

Indebtedness in Rural India: The Contribution of Cognitive Skills and Personality Traits

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Abstract

Keywords : Gender, caste, debt burden

1 Introduction

Since more than a decade, there has been increasing interest in psychology in economics literature¹, especially through personality traits and cognitive skills (PT&CS). The relevance of such analysis in economics is well documented in the literature. Hanushek and Woessmann (2008) shows that cognitive skills are correlated with individual earnings, distribution of income and economic growth. Moreover, other factors such as well-functioning economic institutions –although enter into growth and may well have stronger effects, may also amplify the effects of cognitive skills. Concerning personality traits, Borghans, Duckworth, Heckman, and ter Weel (2008) examines, for instance, the relevance of personality traits in economics. They show that psychological variables are a good predictor of socioeconomic success (especially on labour market²) **and they can be influenced by interventions and investment more readily than IQ after the early years because of the non-stability through life cycle.** Thus, institutions such as World Bank collecting more and more data³ because it enable a “better understanding of skill requirements in the labor market, backward linkages between skills acquisition and educational achievement, personality, and social background, and forward linkages between skills acquisition and living standards, reductions in inequality and poverty, social inclusion, and economic growth” (Valerio, Sanchez Puerta, Pierre, Rajadel, & Monroy Taborda, 2014).

Definition Cognitive skills can be defined as a “term that refers to mental processes involved in the acquisition of knowledge, manipulation of information, and reasoning [that] include the domains of perception, memory, learning, attention, decision making, and language abilities” (Kiely, 2014). While “personality is the dynamic organization within the individual of those psychophysical systems that determine his characteristics behavior and thought” (Allport, 1961). Among the theories of personality, the traits can be defined as thought, emotion and habitual patterns of behavior (Kassin, 2003). The Big-5 model constitute the main personality trait taxonomy. Based on Goldberg (1981) and McCrae and Costa (1987) works, it identify five

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¹In 2020, we find more than 200 articles in economics with “Cognitive skills” or “Personality traits” in the title, abstract or keywords while there are less than 40 in 2009 – Scopus data. Accessed June 29, 2021.

²See Almlund, Duckworth, Heckman, and Kautz (2011).

³As stated by Laajaj and Macours (2019), the World Bank alone spent 1 billion USD a year.

dimensions of personality: neuroticism (or emotional stability), i.e. the capacity to experience negative emotions; extraversion, i.e. the capacity to experience positive emotions, the tendency to seek stimulation and company from others; openness to experience, i.e. “one’s capacity to be creative and unstructured versus one’s tendency to need structure and clarity” (Piedmont, 2014); agreeableness, i.e. “perceptions of others that are caring, compassionate, and altruistic versus manipulative, self-serving, and antagonistic” (Piedmont, 2014); conscientiousness, i.e. the capacity to display self-discipline, act dutifully, and strive for achievement against measures or outside expectations.

Skills in economics Studies in economics⁴ focuses on the role of skills on labour market and especially on income gap, performance at work and type of work or education through educational attainment, course grades or standardized achievement test (SAT) scores but few researcher have been interested in the relationship with household finances while it is a growing area of interest⁵. [Indeed] Household are more implicated in financial decision such as privatization of retirement pension, liberalization of loan market, increase in credit purchase, which are more complicated because of financial innovation (Guiso & Sodini, 2013).

The few studies that have focused on household finance mainly investigate four outcomes: risk aversion, financial distress, savings and debt. Nga and Yien (2013) show that conscientiousness, openness to experience and agreeableness are correlated with risk aversion, cognitive biases and socially responsible investing for undergraduate students of Malaysia. For 4,026 individuals from Netherland, Pinjisakikool (2017) shows that all the Big-5 personality traits are good predictor of financial risk tolerance as Bucciol and Zarri (2017) that shows that agreeableness, cynical hostility and anxiety are good predictor of financial risk taking for 10,641 individuals from USA (negative correlation). In terms of financial distress, Agarwal and Mazumder (2013) shows that individuals with high math scores are less likely to make financial distress in USA. Parise and Peijnenburg (2019) are one of the first who deal with causality instead of correlation. Using instrumental variable method⁶ on Dutch dataset, they shows that people in the bottom quintile of personality traits are 10 times more likely to experience financial distress than those in the top quintile. Concerning saving behaviour, Gerhard, Gladstone, and Hoffmann (2018) decompose 3,382 individuals from United-Kingdom in two groups (striving and established) and find that agreeableness is negatively correlated with total household savings for both groups and the effect is stronger for the striving than for the established. Nyhus and Webley (2001) shows that extraversion is negatively correlated with savings for 1,266 individuals from Netherland and in interesting in debt, they shows that emotional stability is positively correlated with debt. Still with debt, Brown and Taylor (2014) shows that extraversion and agreeableness are positively associated with the level of debt held while conscientiousness is negatively correlated with the level of unsecured debt for 10,000 individuals of United-Kingdom and Forlicz and Rólczyński (2019) shows differences between debtors and debt-free individuals in terms of conscientiousness, honesty, attitude towards money and shopping for 3,711 individuals from Poland, Spain, Romania and Italy.

Other research build a bridge between household finance and individual skills through the notion of financial literacy⁷ (Hastings, Madrian, & Skimmyhorn, 2013) (Gaurav & Singh, 2012) (Klapper, Lusardi, & Panos, 2012) **Developper ? Pas sûr**

⁴For a comprehensive review, see Almlund et al. (2011).

⁵This renewed interest led the Journal of Economic Literature (JEL) to create a field in its own right under the code G5.

⁶They instruments conscientiousness and emotional stability with shock during childhood à vérifier.

⁷Financial literacy measure “how well an individual can understand and use personal finance-related information” (Huston, 2010).

Indebtedness in India To our knowledge, no articles has looked at personality traits and cognitive skills on debt in India⁸ (nor even in developing countries) while the Indian context is unique in terms of household finance. Since the 80's, the incidence of indebtedness increase for rural and urban households (respectively from 19 to 32% and from 17 to 22%) with an increasing in the share of household indebted to formal (or institutional) sources (11 to 17%) and informal sources⁹ (10 to 19%) (Rajakumar, Mani, Shetty, & Karmarkar, 2019). As we discuss in section 2.1, this number is largely under-estimate (Jones, 1994) and micro-level studies indicates incidence of debt around 80-90% (Drèze, Lanjouw, & Sharma, 1997; Guérin, D'Espallier, & Venkatasubramanian, 2013; Jones, 1994; Reboul, Guérin, & Nordman, 2021). The average amount of debt per household strongly increased between 1951 and 2012 (from 83 INR to 32,522 INR) with an increasing in the share of formal debt (from 7 to 56% for rural households) and, thus, a decreasing in the share of traditional informal debt (from 93 to 43% for rural households) (Rajakumar et al., 2019).

Added to this is a high level of inequalities in terms of indebtedness. Guérin et al. (2013) show that the caste affect borrowing strategies as amount, type and source of debt in rural Tamil Nadu, India. Dalits, have higher incidence of indebtedness but borrow smaller amounts and more frequently from ambulant lenders (Guérin et al., 2013). They borrow less for economic reason than non-dalits but more for household expenditures (Guérin et al., 2013; Guérin, Roesch, Venkatasubramanian, & Kumar, 2014). Finally, they have the lower access¹⁰ to bank loans while it offer "the best conditions financially speaking" (low interest rate, higher amounts, long duration) (Chavan, 2007; Guérin et al., 2013).

Disparities is also important through the gender. Reboul et al. (2021) show that the relative amount of debt is higher for female than for male while male earn much more. Moreover, female in the poorest households have the highest borrowing responsibilities and dalit female tend to face higher debt burdens than non-dalit one. In terms of use, male borrow more for economic investment while female more for daily survival and debt repayment (Reboul et al., 2021). **Add details?**

Paragraph on social meaning of debt

Individual debt and public policies (demonetisation Guérin, Lanos, Michiels, Nordman, and Venkatasubramanian (2017) and lockdown Guérin, Michiels, Natal, Nordman, and Venkatasubramanian (2020))

- Financial inclusion : more and more HH are financial included (Badarinza, Balasubramaniam, & Ramadorai, 2019), especially in India (Chakravarty & Pal, 2013). **Literature Isabelle**
- Secondly, on a vue que quasi tout le monde est concernés par la dette et especially to consume which is an determinants of global wealth (expenditures approach of GDP). In India, the households and non-profit institutions serving households (NPISHs) final consumption expenditure represent 60.29% of GDP¹¹.
- Household finance has faced a renewed interest since a decade (Guiso & Sodini, 2013). Indeed, household are more implicated in financial decision such as privatization of

⁸Michiels, Nordman, and Seetahul (2021) interesting in the role of personality traits on labour mobility in rural Tamil Nadu.

⁹In part due to the economic and financial sector reforms of 1991: <http://indiabefore91.in/1991-economic-reforms>.

¹⁰In part, because they do not have necessary guarantee (i) such as good land (irrigated one and good location), specific know-how (ii), or because they self-excluded themselves because dalits are persuaded to fail (Guérin et al., 2013).

¹¹World Bank Data – <https://data.worldbank.org/indicator/NE.CON.PRVT.ZS?locations=IN>. Accessed January 22, 2021.

retirement pension, liberalization of loan market, increase in credit purchase, which are more complicated because of financial innovation¹². Household finance (or consumer finance for researchers in business sciences) refer to the way that “households use financial instruments to attain their objectives” (Campbell, 2006). More precisely¹³ its a “research field to study how financial institutions provide products and services to meet financial needs of consumers, how consumers make financial decisions, how government agencies regulate financial institutions and protect financial consumers and how science and technology help optimize the efficiency of consumer finance markets and improve social welfare” (Xiao & Tao, 2020).

Strength of social identity More recently, several works highlight disparities between caste and gender in terms of aspirations. Mukherjee (2017) show that “gender and caste primes can significantly affect long run aspirations and beliefs”. Alvi, Ward, Makhija, and Spielman (2019) use priming¹⁴ to study the effect of identity salience on aspirations. They find that “when women are primed on gender, they exhibit higher aspirations for their daughters [and] low-case women primed on caste are more aspirational for their daughters”. Finally, Sarkar, Chakravorty, and Lyonette (2020) show that caste and gender work as double jeopardy instead of intersectionality for aspirations. Indeed, “the most socially disadvantaged groups – Scheduled Tribe (ST) and Scheduled Caste (SC) – have significantly lower income aspiration when compared to Other Backward Class (OBC) and Other Caste (OC) participants” [and] [f]emale participants also have significantly lower aspiration than their male counterparts”. Moreover, SC/ST female participants have lower income aspiration levels compared to other groups.

Beyond being a source of inequality, caste and gender seems to deeply impact individuals by conditionning them. In this context it appears important to investigate the role of PT&CS on indebtedness in take into account the deepness of this social identity.

Problematic, contribution and plan In a context where indebtedness is omnipresent but at different level according to social identity, study the relationship with PT&CS appears full of meaning. In this article we investigate how PT&CS shape indebtedness situation (i), how the evolution of debt is correlated with the evolution of PT&CS (ii). More finely, we try to capture the weight of social identity by investigating the contribution of PT&CS for each social groups on the shape of debt and the variation of debt (iii). In other word, in a highly sensitive country to social identity, do individuals manage to differentiate themselves by their skills?

By providing descriptive and econometric empirical insights, this paper contributes to furthering our understanding of the determinants of individual indebtedness –which is rare and valuable in developing countries, as well as, contributing more generally to the expanding literature exploring the implications of PT&CS for economic outcomes.

The rest of the article is organised as follow: section 2 is devoted to data and methodology, then, in section 3 we discuss some descriptive statistics to highlight the weight of social identity before exploring and discussing the relationship between PT&CS and indebtedness in section 4.

¹²For a comprehensive review on the subject, see Tufano (2003).

¹³For a comprehensive review on household finance, see Tufano (2009) for whom household finance is “the study of how institutions provide goods and services to satisfy the financial functions of households, how consumers make financial decisions, and how government action affects the provision of financial services”, Guiso and Sodini (2013), or Xiao and Tao (2020).

¹⁴Priming, in cognitive psychology, is “the effect in which recent experience of a stimulus facilitates or inhibits later processing of the same or a similar stimulus.” – <https://dictionary.apa.org/priming>. Accessed June 21, 2021.

2 Data and methodology

2.1 Data

Our empirical analysis is based on the NEEMSIS-1 & NEEMSIS-2 (Networks, Employment, dEbt, Mobilities and Skills in India Survey) surveys carried out respectively in 2016-17, and 2020-21 ([Nordman, Guérin, Michiels, Natal, & Venkatasubramanian, 2019](#); [Nordman et al., 2017](#)). This survey was the second and third waves of a longitudinal data collection project start in 2010 with RUME (RUral Microfinance and Employment survey) project in ten villages of Tamil Nadu. Located in the Cuddalore and Villupuram districts, a mostly agricultural area, economies benefits from the proximity of two large industrial towns (Neyveli and Cuddalore) and a regional business center (Panruti).

RUME randomly selected 405 households using stratified sample framework based on three dimensions: proximity to small towns (Panruti, Villupuram and Cuddalore), an agro-ecological criterion, and caste affiliation. Thus, half of villages are irrigated (the other half have dry lands) and within villages, half of the sample was selected from the mostly upper and middle caste part of the village (Ur) while the other half from the Colony part, where dalits (the ex-untouchables) mainly live. NEEMSIS1 recovered 388 households (4.19% attrition rate) and randomly selected 104 news households (for a total of 492 households) from these 10 villages, based on the same method. NEEMSIS2 recovered 485 households (1.42% attrition rate) from 2016-17 and recovered 10 households from 2010 that were not recovered in 2016-17. Moreover, 100 news households were randomly selected (for a total of 595 households).

In NEEMSIS1 & NEEMSIS2, two household members, called “ego 1” (mostly household questionnaire respondent) and “ego 2” (one younger household member randomly selected on a criterion of age), are directly addressed individual questionnaires that provide for instance a range of information on cognitive skills and personality traits.

NEEMSIS’s surveys stands out from other Indian data sources such as the All India Debt and Investment Survey (AIDIS), as it has the rare and valuable advantage of recording debt at the individual level (identifying the person who went to the lender and borrowed in her own name).

Concerning the reliability, the great expertise of the team¹⁵, helped to formulate questions appropriately. This for instance involved using particular terms that are less degrading than the generic term “debt” lists of the main local lenders, and asking indirect questions. As stated by [Reboul et al. \(2021\)](#) (same data sets) “[i]mproved data accuracy is for example reflected by an incidence of indebtedness found higher than in the estimates of the nation-wide AIDIS: 99% of households are in debt in our case study, as opposed to 30% in rural Tamil Nadu in 2012 according to the AIDIS ([NSSO, 2014](#)).”

Moreover, the moderate magnitude of the survey, compared to nationally representative datasets, ensures the high quality of the data and the tablet-based mode of data collection improved data quality in including constraints on answers to prevent inconsistencies.

Our final sample consists of 473 households and 835 egos follows in 2016-17 and 2020-21.

2.2 Construction of personality traits & cognitive skills variables

As stated earlier, our survey allow us to construct measures of cognitive skills. It include three score variables: literacy, numeracy, Raven¹⁶. These scores are construct in adding up the correct

¹⁵Some members of the research team are present since more than twenty-year on the region for numerous quantitative and qualitative surveys.

¹⁶Raven test is “a nonverbal test of mental ability consisting of abstract designs, each of which is missing one part. The participant chooses the missing component from several alternatives to complete each design.” – <https://dictionary.apa.org/ravens-progressive-matrices>. Accessed January 27, 2021.

answers of a set of four questions for literacy and numeracy (six for 2020-21) test and 36 for Raven.

Concerning Big-5, on the basis of 35 questions, we averaged answers –based on a Likert scale from 1–“Almost Never” to 5–“Almost always”, that belong to a determined trait after correcting for acquiescence bias¹⁷ (see Appendix B). The resulting mean represent the score on each traits.

McDonald's Ω^{18} , a measure of internal consistency, are mostly satisfactory for 2016-17 data corrected from acquiescence bias: 0.81 for openness; 0.86 for conscientiousness; 0.59 for extraversion; 0.60 for agreeableness and 0.80 for emotional stability (see Figure 1). For 2020-21, the internal validity after correcting for acquiescence bias is not ideal (see Figure 1) and implies that results could suffer from measurement error, which would bias our results towards zero. We, therefore, implement our own exploratory factor analysis to identify personality traits.

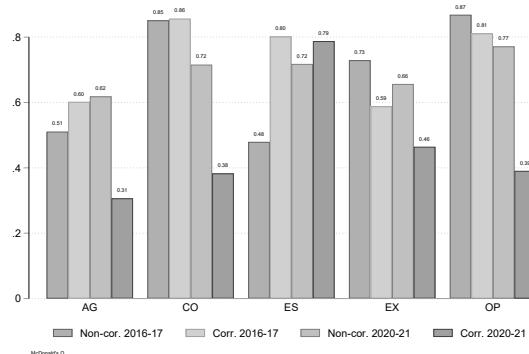


Figure 1: Internal consistency of Big-5 personality traits – Distribution of McDonald's Ω through time and correction for 953 individuals in 2016-17 and 1,316 in 2020-21 from rural Tamil Nadu, India.

Source: NEEMSI-1 (2016-17) & NEEMSI-2 (2020-21); author's calculations.

Factor analysis As warned by Laajaj et al. (2019), the Big-Five taxonomy is limited in developing countries for several reasons: the enumerator-respondent interactions in face-to-face survey can induce a bias; the low education levels can make questions more difficult to understand and can induce a systematic response patterns, especially the acquiescence bias.

The very good knowledge of the field¹⁹ allow us to collect data of high quality and avoid a bias due to misunderstanding of questions. Moreover, we implement our own factor analysis of the 35 questions by principal component with promax rotation. To avoid a bias in factor analysis, we do not correct for acquiescence bias. In our dataset, acquiescence bias is measured with a set of reverse questions that are supposed perfectly opposed to another set of questions. However, the assumption of opposition is supportable only in the Big-5 taxonomy, in another layout pairs of questions can measure different aspects of personality.

The resulting factors for 2016-17 data are relatively similar to the Big-5 personality traits with satisfactory McDonald's Ω : Factor 1 as Extraversion-Openness ($\Omega = 0.91$); Factor 2 as Conscientiousness ($\Omega = 0.87$); Factor 3 as Emotional stability-Conscientiousness ($\Omega = 0.76$); Factor 4 as Emotional stability ($\Omega = 0.81$) and Factor 5 as Agreeableness ($\Omega = 0.64$) (see Appendix B). The resulting factors for 2020-21 data are very different to the Big-5 taxonomy and to the

¹⁷Acquiescence bias represent the “tendency for survey respondents to agree with statements regardless of their content” (Lavrakas, 2008).

¹⁸Literature on internal consistency estimators increasingly agrees that Cronbach's α –the most widely used estimator, is maybe not very efficient (Bourque, Doucet, LeBlanc, Dupuis, & Nadeau, 2019; Trizano-Hermosilla & Alvarado, 2016).

¹⁹More than 20 years.

2016-17 factors: Factor 1 as Sociability (); Factor 2 as Conscientiousness (); Factor 3 as Emotional stability (); Factor 4 as () and Factor 5 as ().

Life-cycle effects To mitigate against the potential problem of life-cycle events –that might induce endogeneity through measurement error, we run univariate OLS regression with cognitive skills and personality traits as endogenous variables and age as exogenous variable. We standardised the resulting residuals and use it at personality measures net of life cycle influences (Brown & Taylor, 2014; Nyhus & Pons, 2005).

Exogeneity The exogeneity of personality traits is well assume because of stability over time while there is no consensus in psychology (Ardelt, 2000).

According to Costa and McCrae (1997); McCrae et al. (2000) it remains stable, in part, because it is a genetic predisposition that, by definition, cannot be changed over life. Many economist²⁰ follow this path and the majority of them assume stability over time after the age of 25 and others verify this stability (Cobb-Clark & Tan, 2011).

This stability refutes sociological and psychological literature which interesting in the influence of childhood and adulthood socialization on personality (Moen, Elder Jr., & Lüscher, 1995; Mortimer & Simmons, 1978). Following this path, Ardelt (2000) state that “personality can change over the course of a person’s life, particularly if age at first measurement is low or over 50, if the retest interval is large, if individual personality aspects rather than the overall personality are considered, and if personality aspects other than the big five NEO traits are assessed.”

Our data allow us to examine stability over time of Big-5 personality traits for 835 individuals of rural India. Calculating variation rate between 2016-17 and 2020-21 of each traits, results show a stability for minor part of the population. Non-corrected traits, in addition to having globally (2016-17 and 2020-21) higher internal consistency (see Table 1) are less unstable over time without being able to relate stability: 50% of egos have an absolute variation of Openness higher than 20%, and higher than 15% for other traits (see Appendix A).

2.3 Indebtedness measures

Before exploring the role of cognitive skills and personality traits, it is necessary to discuss debt and over-indebtedness measures. There is no consensus in the literature but three approaches are often retained (Betti, Dourmashkin, Rossi, & Yin, 2007; Ferreira, 2000). Objective measures focus on the ability (or inability) to service or repay debts. Typically, it is the debt to income ratio, debt to asset ratio, debt service ratio. Over-indebtedness occurs when a certain threshold is exceeded. Although this is the most widely used measure, it under-estimate the burden of debt in ousting personal feeling and sacrifice associated with debt and over-indebtedness (Betti et al., 2007).

Subjectives measure assume that “individual households are the best judges of their own net debt/wealth position” (Betti et al., 2007). The robustness of the results are based on the degree of honesty and literacy of individuals that can make it, sometimes, less reliable (Betti et al., 2007; D’Alessio & Iezzi, 2013). As stated by Rinaldi and Sanchis-Arellano (2006) and Keese (2012), in general, objective measures align quite well with subjective measures at the household classification level.

Administrative measures treat indebtedness and over-indebtedness as “all cases where non-payment of debts have been registered officially or declared before a court” (Betti et al., 2007). In rural Indian context, this type of measures have little meaning since most of the debt is informal.

²⁰But not all, see Almlund et al. (2011); Borghans et al. (2008); Heckman (2011). As stated by Heckman (2011), “Personality traits are not set in stone. They change over the life cycle. They are a possible avenue for intervention and policy.”

In order to best measure the debt, we could combine objective and subjective measures as [Aniola and Golas \(2012\)](#) do in European Countries, but this brings the risk that all households will find themselves categorized as over-indebted according to the measure used ([Chichaiblu & Waibel, 2018](#)).

It is recommended to analyse indebtedness at household level because generally income is grouped between household members ([Fondeville, Ozdemir, & Ward, 2010](#)). However, in order to explore the role of individual characteristics such as personality and cognitive skills on indebtedness, we focus on three types of individual objective measures allowing us to understand the debt from three angles.

First, we investigate the size of the individual debt with the total amount of individual debt taken out in her own name. Second, we investigate the burden of debt repayment with the individual debt service ratio²¹ (DSR).

2.4 Econometric framework

In order to better understand the relationship between debt and PT&CS, our analysis takee place in two step.

How PT&CS shape individual debt? In a first step, we use the PT&CS of 2016-17 (X'_i) on individual debt of 2020-21 to understand how personality shapes individual debt. Our analysis faces sample selection issues because of the nature of our dependent variables: the sample is restricted to those who declared a non-zero and non-missing debt. We therefore do not account for entry and exit in debt by only considering total loan amount and debt service ratio. To overcome this sample selection issue, we use a [Heckman \(1976\)](#) model. The household debt dependency ratios, defined as the number of indebtedness individuals divided by the total number of household members, in 2016-17 are used as exclusion restriction (ER_i) variables²², allowing to compute an inverse Mill's ratio (IMR_i) to correct for selection in our equations of interest (eq. 2). First, we use probit model with maximum likelihood estimation to estimate the probability for an individual of being in debt ($Indebt_i$) (eq. 1) and we clusterize the error at household level.

$$Indebt_i = \beta_0 + X'_i * \beta_1 + C'_i * \beta_2 + Z'_i * \beta_3 + \beta_4 * ER_i + \mu_i \quad (1)$$

Then, in order to investigate the amount of debt and the burden of repayment (Y_i), we use OLS with cluster at household level (eq. 2). We do not use tobit model because our data are not censored or truncated, but defined on \mathbb{R}^+ ([Maddala, 1991](#)). Despite the fact that Debt Service Ratio is a share, we do not use GLM beacuse of the upper bond of the variable (> 1).

$$Y_i = \beta_0 + X'_i * \beta_1 + C'_i * \beta_2 + Z'_i * \beta_3 + \beta_4 * IMR_i + \epsilon_i \quad (2)$$

How does PT&CS variation correlate with indebtedness variation? In a second step, we fully accept the non-stability of personality traits by using the variation of Big-5 personality traits (X'_{it}) through time (2016-17 and 2020-21) on debt evolution with fixed effect regressions (eq. 3). Unlike the previous approach (*How PT&CS shape individual debt?*), we do not use personality traits from factor analysis inssofar as factor for 2016-17 are different from those for 2020-21. We use the same debt measures as before: the total amount of debt and the individual debt service ratio (Y_i).

²¹ $DSR = \frac{\text{Debt service}}{\text{Annual Income}}$ which represent the share of income required to cover the repayment of interest and principal on a debt for one year.

²² The household debt dependency ratios is correlated with the probability, for an individual, of being indebted but not with the loan amount and the debt service ratio (see Appendix C).

$$Y_{it} = \beta_0 + X'_{it}\beta_1 + C'_{it}\beta_2 + Z'_{it}\beta_3 + \alpha_i + u_{it} \quad (3)$$

An important caveat lies in the study of causality. We do not pretend to show a causal relationship between PT&CS and indebtedness but to relate correlations because we cannot rule out the possibility of reverse causality between PT&CS variation and indebtedness variation.

Others variables and interpretation Our control variables (C'_{it}) are based on [Brown and Taylor \(2014\)](#); [Chichaibelu and Waibel \(2017\)](#); [Reboul et al. \(2021\)](#) which take the existing classic controls. We use two vector of variables:

- Individual level variables as age; age square; dummy variable which take 1 if individual is the household head, 0 otherwise; main occupation²³; number of occupation (dummy variable which take 1 if individual declare more than one occupation, 0 otherwise); dummy variable which take 1 if individual received formal education through school, 0 otherwise (no formal education) and a dummy variable for marital status (1 if married, 0 otherwise).
- Household level variables as monetary value of assets²⁴; sex ratio; total annual income; household size; shock exposure (dummy variable which take 1 if the household experienced a shock²⁵ between 2010 and 2016-17, 0 if not).

To take into account the strength of social identity (gender and caste) we investigate relationship on a pooled sample of egos with interactions variables to maximize statistical power, although splitting samples improves model specification (the sub-samples obtained are too small to make regressions). First we do not use interaction to see the global effect (1), then we add interaction variable with gender (2), caste (3) and both (4) to test whether the effect of PT&CS differ by gender and caste :

$$\begin{array}{ll} (1) & Z'_i = 0 \\ (2) & Z'_i = \text{Gender} * X'_i \end{array} \quad \begin{array}{ll} (3) & Z'_i = \text{Caste} * X'_i \\ (4) & Z'_i = \text{Gender} * \text{Caste} * X'_i \end{array}$$

In all of our estimation (and specifications), we choose to cluster the error at households scale to take into account the fact that observations within each household are not i.i.d. Indeed, we have data for two individuals from the same household and these latter sharing resources and pooling others. In terms of debt, as stated by [Reboul et al. \(2021\)](#), “our data is limited, [but] it suggests that fully pooling and sharing the household debt burden is not the norm.”

To interpret our results, we compute marginal effect (ME) at representative values on the predicted values of PT&CS [Williams \(2012\)](#). We use gender (male/female) and caste (non-dalits/dalits) as representative values, all other variables are at mean. Thanks to our interactions variables, we therefore obtain nine groups ME for each PT&CS variable: average individual; average male; average female; average non-dalits; average dalits; average non-dalits male; average dalits male; average non-dalits female and average dalits female.

²³Define as the most time-consuming activity.

²⁴The monetary value of assets includes gold; land; house; livestock; agricultural equipment and consumption good (car, computer, cookgas, phone, etc.).

²⁵Marriage of at least one of the household members or/and household surveyed after the demonetisation.

3 Descriptive statistics

3.1 Household unit in Table 1

Our final sample consists of 835 individuals from 473 households and almost half are dalits. Three quarters of households have 2 egos, the last quarters have only one egos. The sex ratio is significantly different through caste: in 24% of dalits households there are as many men as women while in middle-upper caste, it is 34% of households in 2016-17. In terms of assets, middle-upper caste households are three times richer than dalits on average –respectively 1,493,350 INR and 487,420 INR in 2016-17. 50% of middle-upper caste have less than 666,500 INR of assets while 50% of dalits households have less than 266,400 INR in 2016-17. For 50% of dalits, the monetary value of assets increased by at least 47% between 2016-17 and 2020-21 while for 50% of non-dalits households, it decreased by at least 22%. However, middle and upper caste still have higher amount of assets in 2020-21. This economic advantage of non-dalit households is also found with income: the median income of middle-upper caste is 33.71% higher than dalits one in 2016-17 and 14.64% higher in 2020-21. Last, whatever the caste, we observe a reduction of total income: for 50% dalits households the total income decreased by at least 3.55% and for 50% of non-dalits households, it decreased by at least 5.40%.

3.2 Individual unit in Table 2

At egos scale, 55.45% of our sample are male (44.55% are female) and among male, 46% are dalit (among female 50% are dalit). Male are, on average, older than female and three quarters of them are the head of household while female are only 9% in 2016-17 and 27% in 2020-21. This increase is partly due to the life cycle: when the household head died, the wife **take over**. In terms of education, male are more formal educated than female.

Disparities in terms of gender are found in the occupation. Despite the increasing of the number of female in agriculture and the decreasing of the number of male in self-employment, this activities are mostly reserved for male. The reverse assessment is true for salaried job in agriculture: between 2016-17 and 2020-21 the share of male increase by 47% (from 16% to 24%) but female remain relatively more numerous (27.42% in 2016-17 and 29.58% in 2020-21). Whatever the gender, non-agricultural salaried job remain stable over time and the share of male implicated is similar to the share of female (around 37%). Non-income generating work as the main occupation is over-represented for female while even though the share fell considerably between 2016-17 and 2020-21 (from 24% to 15%). Moreover, female are more likely to have multiple occupations and this probability increase between 2016-17 and 2020-21 (from 50% to 60%). In terms of income, disparities persist between male and female. On average, male have 102,000 INR per year as labour income while female have 19,000 INR. Between 2016-17 and 2020-21, the average variation rate is higher for female than for male (respectively 173% and 163%).

Individual debt trend There are also many disparities in terms of debt. While the share of individual is relatively stable through time and gender (around 75%), the path is different. Female are more vulnerable than male in the sense that the share of individual never in debt is lower for female than for male (respectively 10% and 14%) and the share of individual becomes in debt between 2016-17 and 2020-21 is higher for female than for male (respectively 14% and 8%). To finish with the path, we observe that more than six out of ten individuals remains indebted.

Our sample of indebted individual consists of 643 individuals in 2016-17 and 606 individuals in 2020-21 whose 516 are indebted in 2016-17 and in 2020-21. Male have a higher absolute amount of debt than female (two times more in 2016-17: 190,000 INR for male while 80,000 INR for female) despite a reduction in the amount between 2016-17 and 2020-21 (for 50% of

Table 1: Household-unit descriptive statistics in 2016-17

	Dalits			Middle-upper		
	2016-17	2020-21	Δ	2016-17	2020-21	Δ
Number of households	n=228	n=228	n=228	n=245	n=245	n=245
Socio-demographic characteristics						
Household size (mean)	4.93	4.94		4.46	4.41	
Number of ego (%)						
1	24.12	24.12		22.86	22.86	
2	75.88	75.88		77.14	77.14	
Sex ratio (%)						
<i>More female</i>	32.02	32.46		26.12	27.76	
<i>Equal</i>	23.68	26.32		34.29	31.84	
<i>More male</i>	44.30	41.23		39.59	40.41	
Location (%)						
<i>Near Panruti</i>	74.56	74.56		57.55	57.55	
<i>Near Villupuram</i>	16.23	16.23		31.84	31.84	
<i>Near Tiruppur</i>	0.00	0.00		2.45	2.45	
<i>Near Chengalpattu</i>	6.14	6.14		6.53	6.53	
<i>Near Kanchipuram</i>	3.07	3.07		0.82	0.82	
<i>Near Chennai</i>	0.00	0.00		0.82	0.82	
Wealth & finance characteristics						
Assets* (1,000 INR)						
<i>Mean</i>	487.42	458.69	192.19	1,493.35	768.25	79.93
<i>SD</i>	846.30	353.32	522.68	2,373.47	1,263.68	317.01
<i>Median</i>	266.40	360.59	47.12	666.50	447.00	-22.45
Income [†] (1,000 INR)						
<i>Mean</i>	179.56	146.21	59.80	193.13	191.20	85.87
<i>SD</i>	332.51	160.91	182.79	206.40	244.79	303.90
<i>Median</i>	106.35	104.71	-3.55	142.20	120.04	-5.40
Shock (=1)	57.02	26.75		56.33	17.96	
Indebted household (=1)	99.12	99.12	-	98.78	97.96	-
Household debt path (%)						
<i>Never in debt</i>			0.00			0.00
<i>Out of debt</i>			0.75			1.61
<i>Becomes in debt</i>			1.00			0.92
<i>Always in debt</i>			98.25			97.47

Note: * desc of assets [†] desc of income

Source: NEEMESIS-1 (2016-17) & NEEMESIS-2 (2020-21); author's calculations.

male, debt has decreased by more than 57%). On the other hand, 50% of female saw their debt increased by more than 24% (on average, in 2016-17 a female has a debt of 80,000 INR, while it is at 90,000 INR in 2020-21. Male spend less of their annual income on debt repayment than female: in 2016-17 50% of male spend 27% of their annual income on debt repayment and 12% in 2020-21 while female spend 32% in 2016-17 and 77% in 2020-21. Furthermore, 50% of male have seen their DSR decreased by at least 0.27% while 50% of female have seen their DSR increased by at least 0.09%.

Personality traits & cognitive skills with Figures 2 Figure 2 shows the distribution of each personality traits net of life-cycle. Middle-upper caste male tends to be more extraverted-openned than others (Factor 1). For Conscientiousness (Factor 2), male have significant higher score than women, whatever the caste (see Appendix B, Table ??). Dalits tend to be more emotional stable and conscientiousness (Factor 3) than non-dalits and dalits male more emotional stable than other (Factor 4). For Agreeableness (Factor 5), we do not find significant differences between our four groups (see Appendix B, Table ??). In terms of cognitive skills, male tends to have higher score.

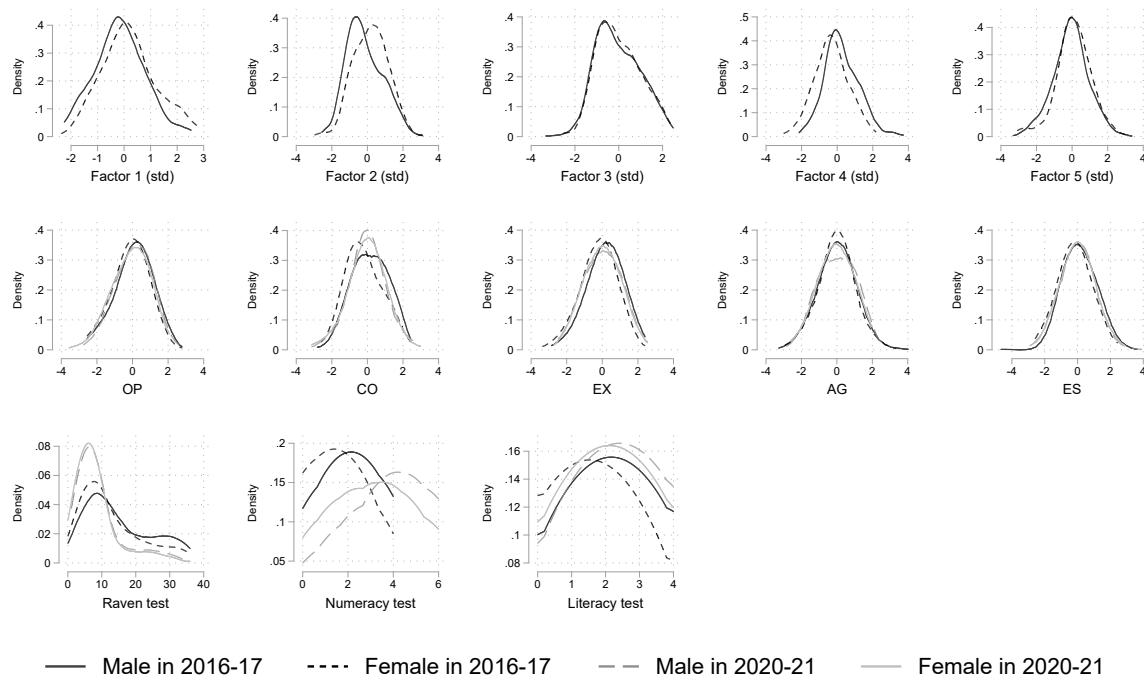


Figure 2: Distribution of PT&CS – The resulting personality trait from factor analysis and Big-5 taxonomy are based on the standardised residual from univariate OLS regression with age as exogenous variable. This is the personality trait purged from life-cycle effects.

Source: NEEMSI-1 (2016-17) & NEEMSI-2 (2020-21); author's calculations.

Table 2: Individual-unit descriptive statistics in 2016-17

	Male			Female		
	2016-17	2020-21	Δ	2016-17	2020-21	Δ
Number of individuals	n=463	n=463	n=463	n=372	n=372	n=372
Socio-economic characteristics						
Caste (%)	46.22	46.22		50.27	50.27	
<i>Dalits</i>	53.78	53.78		49.73	49.73	
<i>Middle-upper caste</i>						
Age (mean)	44.46	48.46		40.33	44.33	
Head of family (=1)	75.38	74.08		9.14	27.15	
Married* (=1)	80.99	86.39		84.41	81.72	
School education (=1)	68.68	68.68		52.69	52.69	
Main occupation (%)						
<i>Agriculture</i>	17.06	16.20		3.49	11.74	
<i>Self-employed</i>	16.63	12.53		5.38	8.98	
<i>Salaried job (agri.)</i>	15.98	23.54		27.42	29.58	
<i>Salaried job (non-agri.)</i>	38.66	36.72		39.78	34.85	
<i>Unpaid working or not working</i>	11.66	11.02		23.92	14.85	
Multiple occupation (=1)	38.01	47.27		50.27	60.00	
Labour income (1,000 INR)						
<i>Mean</i>	102.42	74.63	162.78	19.29	21.71	173.02
<i>SD</i>	243.22	89.33	2,405.69	41.33	45.83	538.41
<i>Median</i>	56.00	51.67	-0.02	7.20	9.30	0.11
Debt characteristics						
In debt (=1)						
<i>Mean</i>	0.78	0.71	-	0.76	0.74	-
Individual debt path (%)						
<i>Never in debt</i>			14.04			9.95
<i>Out of debt</i>			14.69			15.86
<i>Becomes in debt</i>			8.42			13.71
<i>Always in debt</i>			62.85			60.48
Number of indebted individuals	n=359	n=330		n=284	n=276	
Loan amount (1,000 INR)						
<i>Mean</i>	189.74	136.87	2,067.62	79.52	90.38	126.21
<i>SD</i>	250.40	238.64	41,296.09	97.08	94.29	934.12
<i>Median</i>	105.00	64.58	-56.94	44.50	69.10	23.55
DSR (%)						
<i>Mean</i>	93.13	134.10	251.85	173.84	253.05	91.23
<i>SD</i>	417.16	558.99	1,580.94	411.71	554.54	575.37
<i>Median</i>	27.26	11.72	-0.27	31.59	77.30	0.09

Note: *Or not (unmarried, widowed, etc.).

Source: NEEMESIS-1 (2016-17) & NEEMESIS-2 (2020-21); author's calculations.

4 Results and discussion

4.1 How PT&CS shape individual debt?

Table 3 presents the results from the multivariate probit analysis of the first stage of the Heckman procedure. The marginal effects (ME) at representative values on the predicted value of the PT&CS are reported for the four specifications.

Table 3: Marginal effects of the probability of being in debt in 2020-21

	(1)	(2)	(3)	(4)					
	ME/(t-stat) All	ME/(t-stat) Male	ME/(t-stat) Female	ME/(t-stat) MUC	ME/(t-stat) Dalits	ME/(t-stat) MUC male	ME/(t-stat) Dalits male	ME/(t-stat) MUC female	ME/(t-stat) Dalits female
Factor 1 (std)	0.033 (1.910)	0.010 (0.353)	0.048 (1.860)	0.081 (2.997)	0.000 (0.021)	0.049 (1.267)	-0.011 (-0.285)	0.111 (2.369)	0.003 (0.111)
Factor 2 (std)	-0.005 (-0.276)	-0.045 (-1.705)	0.046 (1.605)	-0.026 (-1.026)	0.011 (0.467)	-0.093 (-2.311)	0.004 (0.104)	0.083 (1.862)	0.014 (0.410)
Factor 3 (std)	0.018 (1.035)	0.006 (0.217)	0.036 (1.386)	0.039 (1.529)	0.005 (0.233)	0.022 (0.605)	0.010 (0.268)	0.088 (2.082)	-0.006 (-0.177)
Factor 4 (std)	0.002 (0.096)	0.017 (0.672)	-0.016 (-0.599)	-0.023 (-0.871)	0.012 (0.550)	-0.034 (-0.877)	0.055 (1.523)	-0.045 (-0.960)	-0.023 (-0.761)
Factor 5 (std)	0.026 (1.446)	0.035 (1.347)	0.028 (1.042)	0.045 (1.618)	0.016 (0.680)	0.062 (1.604)	0.021 (0.605)	0.053 (1.154)	0.026 (0.788)
Literacy	0.019 (1.094)	-0.001 (-0.039)	0.047 (1.976)	0.027 (1.237)	0.011 (0.491)	0.018 (0.603)	-0.016 (-0.479)	0.052 (1.585)	0.050 (1.625)
Numeracy	-0.006 (-0.304)	0.002 (0.053)	-0.025 (-0.837)	-0.011 (-0.374)	-0.002 (-0.075)	-0.037 (-0.909)	0.033 (0.785)	-0.006 (-0.134)	-0.037 (-0.945)
Raven	0.001 (0.239)	0.002 (0.708)	-0.002 (-0.609)	-0.002 (-0.567)	0.003 (0.928)	0.000 (0.102)	0.006 (1.106)	-0.004 (-0.848)	-0.000 (-0.103)
Indebted (=1) in 2016-17	0.414 (2.752)		0.412 (2.719)		0.390 (2.563)			0.389 (2.523)	
Debtor ratio in 2016-17	-0.157 (-2.194)		-0.165 (-2.344)		-0.152 (-2.141)			-0.144 (-1.966)	
Individuals controls	X		X		X			X	
Households controls	X		X		X			X	
Villages FE	X		X		X			X	
Observations	831		831		831			831	
Pseudo R ²	0.205		0.218		0.214			0.236	
Log-likelihood	-387.994		-381.828		-383.822			-373.271	
χ^2	240.884		246.493		326.328			314.239	
p-value	0.000		0.000		0.000			0.000	

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

- All else being equal, one more point on the EXOP score reduces the probability of being in debt by 2.7 percentage points (pp).
- For a female, all else being equal, one more point on the EXOP score reduces the probability of being in debt by 3.7 pp.
- For a non-dalit individual, all else being equal, one more point on the EXOP score reduces the probability of being in debt by 6.5 pp.
- For a non-dalit female, all else being equal, one more point on the EXOP score reduces the probability of being in debt by 8.5 pp.

-
- For a female, all else being equal, one more point on the Conscientiousness score, reduces the probability of being in debt by 3.8 pp.
 - For a non-dalit male, all else being equal, one more point on the Conscientiousness score, increases the probability of being in debt by 6.9 pp.
 - For a non-dalit female, all else being equal, one more point on the Conscientiousness score, reduces the probability of being in debt by 6.4 pp.

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- For a non-dalit female, all else being equal, one more point on the ESCO, increases the probability of being in debt by 6.9 pp.
-

- For a dalit male, all else being equal, one more point on the Emotional Stability score, increases the probability of being in debt by 4.9 pp.
-

- For a non-dalit individual, all else being equal, one more point on the Agreeableness score, reduces the probability of being in debt by 3.8 pp.
-

- For a female, all else being equal, one more point at the Literacy test, increases the probability of being in debt by 3.8 pp.

Other things equal, among non-dalit female, those with higher EXOP have a lower probability of being in debt and those with higher Conscientiousness too (and the effect of EXOP is higher than the effect of Conscientiousness – 2.1 pp more). However, non-dalit female with higher ESCO are more likely to be in debt than other non-dalit female.

Table 4: Marginal effects of the total loan amount in 2020-21

	(1)	(2)		(3)		(4)			
	ME/(t-stat) All	ME/(t-stat) Male	ME/(t-stat) Female	ME/(t-stat) MUC	ME/(t-stat) Dalits	ME/(t-stat) MUC male	ME/(t-stat) Dalits male	ME/(t-stat) MUC female	ME/(t-stat) Dalits female
Factor 1 (std)	-16.393 (-1.979)	-17.804 (-1.419)	-9.673 (-1.192)	-23.584 (-1.651)	-1.635 (-0.269)	-40.167 (-1.861)	5.738 (0.487)	4.828 (0.323)	-13.850 (-2.017)
Factor 2 (std)	18.845 (1.820)	29.207 (1.736)	7.115 (0.794)	33.633 (1.827)	8.425 (0.913)	49.214 (1.728)	5.290 (0.296)	20.554 (1.057)	11.659 (1.874)
Factor 3 (std)	18.688 (1.965)	23.697 (1.705)	13.463 (1.421)	33.710 (2.140)	5.956 (0.809)	37.416 (1.873)	5.501 (0.420)	36.457 (1.876)	3.960 (0.623)
Factor 4 (std)	-0.584 (-0.047)	0.619 (0.027)	-4.892 (-0.585)	14.518 (0.539)	-11.525 (-1.283)	28.774 (0.592)	-6.328 (-0.405)	-21.715 (-1.415)	-10.281 (-1.290)
Factor 5 (std)	2.732 (0.303)	1.913 (0.142)	12.309 (1.572)	-7.001 (-0.412)	15.411 (2.467)	-4.561 (-0.182)	13.501 (1.492)	21.664 (1.550)	21.721 (2.835)
Literacy	2.759 (0.315)	7.735 (0.670)	0.471 (0.048)	7.082 (0.551)	8.716 (1.034)	8.920 (0.541)	5.524 (0.489)	13.187 (0.913)	13.572 (1.275)
Numeracy	6.329 (0.817)	9.561 (0.797)	-0.006 (-0.001)	22.252 (1.537)	-7.675 (-1.023)	16.175 (0.709)	8.380 (0.659)	17.904 (0.982)	-22.917 (-2.150)
Raven	0.151 (0.149)	0.985 (0.620)	-0.595 (-0.469)	-0.591 (-0.384)	0.637 (0.510)	2.242 (1.021)	-0.785 (-0.365)	-4.609 (-2.018)	2.336 (2.125)
Indebted (=1) in 2016-17	-19.063 (-0.677)		-5.392 (-0.222)		3.533 (0.141)			12.755 (0.575)	
IMR in 2016-17	-27.001 (-0.269)		28.434 (0.323)		95.547 (0.897)			157.737 (1.707)	
Individuals controls	X		X		X			X	
Households controls	X		X		X			X	
Villages FE	X		X		X			X	
Observations	603		603		603			603	
R ²	0.263		0.272		0.290			0.322	
Adjusted R ²	0.220		0.218		0.238			0.249	
F-stat	5.351		2.969		4.478			2.396	
p-value	0.000		0.000		0.000			0.000	

Note: Marginal effects with T-stat in parentheses.

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

Total loan amount in 2020-21

- All else being equal, an individual with one more point on the EXOP score is predicted to have 15,365 INR of debt in more.
- AEBE, a female with one more point on the EXOP score is predicted to have 11,151 INR of debt in more.
- AEBE, a middle-upper caste individual with one more point on the EXOP score is predicted to have 32,393 INR of debt in more.
- AEBE, a middle-upper caste male with one more point on the EXOP score is predicted to have 47,340 INR of debt in more.

Table 5: Marginal effects of the individual debt service ratio in 2020-21

	(1)	(2)		(3)		(4)			
	ME/(t-stat) All	ME/(t-stat) Male	ME/(t-stat) Female	ME/(t-stat) MUC	ME/(t-stat) Dalits	ME/(t-stat) MUC male	ME/(t-stat) Dalits male	ME/(t-stat) MUC female	ME/(t-stat) Dalits female
Factor 1 (std)	-48.149 (-2.107)	-21.127 (-0.659)	-83.370 (-2.784)	-63.143 (-1.651)	-40.677 (-1.329)	-74.766 (-1.327)	23.592 (0.488)	-74.075 (-1.528)	-94.170 (-2.310)
Factor 2 (std)	47.470 (1.957)	3.555 (0.131)	83.901 (1.686)	48.854 (1.541)	41.055 (1.092)	49.443 (1.113)	-17.690 (-0.623)	13.314 (0.259)	97.337 (1.353)
Factor 3 (std)	-4.064 (-0.157)	12.703 (0.346)	-28.956 (-0.760)	-8.368 (-0.233)	-1.840 (-0.059)	32.003 (0.644)	-24.766 (-0.507)	-124.112 (-1.848)	23.733 (0.591)
Factor 4 (std)	-26.730 (-1.063)	-10.476 (-0.422)	-52.602 (-1.241)	-63.622 (-1.506)	1.149 (0.041)	17.508 (0.438)	-35.907 (-1.021)	-122.386 (-1.807)	34.850 (0.802)
Factor 5 (std)	-10.980 (-0.459)	-18.891 (-0.660)	-2.076 (-0.048)	0.423 (0.014)	-29.793 (-0.954)	-37.718 (-0.958)	-30.502 (-0.861)	49.156 (0.953)	-64.526 (-1.171)
Literacy	2.305 (0.118)	-10.878 (-0.459)	10.345 (0.349)	-6.526 (-0.250)	0.752 (0.030)	-8.836 (-0.264)	-22.687 (-0.760)	-50.232 (-1.148)	1.949 (0.050)
Numeracy	-9.282 (-0.429)	-25.941 (-1.057)	14.362 (0.329)	0.341 (0.011)	-14.675 (-0.548)	-15.842 (-0.465)	-31.237 (-0.835)	37.338 (0.557)	23.590 (0.535)
Raven	2.393 (0.808)	-3.078 (-1.122)	7.994 (1.284)	4.087 (0.904)	-0.189 (-0.042)	-3.719 (-1.268)	-4.837 (-0.924)	16.823 (1.560)	2.493 (0.350)
Indebted (=1) in 2016-17	6.689 (0.086)		-14.044 (-0.181)		-19.067 (-0.241)			-64.112 (-0.766)	
IMR in 2016-17	19.198 (0.067)		-18.563 (-0.069)		-148.052 (-0.536)			-315.454 (-1.080)	
Individuals controls	X		X		X			X	
Households controls	X		X		X			X	
Villages FE	X		X		X			X	
Observations	603		603		603			603	
R ²	0.069		0.092		0.073			0.112	
Adjusted R ²	0.015		0.026		0.005			0.017	
F-stat	2.391		1.587		1.652			1.440	
p-value	0.000		0.014		0.008			0.024	

Note: Marginal effects with T-stat in parentheses.

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

Debt service ratio in 2020-21 – Table 5

5 Conclusion

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A Stability of Big-5 personality traits over time

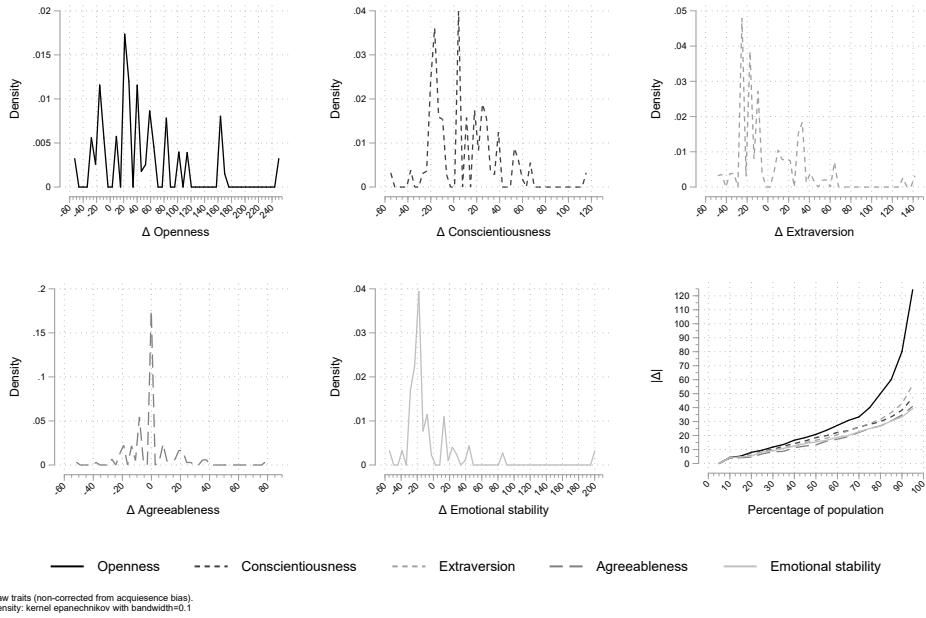


Figure 3: Stability over time of Big-5 personality traits non-corrected from acquiescence bias – Distribution of variation rate between 2016-17 and 2020-21 for Big-5 personality traits non-corrected from acquiescence bias for 835 individuals from rural Tamil Nadu, India.

Source: NEEMSI-1 (2016-17) & NEEMSI-2 (2020-21); author's calculations.

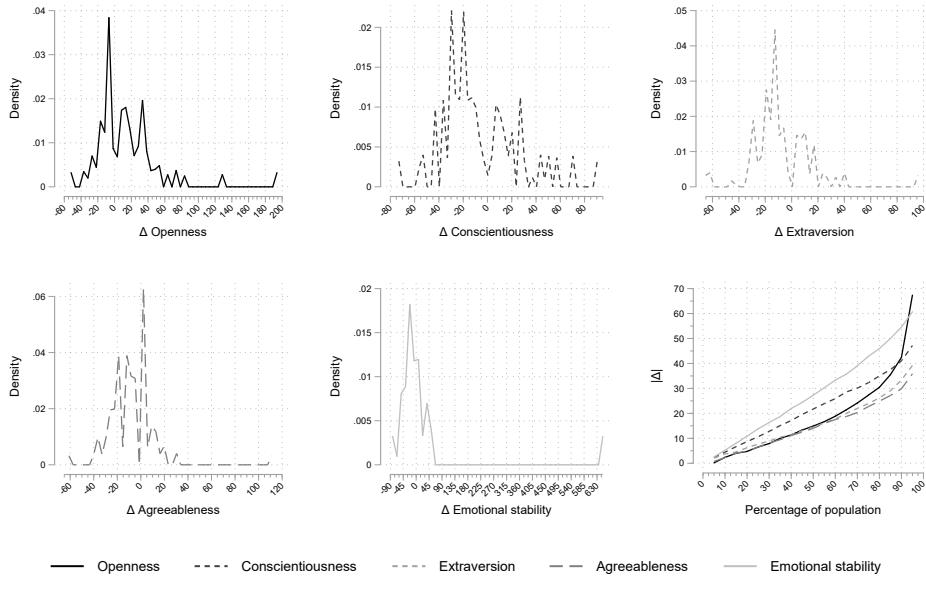


Figure 4: Stability over time of Big-5 personality traits corrected from acquiescence bias – Distribution of variation rate between 2016-17 and 2020-21 for Big-5 personality traits corrected from acquiescence bias for 835 individuals from rural Tamil Nadu, India.

Source: NEEMSI-1 (2016-17) & NEEMSI-2 (2020-21); author's calculations.

B Factor analysis for personality traits

Table 6: Details for personality test questions

Variable	Question	Big-5 traits
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
rudeattother	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

Source: NEEMSIS-1 (2016-17) & NEEMSIS-2 (2020-21)

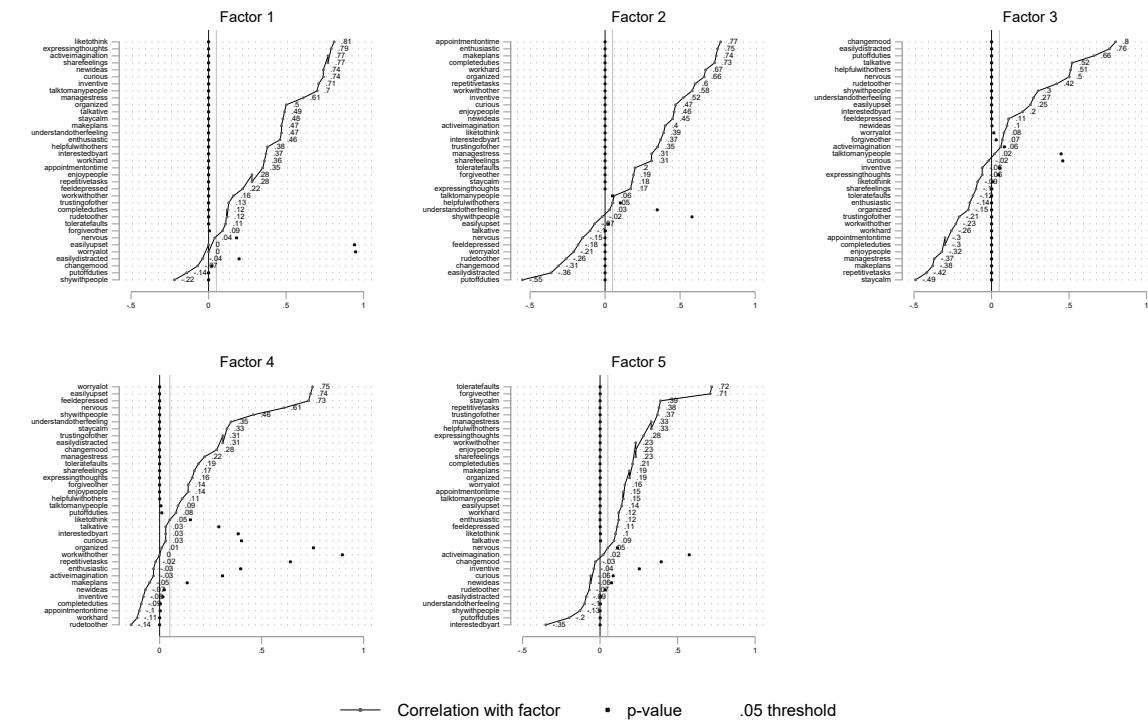


Figure 5: Results of factor analysis for 2016-17 raw items
Source: NEEMSSIS-1 (2016-17); author's calculations.

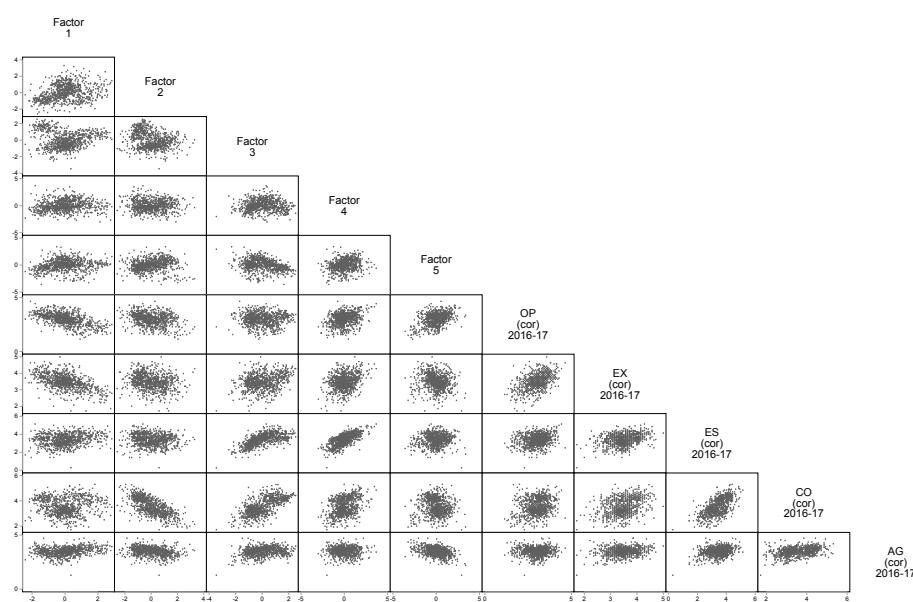


Figure 6: Correlation between Factor from EFA and Big-5 personality traits
Source: NEEMSSIS-1 (2016-17); author's calculations.

C Exclusion restriction variable

Table 7: Verification of the exogeneity of the inverse Mill ratio

	Debtor ratio		
	(1)	(2)	(3)
Indebted (=1)	0.473 (8.554)		
Loan amount		-0.000 (-0.607)	
DSR			0.000 (0.361)
Constant	0.538 (11.435)	0.889 (30.959)	0.879 (32.890)
N	835	835	835
R ²	0.081	0.000	0.000
Adjusted R ²	0.080	-0.001	-0.001
f-stat	73.177	0.368	0.130
p-value	0.000	0.544	0.718

Note: β coefficient are reported with t-stat in parentheses.

Source: NEEMESIS-2 (2020-21); author's calculations.

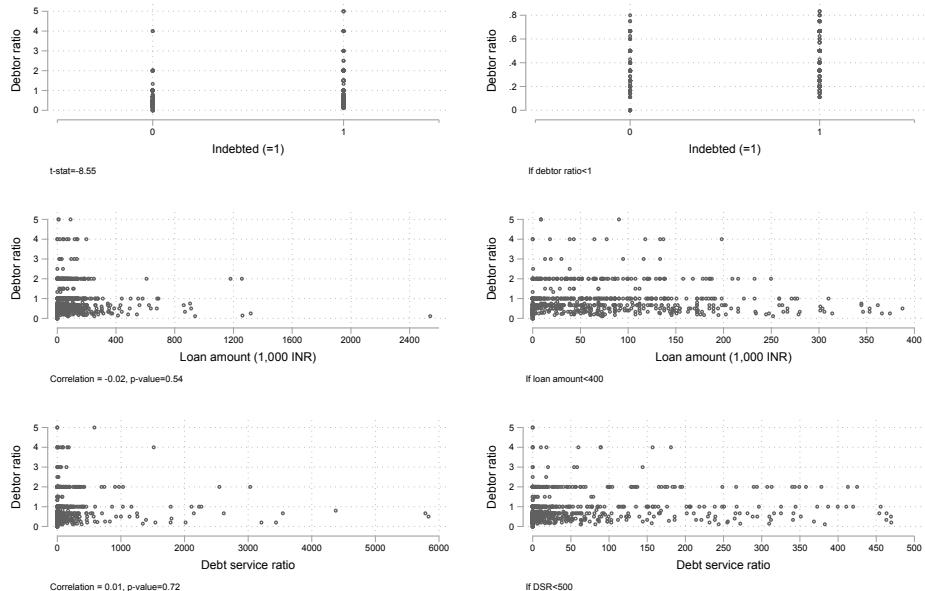


Figure 7: Scatter plot and correlation test for IMR

Source: NEEMESIS-1 (2020-21); author's calculations.

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