1. Descriptive statistics

The final sample is made up of 1084 loans, taken out by 488 individuals, belonging to 413 households.

Almost half of the households are Dalits (see Table 1). Regarding assets, on average, middle-upper caste households are three times richer than Dalit households (1710k rupees compared to 530k rupees, or around USD 25k compared to USD 8k in 2016-17). This economic advantage of non-Dalits is also found in annual labour income: the annual income of middle-upper castes is 42% higher than that of Dalits.

[TABLE 1 AROUND HERE]

At the individual level (see Table 2), 60% of the sample are men and the average individual is 50 years old. On average, men and non-Dalits have a higher level of education than others, and they also have the most stable and highest-paying jobs: while men and non-Dalits are overrepresented in stable occupations (agriculture, regular salaried jobs, or self-employment), women and Dalits are overrepresented in precarious employment (agricultural casual jobs or MGNREGA).

[TABLE 2 AROUND HERE]

Figures 1 and 2 show the distribution of each standardised personality trait and cognitive skill, net of life cycle by gender and caste. While we do not observe any difference in terms of emotional stability and agreeableness between men and women, in terms of conscientiousness and openness-extraversion, men tend to have a higher score. Concerning cognitive skills, men tend to have higher scores for Raven, numeracy, and literacy than women. We did not observe any differences in personality traits between Dalits and non-Dalits, except for emotional stability, where Dalits appear to have higher scores. However, non-Dalits have higher cognitive skills scores than Dalits.

[FIGURES 1 AND 2 AROUND HERE]

The average loan is 38k rupees (i.e., USD 570) and, on average, the loans taken out by men and non-Dalits are higher than those taken out by others (see Table 3). Three quarters of loans are informal, and while women make more use of them than men, there are no statistically

significant differences between Dalits and non-Dalits. Almost one loan in two is for current expenses and seven out of ten are interest-bearing. Finally, with regard to the variables explained, for almost one in two loans, the borrower does not need to provide any service in exchange for the loan. Women and non-Dalits are more likely than men and Dalits not to have to provide services (65% versus 36% and 51% versus 43%). 37% of loans cause repayment problems and women are more likely to have problems to repay than men (43% versus 33%). Interestingly, we do not observe any statistically significant differences in terms of repayment problems between Dalits and non-Dalits.

[TABLE 3 AROUND HERE]

4.2.Econometric results

Marginal effects at representative values are reported in Tables 4 and 5. Through interactions with gender and caste, the representative values are the average individual (col. 1); the average man and the average woman (col. 2); the average non-Dalit and the average Dalit (col. 3); the average non-Dalit man, the average Dalit man, the average non-Dalit woman and the average Dalit woman (col. 4). All the scores for personality traits and cognitive skills are standardised in order to make comparisons possible. We only interpret correlations at the 95 or 99% confidence level.

4.2.1. Debt negotiation

Table A3 in the appendix features a McFadden's pseudo R^2 indicating a suitable goodness-of-fit for all the specifications. The multivariate correlation results between cognition and debt negotiation are presented in Table 4.

The first key result is that we do not observe a correlation between extraversion and negotiation of debt at the 95% confidence level, unlike Barry & Friedman (1998) and Dimotakis, Conlon, & Ilies (2012). This result can be explained by the fact that negotiation is of such importance that borrowers seek to smooth out their visible personality traits, namely extraversion and agreeableness (Penton-Voak, Pound, Little, & Perrett, 2006), to give the most neutral image of themselves to lenders and avoid their personality traits being an obstacle in negotiation.

Secondly, our results on conscientiousness corroborate Jang, Elfenbein, & Bottom's (2016) finding, meaning conscientiousness is the common thread in the success of each phase

of a negotiation. Other things being equal, at a 1% risk of error, when conscientiousness increases by one standard deviation, the predicted probability of not having to provide services increases by nine percentage points, for the average individual woman. This relationship seems to be driven by women (+18 percentage points) and non-Dalits (+14 percentage points). Thanks to the triple interaction, the relationship is ultimately driven by non-Dalit women (+29 percentage points). The fact that it is females who mobilise this personality trait the most is interesting and, in the context of rural South India, can be interpreted in the following way. In patriarchal societies like rural South India, women often have lower self-confidence (Sultana, 2012). This can lead women to rely more on their soft skills to achieve the best outcomes, and this may be expressed when negotiating loan-related services. This assumption corroborates the findings of Michiels, Nordman, & Seetahul (2021), who made use of the same dataset: women' personality traits are generally better predictors of income mobility than men' personality traits. Moreover, the fact that it is non-Dalits who best use conscientiousness to negotiate is also interesting. Our interpretation is that, for women, the added weight of caste puts them in a situation where they can no longer mobilise their personality traits to negotiate. This interpretation echoes Deshpande (2002) who shows that Dalit women suffer from the double jeopardy of their gender-caste identity, meaning they suffer from both material deprivation and immurement, putting them in a situation of greater vulnerability than non-Dalit women, who suffer less from material deprivation.

Thirdly, we find a negative correlation between emotional stability and debt negotiation, particularly for women (-13 percentage points), Dalits (-9 percentage points), and Dalit women (-13 percentage points). This result goes against that of Elfenbein, Curhan, Eisenkraft, Shirako, & Baccaro (2008). One avenue of explanation, which remains to be explored, may lie in perseverance. The anxiety linked to low emotional stability may, in certain cases, lead individuals to work harder and be more perseverant (Norem & Cantor, 1986), which can translate into better negotiating skills.

Fourthly, results show that numeracy and Raven scores are negatively correlated with debt negotiation. While the correlation with the numeracy score is driven particularly by non-Dalit men (-15 percentage points), that with the Raven score is driven exclusively by non-Dalit women (-29 percentage points). These results indicate that a high level of cognitive skills is a disadvantage in the negotiation process. Although surprising, this result may be explained by self-confidence, which is positively correlated with cognitive skills (Stankov, 2013). Excessive self-confidence is a well-known cognitive bias in negotiation that can lead individuals to

believe their judgments to be infallible, which "reduces concessionary behavior and negotiator success in reaching agreement" (Neale & Bazerman, 1985, p. 37). However, further studies are needed to analyse the correlation between cognitive intelligence and self-confidence, particularly in a developing country context.

[TABLE 4 AROUND HERE]

4.2.2. Debt management

The McFadden's pseudo R^2 associated with the debt management estimate is lower than that associated with the debt negotiation estimate, but its level is still acceptable (see Table A4 in appendix). The multivariate correlation results between cognition and debt management are presented in Table 5.

Firstly, we observe a positive correlation between conscientiousness and management of debt. Other things being equal, when conscientiousness increases by one standard deviation, the predicted probability that the average individual has problems repaying the debt decreases by eight percentage points at a 99% confidence level. This relationship seems to be driven by women (-13 percentage points) and non-Dalits (-10 percentage points). Thanks to the triple interaction, the relationship is ultimately driven by non-Dalit women (-24 percentage points). This result is in line with the literature and can be explained by the fact that conscientious people have greater control over their finances, partly due to their positive financial attitudes and future orientation (Donnelly, Iyer, & Howell, 2012). We justify the fact that it is non-Dalit women who use their conscientiousness to better manage their loans in the same way as we justified that it is they who use their conscientiousness to better negotiate the services that accompany the loans, that is, in patriarchal societies like rural South India, women often have lower self-confidence (Sultana, 2012). This can lead women to rely more on their soft skills to achieve the best outcomes, and this may be expressed when managing loans.

Secondly, we find that emotional stability is positively correlated with the predicted probability that the average borrower has problems repaying the debt (+9 percentage points). This relationship seems to be driven more by women (+12 percentage points), although men also contribute (+7 percentage points), and non-Dalits (+11 percentage points). This result is inconsistent with Fan, Chatterjee, & Kim (2022). We do not have a clear interpretation of this results, but it is possible that certain behaviours of emotionally unstable individuals, such as anxiety, lead them to be more cautious in managing their debts, while keeping in mind that

debt management also depends on a variety of structural factors that are difficult to measure (e.g., storm, accident). Further studies in developing countries are needed to see whether a new model could emerge in this respect.

Thirdly, the more individuals have a high level of fluid intelligence (measured with Raven matrices), the fewer problems they have repaying the debt. This correlation is man-driven (-7 percentage points), Dalit-driven (-10 percentage points), and Dalit man-driven (-11 percentage points). This result is not surprising and is consistent with the literature. For example, Konig, Buhner, & Murling (2005) demonstrated that fluid intelligence is an important predictor of management skills measured with multitasking. Additionally, cognitive abilities are predictors of financial literacy (Gaurav & Singh, 2012), and Gaudecker (2015) supported that individual with higher levels of financial literacy are more likely to avoid financial mistakes.

[TABLE 5 AROUND HERE]

5. Conclusion

Using an original survey conducted by the authors in rural Tamil Nadu, in South India, this study analyses the financial practices of a rural population in terms of negotiation and management of debt. We focus on the correlation between these two aspects of debt and cognitive skills (Raven, numeracy, and literacy scores) and Big Five personality traits while taking into account the weight of social identity, namely caste and gender.

In doing so, we propose a new way of reading debt while trying to highlight the existence of a plurality of mechanisms explaining the process of indebtedness. This is done by articulating two disjointed strands of the literature. On the one hand, behavioural economics, which provides evidence that cognitive and socioemotional skills are likely to impact individual choices and outcomes (Brown & Taylor, 2014). On the other hand, sociological and anthropological structuralist approaches in our field of investigation (Guérin, Kumar, & Venkatasubramanian, 2023), which recognise that individuals are embedded in social relations that determine the collective structure. In other words, negotiation and management of debt are affected both by individual characteristics (e.g., personality traits, cognitive skills) and by structural characteristics such as gender, caste, but also the household environment and various hasards.

Our study contributes to the growing literature on individual and household finances, furthering our understanding of the determinants of debt negotiation and debt management. It also contributes more generally to the expanding literature on the implications of personality traits for economic outcomes and the interaction between social identity and economic choices. More generally, although we rely on correlations, this paper represents the first attempt to examine the relationship between cognition and indebtedness in a rural area of a developing country where households are highly indebted. Additionally, it is the first attempt to study the effects of cognition on a negotiation process in a developing country.

The three take away results from the econometric analyses in this article are as follows. Firstly, a high level of conscientiousness is a significant advantage in the negotiation and management of debt, particularly for non-Dalit women. Women's greater reliance on this personality trait may be attributed to their often lower self-confidence in a patriarchal society like rural South India, leading them to use more their soft skills to achieve the best results during loan negotiations and management. Secondly, emotional stability is negatively correlated with debt negotiation and management, which contradicts existing literature. We believe this result is linked to perseverance. The anxiety associated with low emotional stability may drive individuals to work harder and be more persistent, enhancing their negotiating and management skills. Thirdly, the Raven score is negatively correlated with debt negotiation but positively correlated with debt management. The positive correlation with debt management aligns with existing literature, while the negative correlation with negotiation is more surprising. We attribute this to self-confidence, which is positively correlated with cognitive skills. Overconfidence, well-known cognitive bias, can lead individuals to overestimate their judgement, reducing their likelihood of success in negotiations.

The results of this study could lead to valuable policy recommendations. Notably, the finding that conscientiousness is a key factor in effective debt negotiation and management suggests that training programmes aimed at enhancing individuals' conscientiousness could be beneficial. Such training could help individuals secure loans with fewer burdensome conditions and avoid difficult repayment situations. However, it is even more crucial that these training programmes are integrated into broader macroeconomic policies that aim, on the one hand, to rebalance the debt burden between the sexes, as women currently bear a disproportionate share of the debt. On the other hand, these policies should develop a reliable and universal social protection system so that even the most vulnerable households can avoid going into debt for everyday expenses, thereby limiting their financial pressure. In the specific case of India, this

means, for example, reinforcing the existing rural employment guarantee programme, the MGNREGA, by increasing budget allocations and the number of guaranteed job days. This is all the more important as budgetary allocations to the programme have been considerably reduced in recent years,[10] even though the programme was proving to be effective (see, e.g., Drèze & Khera, 2017; Muralidharan, Niehaus, & Sukhtankar, 2023).

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Appendix

Table A1 Details of questions on cognitive skills

Item	Question	Skill
canreadcard1a	Can you please read the letters on this card?	Literacy
canreadcard1b	Can you please read the word on this card?	Literacy
canreadcard1c	Can you please read the sentence on this card?	Literacy
canreadcard2	Can you please write the following sentence?	Literacy
numeracy1	Please tell me the answer to the calculation (5+9=14)	Numeracy
numeracy2	Please tell me the answer to the calculation (33-7=26)	Numeracy
numeracy3	Please tell me the answer to the calculation (7*8=56)	Numeracy
numeracy4	Please tell me the answer to the calculation (42/6=7)	Numeracy

Table A2 Details of questions on personality traits

Item	Question	Trait
curious*	Are you curious, interested in learning new things?	OP
interestbyart	Are you interested in nature, art or music?	OP
repetitivetasks*	Do you prefer work that involves repetitive tasks and routines?	OP
inventive	Are you inventive, and discover new ways of doing things?	OP
liketothink	Do you like to think a lot, and reflect about ideas?	OP
newideas	Do you come up with original or new ideas?	OP
activeimagination	Do you have an active imagination?	OP
organized	Are you organized?	CO
makeplans**	Do you make plans and stick to them?	CO
workhard	Do you work hard to do things well and on time?	CO
appointmentontime	Do you get to work and appointments on time?	CO
putoffduties*	Do you put off your duties in order to relax?	CO
easilydistracted**	Do you get easily distracted?	CO
completeduties*	Do you complete your duties on time?	CO
enjoypeople	Do you enjoy being with people?	EX
sharefeelings	Do you easily share your thoughts and feelings with other people?	EX
shywithpeople*	Are you shy with people?	EX
enthusiastic	Are you enthusiastic and full of energy?	EX
talktomanypeople*	In social gatherings, do you like to talk to many people?	EX
talkative	Are you talkative?	EX
expressedthoughts	Are you comfortable expressing your thoughts and opinions to others?	EX
workwithother	Do you work well with other people?	AG
understandotherfeeling	Do you try to understand how other people feel and think?	AG
trustingofother	Are you generally trusting of other people?	AG
rudetoother*	Do you tend to be rude to other people?	AG
toleratefaults	Do you tolerate faults in other people?	AG
forgiveother	Do you forgive other people easily?	AG
helpfulwithothers*	Are you helpful with others?	AG
managestress**	Do you manage stress well?	ES
nervous*	Do you get nervous easily?	ES
changemood	Do you have sudden changes in your mood?	ES
feeldepressed	Do you feel sad, depressed?	ES
easilyupset	Do you get easily upset?	ES
worryalot**	Do you worry a lot?	ES
staycalm*	Do you stay calm in tense or stressful situations?	ES

Note: *For a given trait, first pair of reverse-coded variables. **For a given trait, second pair of reverse-coded variables.

Table A3 Multivariate probit of the probability of not providing a service to the lender

	(1) Nego. β/Std. Err.	(2) Nego. β/Std. Err.	(3) Nego. β/Std. Err.	(4) Nego. β/Std. Err.	(5) Nego. β/Std. Err.
Individual level controls					
Indebted in 2016-17 (=1)	0.24	0.19	0.22	0.11	0.11
	(0.20)	(0.20)	(0.20)	(0.20)	(0.21)
Woman (=1)	0.26	0.22	0.28	0.24	0.26
	(0.19)	(0.19)	(0.20)	(0.19)	(0.27)
Dalit (=1)	-0.34**	-0.33**	-0.33**	-0.30*	-0.42**
	(0.15)	(0.15)	(0.15)	(0.16)	(0.20)
Age	0.00	0.00	0.00	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Occ: Unoccupied	-0.65*	-0.70*	-0.68*	-0.77**	-0.57
	(0.39)	(0.38)	(0.36)	(0.38)	(0.38)
Occ: Agricultural SE	-0.19	-0.21	-0.27	-0.21	-0.31
	(0.25)	(0.25)	(0.25)	(0.25)	(0.26)
Occ: Agricultural casual (ref)					
Occ: Casual	-0.07	-0.15	-0.17	-0.21	-0.23
	(0.22)	(0.23)	(0.23)	(0.24)	(0.24)
Occ: Regular	-0.31	-0.44*	-0.50**	-0.44*	-0.48*
	(0.23)	(0.24)	(0.24)	(0.25)	(0.25)
Occ: SE	-0.17	-0.21	-0.20	-0.26	-0.23
	(0.26)	(0.26)	(0.25)	(0.26)	(0.26)
Occ: MGNREGA	0.19	0.30	0.49*	0.29	0.46
	(0.25)	(0.25)	(0.29)	(0.26)	(0.28)
School education (=1)	0.29*	0.32	0.35*	0.30	0.29
	(0.15)	(0.21)	(0.21)	(0.21)	(0.21)
Married (=1)	-0.03	-0.01	0.05	-0.02	0.04
	(0.21)	(0.21)	(0.21)	(0.20)	(0.21)
Household level controls					
Assets (log)	0.11*	0.13*	0.14**	0.12*	0.14**
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Household size	0.05	0.07*	0.06*	0.07*	0.07**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Annual income (log)	-0.14*	-0.17**	-0.17**	-0.15*	-0.18**
	(0.08)	(0.08)	(0.08)	(0.08)	(0.09)
Loan level controls					
Lender: Informal (ref)					
Lender: Formal	0.76***	0.79***	0.78***	0.76***	0.70***
	(0.26)	(0.25)	(0.25)	(0.26)	(0.26)
Interest rate (=1)	0.14	0.13	0.17	0.12	0.19
	(0.14)	(0.14)	(0.15)	(0.14)	(0.15)
Reason: Economic	0.13	0.13	0.11	0.11	0.10
	(0.18)	(0.17)	(0.17)	(0.17)	(0.17)

Reason: Current (ref)					
Reason: Human capital	0.23	0.21	0.23	0.21	0.23
	(0.14)	(0.14)	(0.14)	(0.14)	(0.15)
Reason: Social	0.19	0.20	0.23	0.19	0.20
	(0.16)	(0.16)	(0.16)	(0.17)	(0.17)
Reason: Housing	0.21	0.29	0.32*	0.28	0.33*
	(0.17)	(0.18)	(0.18)	(0.18)	(0.18)
Loan amount (log)	-0.18***	-0.17***	-0.18***	-0.17***	-0.19***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Same sex: No (ref)					
Same sex: Yes	-0.31**	-0.33**	-0.30**	-0.34**	-0.33**
	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
Same sex: N/A	0.43	0.40	0.44	0.41	0.51*
	(0.27)	(0.27)	(0.27)	(0.27)	(0.28)
Same caste: No (ref)					
Same caste: Yes	-0.33**	-0.38***	-0.37**	-0.43***	-0.44***
	(0.15)	(0.14)	(0.15)	(0.15)	(0.15)
Cognition					
ES (std)		-0.11	0.00	0.04	0.14
		(0.09)	(0.11)	(0.15)	(0.18)
CO (std)		0.24***	0.14	0.35***	0.22
		(0.08)	(0.10)	(0.12)	(0.16)
OP-EX (std)		-0.10	-0.12	-0.17*	-0.21*
		(0.07)	(0.09)	(0.10)	(0.12)
AG (std)		0.04	-0.04	-0.04	-0.08
		(0.07)	(0.09)	(0.14)	(0.17)
Raven (std)		-0.02	0.16	-0.02	0.19
		(0.09)	(0.11)	(0.12)	(0.15)
Numeracy (std)		-0.20*	-0.27**	-0.21	-0.38**
		(0.11)	(0.13)	(0.17)	(0.19)
Literacy (std)		0.16	0.16	0.25	0.32*
		(0.11)	(0.12)	(0.15)	(0.18)
Woman (=1) # ES (std)			-0.33*		-0.39
			(0.18)		(0.28)
Woman (=1) # CO (std)			0.31*		0.53**
			(0.17)		(0.26)
Woman (=1) # OP-EX (std)			0.02		0.02
			(0.15)		(0.22)
Woman (=1) # AG (std)			0.19		0.10
			(0.16)		(0.28)
Woman (=1) # Raven (std)			-0.55***		-0.95***
			(0.19)		(0.29)
Woman (=1) # Numeracy (std)			0.36		0.77*
			(0.24)		(0.39)
Woman (=1) # Literacy (std)			-0.05		-0.13

			(0.21)		(0.31)
Dalits (=1) # ES (std)				-0.27	-0.31
				(0.18)	(0.23)
Dalits (=1) # CO (std)				-0.24	-0.13
				(0.16)	(0.20)
Dalits (=1) # OP-EX (std)				0.14	0.20
				(0.14)	(0.17)
Dalits (=1) # AG (std)				0.12	0.09
				(0.16)	(0.21)
Dalits (=1) # Raven (std)				-0.03	-0.21
				(0.17)	(0.22)
Dalits (=1) # Numeracy (std)				0.02	0.19
				(0.21)	(0.25)
Dalits (=1) # Literacy (std)				-0.13	-0.26
				(0.19)	(0.23)
Woman (=1) # Dalits (=1)					0.07
					(0.33)
Woman (=1) # Dalits (=1) # ES (std)					0.24
					(0.36)
Woman (=1) # Dalits (=1) # CO (std)					-0.40
					(0.34)
Woman (=1) # Dalits (=1) # OP-EX (std)					-0.13
					(0.30)
Woman (=1) # Dalits (=1) # AG (std)					0.11
					(0.33)
Woman (=1) # Dalits (=1) # Raven (std)					0.85**
					(0.39)
Woman (=1) # Dalits (=1) # Numeracy (std)					-0.71
					(0.48)
Woman (=1) # Dalits (=1) # Literacy (std)					0.20
					(0.42)
Location controls	Yes	Yes	Yes	Yes	Yes
Shock controls	Yes	Yes	Yes	Yes	Yes
Observations	1084	1081	1081	1081	1081
Pseudo R2	0.33	0.34	0.36	0.35	0.38
Log-likelihood	-502.23	-491.57	-480.01	-483.69	-465.68
chi-2	249.28	293.07	315.26	305.21	361.18
p-value	0.00	0.00	0.00	0.00	0.00

*Note: *p<0.1, **p<0.05, ***p<0.01.*

Source: NEEMSIS-1 (2016-17) and NEEMSIS-2 (2020-21), author's calculations.

Table A4 Multivariate probit of the probability to have a problem to repay the loan

	(1) Mana. β/Std. Err.	(2) Mana. β/Std. Err.	(3) Mana. β/Std. Err.	(4) Mana. β/Std. Err.	(5) Mana. β/Std. Err.
Individual level controls					
Indebted in 2016-17 (=1)	-0.05	0.01	-0.00	-0.02	0.02
	(0.18)	(0.19)	(0.19)	(0.19)	(0.20)
Woman (=1)	0.25*	0.26*	0.15	0.24	0.11
	(0.15)	(0.15)	(0.16)	(0.15)	(0.19)
Dalit (=1)	0.00	-0.03	-0.04	-0.05	0.02
	(0.13)	(0.13)	(0.13)	(0.14)	(0.17)
Age	0.01	0.00	0.00	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Occ: Unoccupied	0.17	0.11	0.20	0.02	0.07
	(0.38)	(0.38)	(0.38)	(0.39)	(0.39)
Occ: Agricultural SE	-0.39*	-0.39*	-0.39*	-0.40*	-0.36
	(0.21)	(0.21)	(0.22)	(0.22)	(0.22)
Occ: Agricultural casual (ref)					
Occ: Casual	-0.14	-0.04	-0.07	-0.07	-0.08
	(0.20)	(0.21)	(0.21)	(0.21)	(0.21)
Occ: Regular	-0.05	0.15	0.12	0.11	0.13
	(0.22)	(0.22)	(0.22)	(0.22)	(0.23)
Occ: SE	-0.25	-0.18	-0.17	-0.19	-0.14
	(0.20)	(0.19)	(0.20)	(0.19)	(0.20)
Occ: MGNREGA	-0.00	-0.09	-0.12	-0.06	-0.07
	(0.23)	(0.24)	(0.25)	(0.24)	(0.25)
School education (=1)	-0.12	-0.23	-0.22	-0.23	-0.25
	(0.13)	(0.17)	(0.18)	(0.17)	(0.18)
Married (=1)	0.68***	0.68***	0.67***	0.71***	0.77***
	(0.21)	(0.21)	(0.21)	(0.22)	(0.22)
Household level controls					
Assets (log)	0.04	0.06	0.05	0.05	0.05
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Household size	-0.06*	-0.07**	-0.06**	-0.07**	-0.07**
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Annual income (log)	-0.01	0.02	0.01	0.02	0.02
	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
Loan level controls					
Lender: Informal (ref)					
Lender: Formal	0.33**	0.28**	0.29**	0.28**	0.31**
	(0.13)	(0.14)	(0.14)	(0.14)	(0.14)
Interest rate (=1)	0.54***	0.52***	0.53***	0.52***	0.52***
	(0.14)	(0.14)	(0.15)	(0.14)	(0.15)
Reason: Economic	-0.10	-0.13	-0.12	-0.13	-0.12
	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)

Reason: Current (ref)					
Reason: Human capital	0.10	0.03	0.02	0.04	-0.00
	(0.12)	(0.13)	(0.13)	(0.13)	(0.13)
Reason: Social	0.27*	0.18	0.16	0.19	0.18
	(0.15)	(0.16)	(0.16)	(0.16)	(0.16)
Reason: Housing	0.26	0.20	0.19	0.21	0.17
	(0.16)	(0.16)	(0.17)	(0.16)	(0.17)
Loan amount (log)	0.12**	0.13**	0.13**	0.13**	0.14***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Total amount of debt (log)	-0.01	-0.01	-0.02	-0.02	-0.03
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Cognition					
ES (std)		0.26***	0.21**	0.31**	0.22
		(0.08)	(0.10)	(0.12)	(0.16)
CO (std)		-0.22***	-0.16*	-0.27**	-0.11
		(0.08)	(0.09)	(0.11)	(0.15)
OP-EX (std)		0.08	0.05	0.09	0.02
		(0.06)	(0.08)	(0.09)	(0.11)
AG (std)		-0.01	0.07	-0.03	0.08
		(0.07)	(0.08)	(0.12)	(0.16)
Raven (std)		-0.13*	-0.20**	-0.05	-0.15
		(0.07)	(0.09)	(0.10)	(0.12)
Numeracy (std)		-0.00	0.04	0.02	0.05
		(0.10)	(0.11)	(0.14)	(0.17)
Literacy (std)		0.08	0.11	0.08	0.14
		(0.10)	(0.11)	(0.13)	(0.15)
Woman (=1) # ES (std)			0.11		0.24
			(0.17)		(0.28)
Woman (=1) # CO (std)			-0.18		-0.54**
			(0.15)		(0.24)
Woman (=1) # OP-EX (std)			0.10		0.22
			(0.13)		(0.18)
Woman (=1) # AG (std)			-0.17		-0.28
			(0.14)		(0.24)
Woman (=1) # Raven (std)			0.22		0.31
			(0.15)		(0.19)
Woman (=1) # Numeracy (std)			-0.20		-0.33
			(0.20)		(0.28)
Woman (=1) # Literacy (std)			-0.11		-0.13
			(0.18)		(0.24)
Dalits (=1) # ES (std)				-0.10	-0.04
				(0.16)	(0.21)
Dalits (=1) # CO (std)				0.10	-0.11
				(0.14)	(0.18)
Dalits (=1) # OP-EX (std)				-0.04	0.04
				(0.12)	(0.16)
Dalits (=1) # AG (std)				0.05	-0.02

				(0.14)	(0.19)
Dalits (=1) # Raven (std)				-0.22	-0.18
				(0.15)	(0.18)
Dalits (=1) # Numeracy (std)				-0.05	-0.02
				(0.18)	(0.22)
Dalits (=1) # Literacy (std)				0.03	0.02
				(0.17)	(0.20)
Woman (=1) # Dalits (=1)					0.02
					(0.27)
Woman (=1) # Dalits (=1) # ES (std)					-0.16
					(0.36)
Woman (=1) # Dalits (=1) # CO (std)					0.67**
					(0.31)
Woman (=1) # Dalits (=1) # OP-EX (std)					-0.27
					(0.26)
Woman (=1) # Dalits (=1) # AG (std)					0.19
					(0.30)
Woman (=1) # Dalits (=1) # Raven (std)					-0.18
					(0.31)
Woman (=1) # Dalits (=1) # Numeracy (std)					0.19
					(0.40)
Woman (=1) # Dalits (=1) # Literacy (std)					0.02
					(0.37)
Location controls	Yes	Yes	Yes	Yes	Yes
Shock controls	Yes	Yes	Yes	Yes	Yes
Observations	1084	1081	1081	1081	1081
Pseudo R2	0.13	0.16	0.16	0.16	0.18
Log-likelihood	-618.40	-600.82	-595.09	-598.09	-587.20
chi-2	108.85	132.01	138.08	140.84	166.46
p-value	0.00	0.00	0.00	0.00	0.00

*Note: *p<0.1, **p<0.05, ***p<0.01.*

Source: NEEMSIS-1 (2016-17) and NEEMSIS-2 (2020-21), author's calculations.

Figures

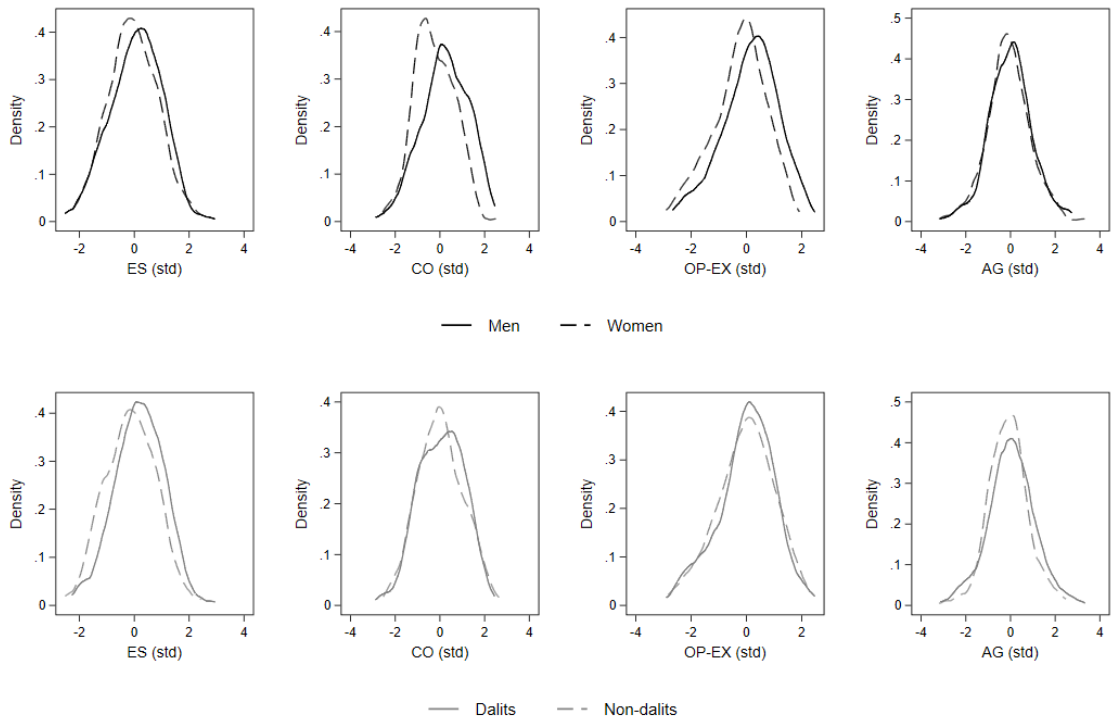

Figure 1 Distribution of personality trait scores in 2016-17

Note: For 488 individuals. ES: Emotional stability, CO: Conscientiousness, OP-EX: Openness-extraversion, AG: Agreeableness. The resulting personality traits are based on the standardised residual from univariate OLS regression with age as exogenous variable.

Source: NEEMSIS-1 (2016-17), author's calculations.

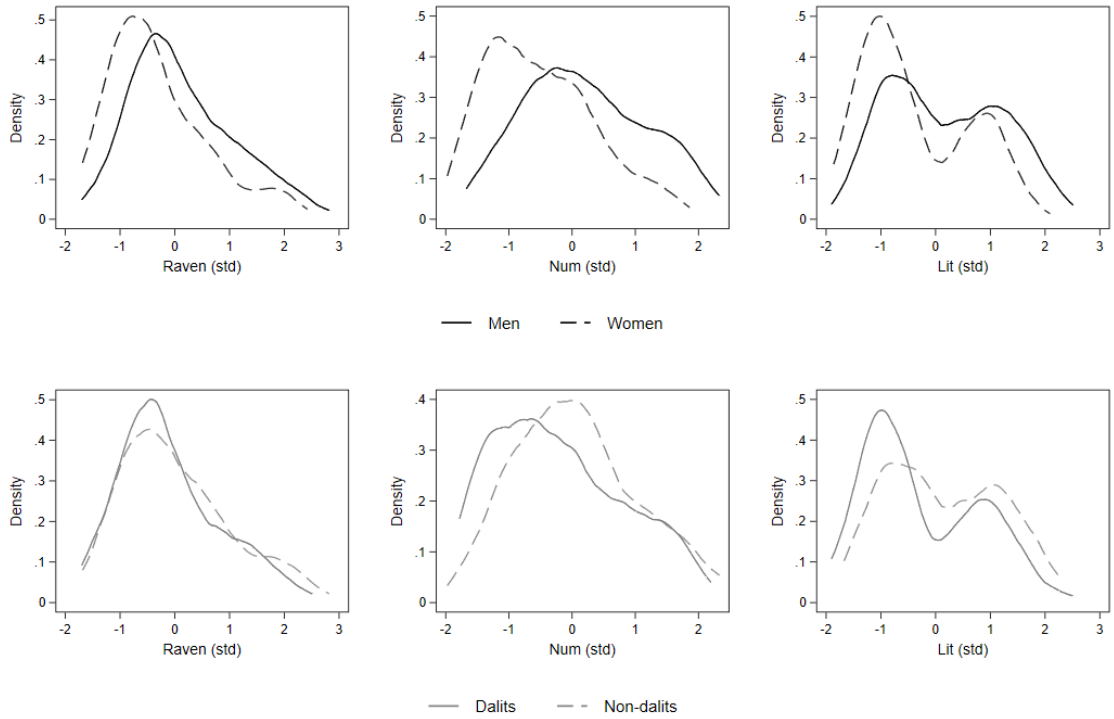

Figure 2 Distribution of cognitive skill scores in 2016-17

Note: For 488 individuals. Num: Numeracy, Lit: Literacy. The resulting cognitive skills are based on the standardised residual from univariate OLS regression with age as exogenous variable.

Source: NEEMSIS-1 (2016-17), author's calculations.

Tables

Table 5 Descriptive statistics of household characteristics in 2016-17

	Total	Dalits	Non-Dalits	Khi2/Student†
No. of HH	n=413	n=198	n=215	
Household size	4.70	4.93	4.45	2.44***
Assets:‡ Mean	1144.88	528.77	1712.28	5.88***
Assets: CV	1.86	1.43	1.60	
Assets: Median	417.50	277.20	710.00	
Income:§ Mean	152.96	125.44	178.31	3.40***
Income: CV	1.04	0.74	1.12	
Income: Median	115.40	99.10	130.20	
Shocks:¶ Yes	55.93	55.56	56.28	0.02
Lockdown exposure: Yes	19.19	21.21	17.21	1.067

*Note: *p<0.1, **p<0.05, ***p<0.01. †Statistical values according to the type of variable: chi-square test for categorical variables, Student's t-test for continuous variables. ‡Monetary value of assets held, without land (1k rupees). §Annual labour income (1k rupees). ¶Exposure to demonetisation of November 2016 and/or a marriage.*

Source: NEEMSIS-1 (2016-17), author's calculations.

Table 6 Descriptive statistics of individual characteristics in 2016-17

	Total	Men	Women	Khi2/Student†	Dalits	Non-dalits	Khi2/Student†
No. of individuals	n=488	n=294	n=194		n=238	n=250	
Age (mean)	49.74	52.28	45.89	6.40***	48.47	50.95	2.46**
Married: Yes	89.75	95.24	81.44	24.19***	87.39	92.00	2.81*
Edu: Below primary	42.62	35.03	54.12	17.42***	50.42	35.20	11.55***
Edu: Primary or more	57.38	64.97	45.88		49.58	64.80	
Occ: Unoccupied	3.28	0.68	7.22	104.36***	2.52	4.00	68.13***
Occ: Agricultural SE	18.65	22.79	12.37		8.40	28.40	
Occ: Agricultural casual	23.16	18.71	29.90		35.29	11.60	
Occ: Casual	12.91	15.99	8.25		15.13	10.80	
Occ: Regular	17.01	23.13	7.73		15.97	18.00	
Occ: Self-employed	14.34	16.67	10.82		9.66	18.80	
Occ: MGNREGA	10.66	2.04	23.71		13.03	8.40	

*Note: *p<0.1, **p<0.05, ***p<0.01. †Statistical values according to the type of variable: chi-square test for categorical variables, Student's t-test for continuous variables.*

Source: NEEMSIS-1 (2016-17), author's calculations.

Table 7 Descriptive statistics of loan characteristics in 2020-21

	Total	Men	Women	Khi2/ Student†	Dalits	Non-dalits	Khi2/ Student†
No. of loans	n=1084	n=666	n=418		n=522	n=562	
Loan amount: Mean	37.76	44.11	27.64	4.17***	29.50	45.42	4.13***
Loan amount: CV	1.69	1.69	1.41		1.58	1.67	
Loan amount: Median	20.00	20.00	25.00		20.00	25.00	
Lender: Informal	75.09	85.44	58.61	98.79***	75.48	74.73	0.08
Lender: Formal	24.91	14.56	41.39		24.52	25.27	
Reason: Economic	13.01	16.52	7.42	20.85***	6.32	19.22	47.02***
Reason: Current expenses	48.25	47.15	50.00		54.02	42.88	
Reason: Human capital	14.76	14.11	15.79		13.03	16.37	
Reason: Social expenses	14.02	13.66	14.59		16.09	12.10	
Reason: Housing	9.96	8.56	12.21		10.54	9.43	
Interest: Yes	69.28	70.57	67.22	1.35	69.35	69.22	0.00
Same sex: No	18.73	13.96	26.32	173.17***	20.11	17.44	2.27
Same sex: Yes	59.13	74.32	34.93		59.39	58.90	
Same sex: N/A	22.14	11.71	38.76		20.50	23.67	
Same caste: No	20.30	22.37	16.99	109.44***	23.56	17.26	6.99**
Same caste: Yes	57.56	65.92	44.26		55.94	59.07	
Same caste: N/A	22.14	11.71	38.76		20.50	23.67	
No need to provide services: Yes	47.05	35.59	65.31	91.09***	42.91	50.89	6.91***
Have a problem to repay: Yes	36.90	33.03	43.06	11.09***	37.93	35.94	0.46

*Note: *p<0.1, **p<0.05, ***p<0.01. †Statistical values according to the type of variable: chi-square test for categorical variables, Student's t-test for continuous variables.*
Source: NEEMSIS-2 (2020-21), author's calculations.

Table 8 Marginal effects at representative values of the probability of not providing a service to the lender

	(1)	(2)		(3)		(4)			
	ME/Std. Err.	ME/Std. Err.		ME/Std. Err.		ME/Std. Err.			
	Total	Man†	Woman	Non-Dalit	Dalit	Non-Dalit man	Dalit man	Non-Dalit woman	Dalit woman
Emotional stability (std)	-0.04	0.00	-0.13**	0.02	-0.09**	0.05	-0.07	-0.10	-0.13**
	(0.03)	(0.04)	(0.06)	(0.06)	(0.04)	(0.07)	(0.05)	(0.09)	(0.07)
Conscientiousness (std)	0.09***	0.06	0.18***	0.14***	0.04	0.09	0.03	0.29***	0.09
	(0.03)	(0.04)	(0.06)	(0.05)	(0.04)	(0.06)	(0.05)	(0.08)	(0.08)
Openness-extraversion (std)	-0.04	-0.05	-0.04	-0.07*	-0.01	-0.08*	-0.00	-0.07	-0.04
	(0.03)	(0.03)	(0.05)	(0.04)	(0.04)	(0.05)	(0.04)	(0.07)	(0.06)
Agreeableness (std)	0.02	-0.02	0.06	-0.02	0.03	-0.03	0.00	0.00	0.08
	(0.03)	(0.04)	(0.05)	(0.05)	(0.03)	(0.07)	(0.04)	(0.08)	(0.06)
Raven (std)	-0.01	0.06	-0.16***	-0.01	-0.02	0.08	-0.01	-0.29***	-0.04
	(0.04)	(0.04)	(0.06)	(0.05)	(0.05)	(0.06)	(0.06)	(0.10)	(0.08)
Numeracy (std)	-0.08*	-0.11**	0.04	-0.08	-0.07	-0.15**	-0.07	0.15	-0.05
	(0.04)	(0.05)	(0.08)	(0.07)	(0.05)	(0.08)	(0.06)	(0.13)	(0.09)
Literacy (std)	0.06	0.06	0.04	0.10	0.04	0.13*	0.02	0.07	0.05
	(0.04)	(0.05)	(0.08)	(0.06)	(0.05)	(0.07)	(0.06)	(0.10)	(0.09)

*Note: *p<0.1, **p<0.05, ***p<0.01. †When a personality trait/cognitive skill increases by one standard deviation, the probability that Y=1 increases/decreases by ME percentage point, for the average man, all else being equal.*

Source: NEEMSIS-1 (2016-17) and NEEMSIS-2 (2020-21), author's calculations.

Table 9 Marginal effects at representative values of the probability to have a problem to repay the loan

	(1)	(2)		(3)		(4)			
	ME/Std. Err.	ME/Std. Err.		ME/Std. Err.		ME/Std. Err.			
	Total	Man†	Woman	Non-Dalit	Dalit	Non-Dalit man	Dalit man	Non-Dalit woman	Dalit woman
Emotional stability (std)	0.09***	0.07**	0.12**	0.11**	0.08*	0.08	0.06	0.17**	0.10
	(0.03)	(0.03)	(0.05)	(0.04)	(0.04)	(0.06)	(0.05)	(0.09)	(0.07)
Conscientiousness (std)	-0.08***	-0.06*	-0.13***	-0.10**	-0.06*	-0.04	-0.08*	-0.24***	-0.03
	(0.03)	(0.03)	(0.05)	(0.04)	(0.03)	(0.05)	(0.04)	(0.07)	(0.06)
Openness-extraversion (std)	0.03	0.02	0.05	0.03	0.02	0.01	0.02	0.09	0.01
	(0.02)	(0.03)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.05)	(0.05)
Agreeableness (std)	-0.00	0.02	-0.04	-0.01	0.01	0.03	0.02	-0.07	-0.01
	(0.02)	(0.03)	(0.04)	(0.04)	(0.03)	(0.06)	(0.03)	(0.07)	(0.05)
Raven (std)	-0.05*	-0.07**	0.01	-0.02	-0.10**	-0.05	-0.11**	0.06	-0.07
	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.06)	(0.07)
Numeracy (std)	-0.00	0.01	-0.06	0.01	-0.01	0.02	0.01	-0.10	-0.04
	(0.03)	(0.04)	(0.06)	(0.05)	(0.04)	(0.06)	(0.05)	(0.08)	(0.10)
Literacy (std)	0.03	0.04	-0.00	0.03	0.04	0.05	0.05	0.00	0.02
	(0.04)	(0.04)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)	(0.07)	(0.09)

*Note: *p<0.1, **p<0.05, ***p<0.01. †When a personality trait/cognitive skill increases by one standard deviation, the probability that Y=1 increases/decreases by ME percentage point, for the average man, all else being equal.*

Source: NEEMSIS-1 (2016-17) and NEEMSIS-2 (2020-21), author's calculations.