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

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Abstract
In each social identity (gender, caste)

Keywords : Gender, caste,

1 Introduction

Since a decade, there has been increasing interest in psychology in economics literature[1], especially through personality traits and cognitive skills (PT&CS). Institutions –such as World Bank, are more and more interesting in collecting data on skills 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" (**?**).

In the literature, **?** for Cognitive skills and **???** for Personality traits

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" (**?**). While "personality is the dynamic organization within the individual of those psychophysical systems that determine his characteristics behavior and thought" (**?**). Among the theories of personality, the traits can be defined as thought, emotion and habitual patterns of behavior (**?**). The Big-5 model constitute the main personality trait taxonomy. Based on **?** and **?** works, it identify five 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" (**?**); agreeableness, i.e. "perceptions of others that are caring, compassionate, and altruistic versus manipulative, self-serving, and antagonistic" (**?**); conscientiousness, i.e. the capacity to display self-discipline, act dutifully, and strive for achievement against measures or outside expectations.

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

Skills in economics Studies in economics[2] 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 achievment test (SAT) scores but few researcher have been interested in the relationship with household finances while it is a growing area of interest[3]. [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 (**?**).

The few studies that have focused on household finance mainly investigate four outcomes: risk aversion, financial distress, savings and debt. **?** 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, **?** shows that all the Big-5 personality traits are good predictor of financial risk tolerance as **?** 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, **?** shows that individuals with high math scores are less likely to make financial distress in USA. **?** are one of the first who deal with causality instead of correlation. Using instrumental variable method[4] on Dutch dataset, they shows that people in the bottom quintile of personality traits are 10 times more likely to experience fi

nancial distress than those in the top quintile. Concerning saving behaviour, **?** 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. **?** 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, **?** 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 **?** shows differences between debtors and debt-free individuals in terms of conscientiousness, honesty, attittude towards money and shoppping 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 literacy[5] (**?**) (**?**) (**?**) **Developper ? Pas sûr**

Indebtedness in India To our knowledge, no articles has looked at personality traits and cognitive skills on debt in India[6] (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 sources[7] (10 to 19%) (**?**). As we discuss in section 2.1, this number is largely under-estimate (**?**) and micro-level studies indicates incidence of debt around 80-90% (**????**). 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)] (**?**).

[2] For a comprehensive review, see **?**.

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

[4] They instruments conscientiousness and emotional stability with shock during childhood **à vérifier**.

[5] Financial literacy measure "how well an individual can understand and use personal finance-related information" (**?**).

[6] **?** intersting in the role of personality traits on labour mobility in rural Tamil Nadu.

[7] In part due to the economic and financial sector reforms of 1991: http://indiabefore91.in/1991-economic-reforms.

Added to this is a high level of inequalities in terms of indebtedness. **?** show that the caste affect borrowing strategies as amount, type and source of debt in rural Tamil Nadu, India. Dalits (ex-intouchable, the most persecuted group?), have higher incidence of indebtedness but borrow smaller amounts and more frequently from ambulant lenders (**?**). They borrow less for economic reason than non-dalits (middle and upper caste) but more for household expenditures (**??**). Finally, they have the lower access[8] to bank loans while it offer "the best conditions financially speaking" (low interest rate, higher amounts, long duration) (**??**).

Disparities is also important through the gender. **?** 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 (**?**). **Add details?**

1.0.1 Social meaning of debt

- Question de la confiance très présente dans la dette : **?** Households' creditworthiness is above all a matter of trust (nambikai), the term used locally when people refer to their ability to access credit. The fabric of trust covers many aspects that far exceed good credit history and repayment behaviour, and relates to every aspect of the borrowers' reputation. Creditworthiness is rarely assessed on the individual level, and often incorporates the reputation and morality of the whole family or even lineage (Harriss-White and Colatei 2004). Lenders often state that they take two levels into account. One relates to family and lineage (taradaram), namely the family's history, its "ethical" background and "morality". The second level is individual (daram), relating very broadly to the "quality" of a person. It is therefore perfectly rational that the poor attach an equal importance to their reputation.

  "Behavior" also matters. As previously discussed, low castes are often seen as risky borrowers. Irrespective of caste, bad habits such as laziness, alcoholism and gambling are considered as indicators of poor repayment potential. As discussed above, respect and deference are also highly valued. Potential borrowers should equally show respect to their lenders and at times to its community. Giving money is a matter of respect. I respect them, they should respect me. How could I give them money if they talk badly about me? (Rajagopalan, Reddiar [FC], landowner and lender). If you don't want credit from a particular community, then you can talk about them to others; otherwise you should not criticize. It might spoil creditworthiness. We should talk respectfully about these people, this is the only way to get creditworthiness (Gundusammy, Goundar (MBC), agriculture coolie and marginal farmer).

- Rapport de force **?**

  (**?**) inseparable from an overall set of interdependencies, protection and social differentiation

- Social and moral experience imbued with subjectivities, felt-obligations and also aspirations

- Prestige sociale **?** To understand debt practices, motivations and rationales, however, it is necessary to examine how the poor perceive and experience debt. It also requires taking into account the diversity of debt meanings and debt relationships. Of those in extremely vulnerable financial situations, very few consider themselves as over-indebted. The contrast between exogenous categorisations and local subjectivities is striking. One could of course argue that the poor suffer from "false consciousness", in the sense that they

[8] In part, because of they does 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 (**?**).

are not even able to assess their own exploitation. Our explanation is different: we argue that the poor have their own "frameworks of calculations" (Villarreal 2009; this volume) and debt hierarchies (Shipton 2007). Such phenomena transcend questions of material or self-centred motivations and reflect issues of status, honour, power, and individual and group identity. This is our second argument: individuals engage multiple criteria to establish debt hierarchies and to evaluate debt burdens. Though financial criteria certainly matter, the social meaning of debt is equally, or more valued. While some debts are dishonoring, others are not. This depends upon the social relation between the debtor and the creditor and their respective status. Caste, class, kin and gender relationships are instrumental here.

? Firstly, the social meaning of debt clearly matters. Debt is a marker of social hierarchy in kinship groups, the neighborhood and community alike. People try to avoid debts degrading to their status, or at least try to pay back these debts first.

? : What is however clear is that over-indebtedness as a concept has little meaning to the poor. Financial indicators are certainly useful (and will be used here) to quantify the cost of debt.

1.0.2 Individual debt and public policies

(**??**)

- Financial inclusion : more and more HH are financial included (**?**), especially in India (**?**). **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 GDP[9].
- Household finance has faced a renewed interest since a decade (**?**). 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[10]. Household finance (or consumer finance for researchers in business sciences) refer to the way that "households use financial instruments to attain their objectives" (**?**). More precisely[11] 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" (**?**).

1.1 Conditioned individuals through caste and gender with aspirations

More recently, several works highlight disparities between *jāti* and gender in terms of aspirations. **?** show that "gender and caste primes can significantly affect long run aspirations and beliefs". **?** use priming[12] to study the effect of identity salience on aspirations. They find that "when

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

[10] For a comprehensive review on the subject, see **?**.

[11] For a comprehensive review on household finance, see **?** 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", **?**, or **?**.

[12] Priming, 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.

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, **?** 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) partiipants" [and] [f]emale participants also have significantlty lower aspiration than their male counterparts". Moreover, SC/ST female participants have lower income aspiration levels compared to other groups. Thus, beyond being a source of inequality, *jāti*and gender seems to deeply impact individuals by conditioning them. More than an fregmentation and more than sources of dispartities, caste and gender seems to deeply impact social identities of individuals in India. Indeed, it seems to conditionned individuals, it is part of their identity that affect action deep inside them as determine their aspirations. In this context it appears important to analyse the role of personality traits & cognitive skills on debt in take into account the deepness of this social identity.

Aspirations limitée par notre caste et notre sexe.

1.2 Topic relevance

C'est d'autant plus intéressant que la dette est omniprésente **??**

Les crises récentes en Inde rendent la chose encore plus pertinente: demonetisation **?** and lockdown **?**

Try to capture the role of cognitive skills and personality traits thus allows to better understand the determinants of indebtedness in India, which is an important vector of wealth through consumption.

Est-ce qu'il y a un lien entre compétences cognitives et endettement ? Plus particulierement, est-ce qu'à l'intérieur des carcans, des individus se différencient par leurs compétences cognitives ?

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 (**??**). 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 team[13], 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 **?** (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 (**?**)."

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 because in 2016-17, two households does not have egos; and for 10 households all egos have changed between 2016-17 and 2020-21 (see Appendix A).

2.2 Construction of personality traits & cognitive skills variables

As stated earlier, our survey allow us to construct Big-5 personality traits. On the basis of 35 questions relatives to Big-5 taxonomy, 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

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

acquiescence bias[14] (see Appendix C). The resulting mean represent the score on each traits.

?'s ω[15], a measure of internal consistency, are mostly satisfactory: 0.81 for openness; 0.86 for conscientiousness; 0.59 for extraversion; 0.60 for agreeableness and 0.80 for emotional stability.

Cognitive skills include three score variables: literacy, numeracy, Raven[16]. These scores are construct in adding up the correct answers of a set of four questions for literacy and numeracy test and 36 for Raven.

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

According to **??** it remains stable, in part, because it is a genetic predisposition that, by definition, cannot be changed over life. Economist follow this path and the majority of then assume stability over time after the age of 25 and other verify this stability (**?**).

This stability refutes sociological and psychological literature which interesting in the influence of childhood and adulthood socialization on personality (**??**). Following this path, **?** 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 (see Table 9 of Appendix B).

Factor analysis As warned by **?**, 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 knownledge of the field[17] 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 corrected for acquiescence bias. In our dataset, acquiesence bias is measure 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 are relatively similar to the Big-5 personality traits (see Table 1) with satisfactory **?**'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 ($\omega = 0.64$).

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 (see Appendix C). We standardised the resulting residuals and use it as cognitive and personality measures net of life cycle influences (**??**).

[14] Acquiescence bias represent the "tendency for survey respondents to agree with statements regardless of their content" (**?**).

[15] Literature on internal consistency estimators increasingly agrees that **?**'s α –the most wide used estimator, is maybe not very efficient (**??**).

[16] Raven 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.

[17] More than 20 years.

Table 1: Correlation table between Big-5 classification and factor analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
?'s ω	0.81	0.59	0.8	0.86	0.6	0.91	0.87	0.76	0.81	0.64

Note: p-value between [hooks].

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

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 (**??**). 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 (**?**).

Subjectives measure assume that "individual households are the best judges of their own net debt/wealth position" (**?**). The robustness of the results are based on the degree of honesty and literacy of individuals that can make it, sometimes, less reliable (**??**). As stated by **?** and **?**, 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" (**?**). In rural Indian context, this type of measures have little meaning since most of the debt is informal.

In order to best measure the debt, we could combine objective and subjective measures as **?** do in European Countries, but this brings the risk that all households will find themselves categorized as over-indebted according to the measure used (**?**).

It is recommended to analyse indebtedness at household level because generally income is grouped between household members (**?**). 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 ratio[18] (DSR).

2.4 Econometric framework

To analyse the relationship between personality traits and individual indebtedness, we proceed in two stages in order to better understand the relationship.

2.4.1 Role of skills on future debt

In a first step, we use the lagged personality traits on individual debt (the role of personnality traits in t on the individual debt in $t+1$). It allow us to understand

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

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

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 **?** model to estimate the effect of PT&CS on indebtedness. 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 variables, allowing to compute an Inverse Mill's Ratios to correct for selection in our equations of interest.

?

First, to estimates dummy variables, we use probit modele with maximum likelihood (ML) estimation and we clusterize the error at household level. Same estimator for over-indebtedness because dummy variable too.

$$P(Y = 1|x) = \phi(\beta_0 + X_1'\beta_1) \tag{1}$$

To estimates the total loan amount, we use OLS with cluster at household level and not use tobit model because our data are not censored or truncated, but defined on $\mathbb{R}^+$ (**?**). For IDSR, we also use OLS with cluster at household level and not GLM because of the upper bound of the variable ($+\infty$ and not 1).

$$Y_i = \alpha + X_i'\beta + Z_i'\gamma + \epsilon_i \tag{2}$$

Data structure and clustering As mention earlier, in our data, individual questionnaire concerned two individuals "egos" of each household. In analyzing debt at individual scale here, we investigate the role of personality traits & cognitive skills for all "egos". **Cluster car plusieurs indiv par HH = non indépendants en stat et dans la lit avec allocation of ressources:** Question of the allocation of ressources within household is, obviously, essential in this configuration. Indeed, (**?**) (**?**) We find that in most households the income distribution is correlated with the sharing of consumption—the economic approach—and that this holds true even if the household pools its resources—the economic psychology approach, implying that there is no strong relationship between the two approaches.

Thus, we clustered error by households to take into account the fact that observations within each household are not independently and identically distributed.

interaction variable

2.4.2 Fixed effects

In a second step, we fully accept the non-stability of personnality traits by using the variation of Big-5 personality traits through time with fixed effect model.

Non corrected traits because, de facon globale, meilleure internal consistancy

Interpretation with **?** : marginal effect at representative values for gender and caste and at means for others

- L'individu moyen
- La female moyenne
- Le male moyen
- Le dalit moyen
- Le muc moyen
- La femme dalit moyenne
- L'homme dalit moyen

Table 2: Summary of specifications

Code	Specifications	In debt (=1)	Loan amount	Number of loans	IDSR	Over-indebtedness (=1)
(1)	All controls	✓	✓	✓	✓	✓
(2)	+ PTCS X Gender[†]	✓	✓	✓	✓	✓
(3)	+ PTCS X Caste[‡]	✓	✓	✓	✓	✓
(4)	+ PTCS X Gender X Caste[§]	✓	✓	✓	✓	✓
Estimator		Probit	OLS	Poisson	OLS	Probit
Interpretation		M.E.	M.E.	M.E.	M.E.	M.E.
Number of individuals		835	606	606	606	606
Description of individuals		All egos	All indebted egos	All indebted egos	All indebted egos	All indebted egos

Note: [†]Two-way interaction terms allow us to separate M.E. between sex, which mean that we obtains two columns: male and female. [‡]Two-way interaction terms allow us to separate M.E. between caste, which mean that we obtains two columns: dalits and middle-upper caste. [§]Three-way interaction terms allow us to separate M.E. between gender and caste, which mean that we obtains four columns: muc male, dalits male, muc female and dalits female.

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

- La femme muc moyenne
- L'homme muc moyen

Control variables Our control variables are based on **???** which take the existing classic controls. We use two vector of variables in 2016-17.

One at individual level, includes: age; age square; dummy variable which take 1 if individual is the household head, 0 otherwise; main occupation[19]; number of occupation (dummyvariable if plusieurs occupations plutôt); 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). And households controls:

One at household level, includes: monetary value of assets[20]; sex ratio; annual income; household size; number of children (individual under 16 years old); shock exposure (dummy variable which take 1 if the household experienced a shock[21] between 2010 and 2016-17, 0 if not); number of income sources. Finally, we added villages fixed effects.

[19] Define as the most time-consuming activity.

[20] The monetary value of assets includes the monetary value of gold; land; house; livestock; agricultural equipment and consumption good such as car, computer, cookgas, phone, etc.

[21] Marriage of at least one of the household members or/and household surveyed after the demonetisation.

3 Descriptive statistics

Household unit in Table 3 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 terms of assets, middle-upper caste households are three times richer than dalits on average –respectively 1,493,350 INR and 487,420 INR. 50% of middle-upper caste have less than 666,500 INR of assets while 50% of dalits households have less than 266,400 INR. This economic advantage is also found with income: the median income of middle-upper caste is 33.71% higher than dalits one (respectively 142,200 INR and 106,350 INR). We do not find difference in terms of shock and indebtedness between caste: 57% of households faced a shock between 2016-17 and 2020-21 and 99% of households have at least one outstanding loan.

Table 3: 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 (%)						
More female	32.02	32.46		26.12	27.76	
Equal	23.68	26.32		34.29	31.84	
More male	44.30	41.23		39.59	40.41	
Location (%)						
Near Panruti	74.56	74.56		57.55	57.55	
Near Villupuram	16.23	16.23		31.84	31.84	
Near Tiruppur	0.00	0.00		2.45	2.45	
Near Chengalpattu	6.14	6.14		6.53	6.53	
Near Kanchipuram	3.07	3.07		0.82	0.82	
Near Chennai	0.00	0.00		0.82	0.82	
Wealth & finance characteristics						
Assets* (1,000 INR)						
Mean	487.42	458.69	192.19	1,493.35	768.25	79.93
SD	846.30	353.32	522.68	2,373.47	1,263.68	317.01
Median	266.40	360.59	47.12	666.50	447.00	-22.45
Income† (1,000 INR)						
Mean	179.56	146.21	59.80	193.13	191.20	85.87
SD	332.51	160.91	182.79	206.40	244.79	303.90
Median	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 (%)						
Never in debt			0.00			0.00
Out of debt			0.75			1.61
Becomes in debt			1.00			0.92
Always in debt			98.25			97.47

Note: * desc of assets † desc of income

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

Individual unit in Table 4 At egos scale, 22% of our sample are dalits female, 26% are dalits male, 22% are middle-upper caste female and 30% are middle-upper caste male. Dalits women are, on average, the youngest (39 years old) and middle-upper caste male are the oldest (45 years old). Three quarters of male are the head of household while female are only 9%. In terms of education, middle-upper caste are more formal educated than dalits and male than female. Thus, 48% of dalits female received formal education at school and this rate is around 76% for middle-upper caste male.

Significant differences through caste and gender are found in terms of occupation. One quarter of middle-upper caste male have agriculture as main occupation, more than three times higher than other groups (going to 16 times for dalits female). Self-employment is also over-represented for middle-upper caste male: while there are 20%, there only are 13% for dalits male, and last than 6% for female (dalits and non-dalits). Salaried job in agriculture appears as one of the major main occupation for dalits (37% for female and 26% for male) but not for non-dalits (17% for female and 7% for male). There is no important differences for salaried job in non-agricultural activity through the four groups (from 34% for non-dalits male to 44% for dalits male). A third of non-dalits female have unpaid work as main occupation –or they does not work at all, while they are less than 13% among middle-upper male, 10% among dalits male and 15% among dalits female. The significant differences between caste corroborate with data on labour income: On average, male have 102,000 INR per year as labour income, but the standard deviation is more than two times lower for non-dalits thus 50% of non-dalits have 67,000 INR per year while 50% of dalits have 45,000 INR. Non-dalits individual have more income generating occupation that allow members of household to not work. **literature** The conclusion is the same with data on multiple occupation. More than a half of dalits female (55%) have more than one occupation, while there are "only" 45% among middle-upper caste female. For male, more than a third of non-dalits have multiple occupation while they are 42% among dalits. Finally, on average, female have more than five times less than male in terms of labour income (around 20,000 INR per year for female and 102,000 INR for male).

Personality traits & cognitive skills in Figure ?? Figure **??** 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 C, 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 C, Table **??**). In terms of cognitive skills, male tends to have higher score.

Individual debt with Table ?? and 5 Dalits female are more indebted than others, but there is no statistical evidence: 79% of dalits female while 71% for others. Middle-upper caste male have highest total loan amount (124,440 INR that represent 1.21 years of labour income for the average dalit male), relatively similar for other groups (mean around 66,000 INR). But, the distribution is very different: median at 54 for dalits female, around 24 for dalits male and non-dalits female.

Number of loans

IDSR, share of income for principal and interest repayment can represent the burden of debt: double jeopardy for dalits female 185.87% on average and 44% for 50% of individuals while 4% for dalit male, 26% for middle-upper caste female and 4% for middle-upper caste male.

Female more over-indebted than male :

Female more loans but amount smaller than male => indebtedness for daily expenditures female and investment for male

Table 4: 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	
Dalits	53.78	53.78		49.73	49.73	
Middle-upper caste						
Age (mean)	44.46	48.46		40.33	44.33	
Head of family (=1)	75.38	74.08		9.14	27.15	
Main occupation (%)						
Agriculture	17.06	16.20		3.49	11.74	
Self-employed	16.63	12.53		5.38	8.98	
Salaried job (agri.)	15.98	23.54		27.42	29.58	
Salaried job (non-agri.)	38.66	36.72		39.78	34.85	
Unpaid working or not working	11.66	11.02		23.92	14.85	
School education (=1)	68.68	68.68		52.69	52.69	
Married* (=1)	80.99	86.39		84.41	81.72	
Multiple occupation (=1)	38.01	47.27		50.27	60.00	
Labour income (1,000 INR)						
Mean	102.42	74.63	162.78	19.29	21.71	173.02
SD	243.22	89.33	2,405.69	41.33	45.83	538.41
Median	56.00	51.67	-0.02	7.20	9.30	0.11
Debt characteristics						
In debt (=1)						
Mean	0.78	0.71	-	0.76	0.74	-
Individual debt path (%)						
Never in debt			14.04			9.95
Out of debt			14.69			15.86
Becomes in debt			8.42			13.71
Always in debt			62.85			60.48
Number of indebted individuals	n=359	n=359		n=284	n=284	
Loan amount (1,000 INR)						
Mean	189.74	136.87	2,067.62	79.52	90.38	126.21
SD	250.40	238.64	41,296.09	97.08	94.29	934.12
Median	105.00	64.58	-56.94	44.50	69.10	23.55
DSR						
Mean	93.13	134.10	251.85	173.84	253.05	91.23
SD	417.16	558.99	1,580.94	411.71	554.54	575.37
Median	27.26	11.72	-0.27	31.59	77.30	0.09

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

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

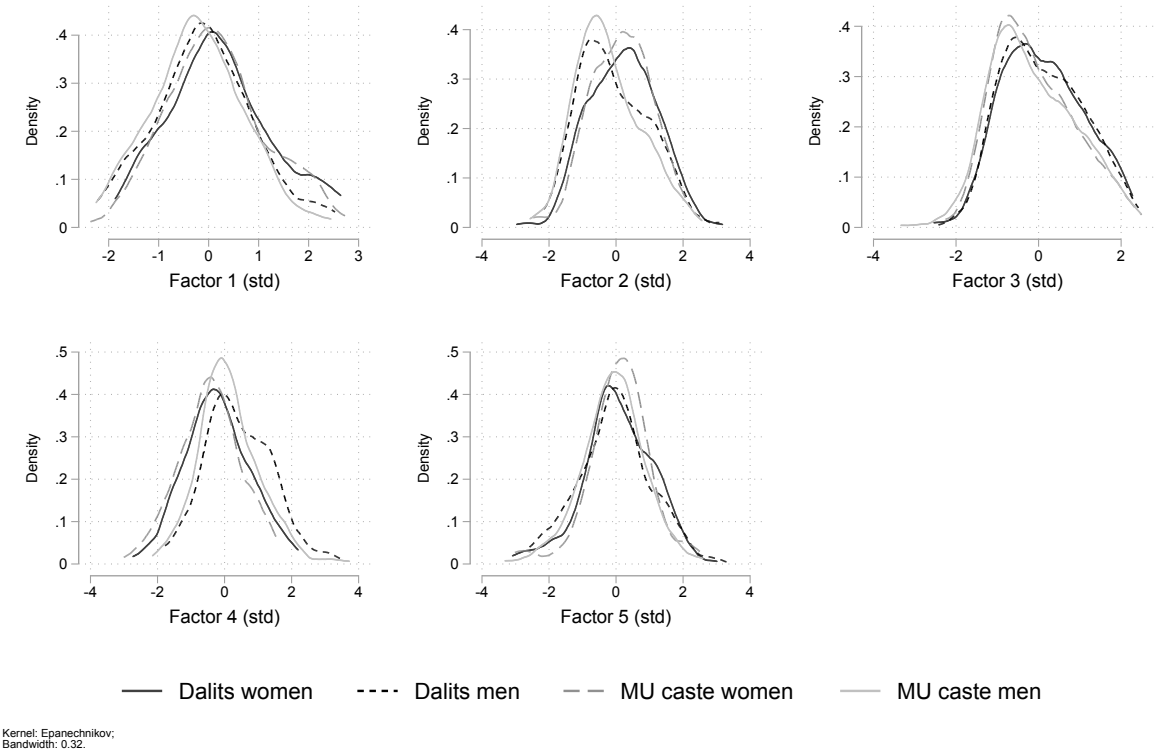

Figure 1: Distribution of personality traits (from exploratory factor analysis) – The resulting personality trait are based on the standardised residual from univariate OLS regression with age as exogenous variable. This is the personality trait purged from life-cycle effects
Source: NEEMSIS-1 (2016-17); author's calculations.

Table 5 shows correlation test between personality traits & cognitive skills and individual indebtedness measures. For dalits, cognitive skills sems to be more correlated with debt than personality traits. Indeed, Numeracy appears as well negatively correlated with indebtedness measure for dalits, as Raven. Literacy seems to be positively correlated with individual debt for male while it is negatively correlated for female IDSR, whatever the caste.

Factor 1 –as Extraversion-Openness, is significantly positively correlated with individual debt service ratio for dalits female while, for dalits male, Factor 3 –as ESCO, is significantlty negatively correlated with the probability of being in debt in 2020-21. For middle-upper caste female, Factor 1 is more correlated with the probability of being in debt than Raven test (respectively -0.18 and -0.13) Factor 1 to 4 are always negatively correlated with indebtedness measure for non-dalits female, going against cognitive skills for individual debt service ratio: Factor 3 and Factor 4 are negatively correlated while Raven, Numeracy and Literacy are positively correlated with the ratio.

Last, for non-dalits male, Factor 1 pulls debt in opposite directions depending on the measure used: it is positively correlated with loan amount and over-indebtedness (strongest relation with loan amount) and negatively correlated with the number of loans. **Peut-être car les gens très F1 ont peu de prêts mais des montants élevés, ca semble cohérent avec les hommes qui empruntent plus pour un besoin économique, donc besoin d'être EXOP alors que Femme petits prêts mais beaucoup : il n'y a que voir les montants avec les stat descriptives précédents**

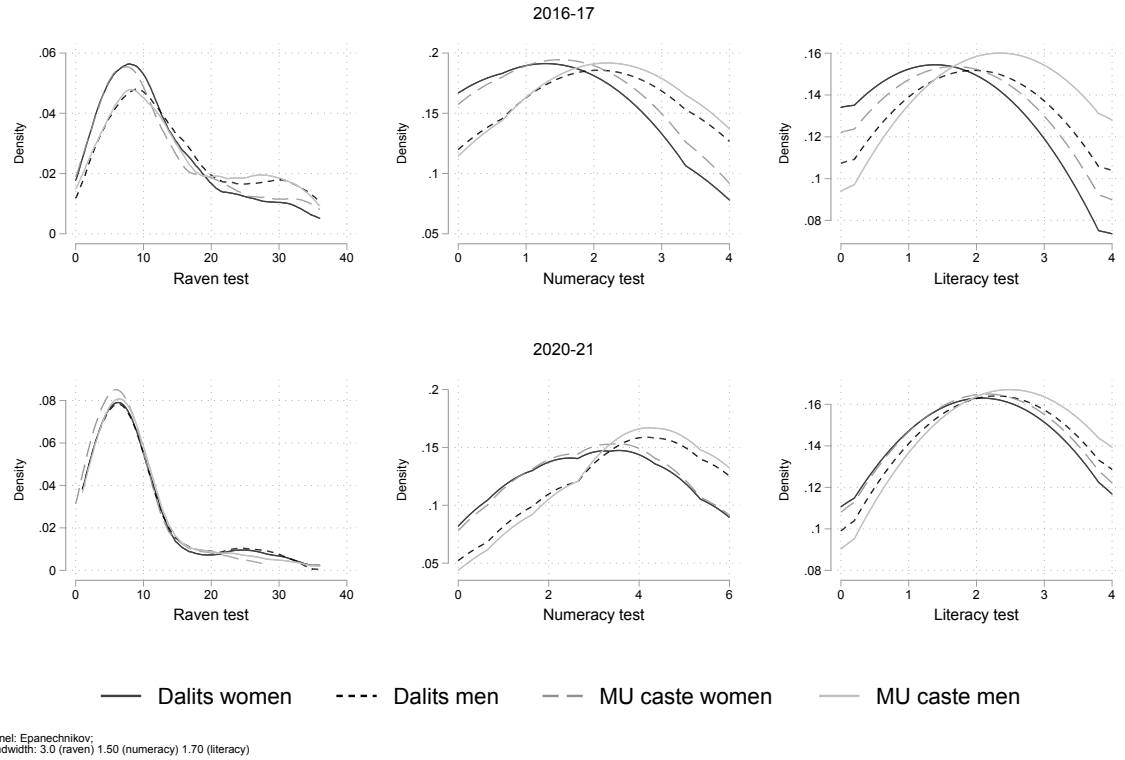

Figure 2: Distribution of cognitive skills score
Source: NEEMSIS-1 (2016-17) & NEEMSIS-2 (2020-21); author's calculations.

4 Results

F1 Extraversion-Openness

- Do you like to think a lot, and reflect about ideas? OP
- Are you comfortable expressing your thoughts and opinions to others? EX
- Do you have an active imagination? OP
- Do you easily share your thoughts and feelings with other people? EX
- Do you come up with original or new ideas? OP
- Are you curious, interested in learning new things? OP
- Are you inventive, and discover new ways of doing things? OP
- In social gatherings, do you like to talk to many people? EX

Table 5: Correlation test between personality traits & cognitive skills and individual debt

Personality traits					Cognitive skills		
F1 (std)	F2 (std)	F3 (std)	F4 (std)	F5 (std)	Raven	Numeracy	Literacy

Note: p-value between [hooks].

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

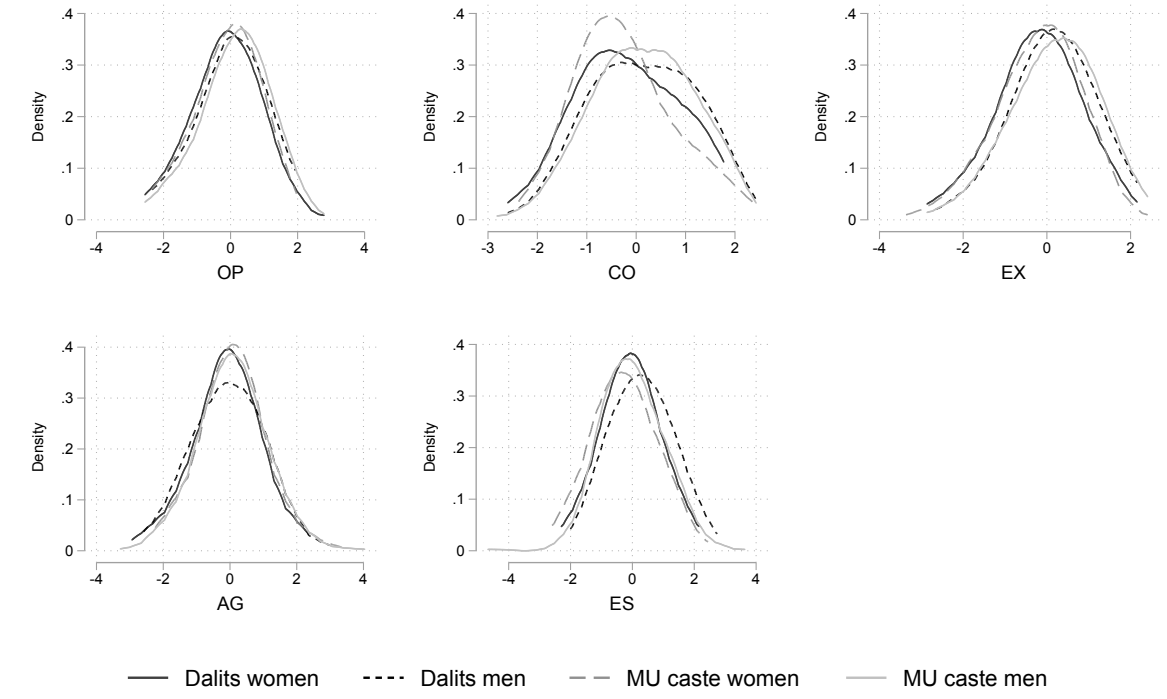

Figure 3: Distribution of Big-5 personality traits in 2016-17 – The resulting personality trait are non-corrected from acquiescence bias and are based on the standardised residual from univariate OLS regression with age as exogenous variable. This is the personality trait purged from life-cycle effects
Source: NEEMSIS-1 (2016-17); author's calculations.

F2 Conscientiousness

- Do you get to work and appointments on time? CO
- Are you enthusiastic and full of energy? EX
- Do you make plans and stick to them? CO
- Do you complete your duties on time? CO
- Do you work hard to do things well and on time? CO
- Are you organized? CO

F3 Emotional stability-Conscientiousness

1. Do you have sudden changes in your mood? ES
2. Do you get easily distracted? CO
3. Do you put off your duties in order to relax? CO
4. Do you get nervous easily? ES
5. Do you stay calm in tense or stressful situations? ES
6. Do you tend to be rude to other people? AG

F4 Emotional stability

1. Do you worry a lot? ES

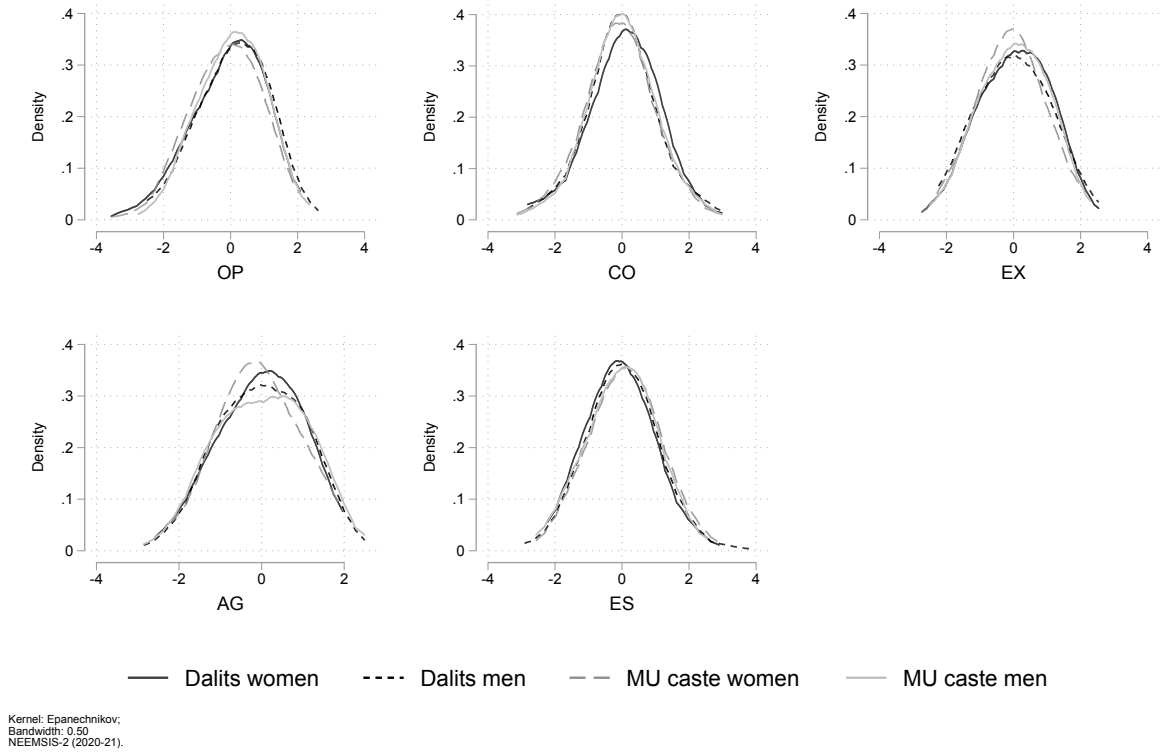

Figure 4: Distribution of Big-5 personality traits in 2020-21 – The resulting personality trait are non-corrected from acquiescence bias and are based on the standardised residual from univariate OLS regression with age as exogenous variable. This is the personality trait purged from life-cycle effects
Source: NEEMSIS-1 (2020-21); author's calculations.

2. Do you get easily upset? ES
3. Do you feel sad, depressed? ES
4. Do you get nervous easily? ES
5. Are you shy with people? EX

F5 Agreeableness

1. Do you tolerate faults in other people? AG
2. Do you forgive other people easily? AG
3. Do you stay calm in tense or stressful situations? ES
4. Are you generally trusting of other people? AG
5. Do you manage stress well? ES
6. Are you helpful with others? AG

Probability being in debt in 2020-21

Table 6 presents the results from the multivariate probit analysis of the determinents of the probability of being in debt, where the marginal effects at representative values (MERs) on the predicted value of the PT&CS are reported.

- All else being equal, one more point on the EXOP score reduces the probability of being in debt by 2.7 percentage points (pp).

Table 6: Marginal effects of the probability of being in debt in 2020-21

	Probability of being in debt in 2020-21								
	(1)	(2)		(3)		(4)			
	All	Male	Female	MUC	Dalits	MUC male	Dalits male	MUC female	Dalits female
Indebted situation in 2016-17	✓	✓		✓				✓	
Indiv. controls	✓	✓		✓				✓	
HH controls	✓	✓		✓				✓	
Villages FE	✓	✓		✓				✓	
N	831	831		831			831		
Pseudo R^2	0.201	0.213		0.210			0.232		
Log-likelihood	-390.039	-384.134		-385.729			-375.052		
χ^2	222.391	229.338		286.188			272.868		
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.

- 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.

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- 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.

—-

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

	Total loan amount (1,000 INR) in 2020-21								
	(1)	(2)		(3)		(4)			
	All	Male	Female	MUC	Dalits	MUC male	Dalits male	MUC female	Dalits female
Indebted situation in 2016-17	✓	✓		✓				✓	
Indiv. controls	✓	✓		✓				✓	
HH controls	✓	✓		✓				✓	
Villages FE	✓	✓		✓				✓	
N	603	603		603			603		
R^2	0.263	0.271		0.289			0.319		
Adjusted R^2	0.221	0.220		0.238			0.247		
F	5.427	3.049		5.184			2.429		
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 – Table 7

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

	Individual Debt Service Ratio in 2020-21								
	(1)	(2)		(3)		(4)			
	All	Male	Female	MUC	Dalits	MUC male	Dalits male	MUC female	Dalits female
Indebted situation in 2016-17	✓	✓		✓				✓	
Indiv. controls	✓	✓		✓				✓	
HH controls	✓	✓		✓				✓	
Villages FE	✓	✓		✓				✓	
N	603	603		603		603			
R^2	0.069	0.092		0.073		0.110			
Adjusted-R^2	0.016	0.027		0.007		0.017			
F	2.484	1.588		1.586		1.404			
p-value	0.000	0.015		0.015		0.034			

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 8

5 Discussion

Homo oeconomicus rationel, comprendre le comportement d'endettement, etc

6 Conclusion

References

Appendix

A Data description

In 2016-17, 492 households, 2,696 individuals, 953 egos. But, 2 households without egos. So we have 490 households and 953 egos. NEEMSIS2 (2020-21) recovered 485 households, 2,635 individuals. But, 600+1 individuals have left their households between the two wave, whose 98 egos. Which mean that we have 485 housholds and 2,034 individuals. But, we always have our two households without egos in 2016-17 that we can not compare. Thus, we have 483 households. But, for 10 households all egos have changed between 2016-17 and 2020-21. Egos of 2016-17 are still here in 2020-21, but they do not be selected as egos. Finally, our sample is constitute from 835 egos represented 473 households.

B Stability of Big-5 personality traits over time

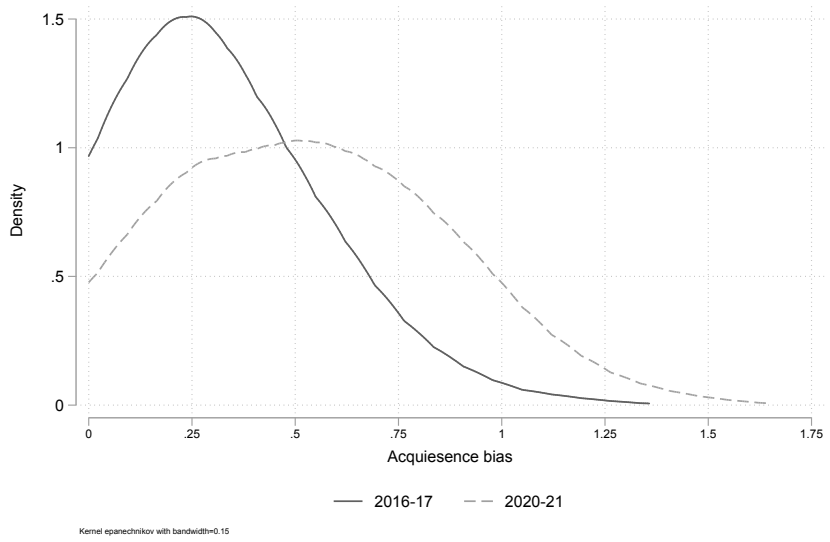

Figure 5: Acquiescence biais in 2016-17 and in 2020-21 – Distribution of acquiescence biais for 953 individuals in 2016-17 and 1,316 in 2020-21 from rural Tamil Nadu, India.
Source: NEEMSIS-1 (2016-17) & NEEMSIS-2 (2020-21); author's calculations.

Paragraph on non-stability with **?**, Chapter (section) 8.

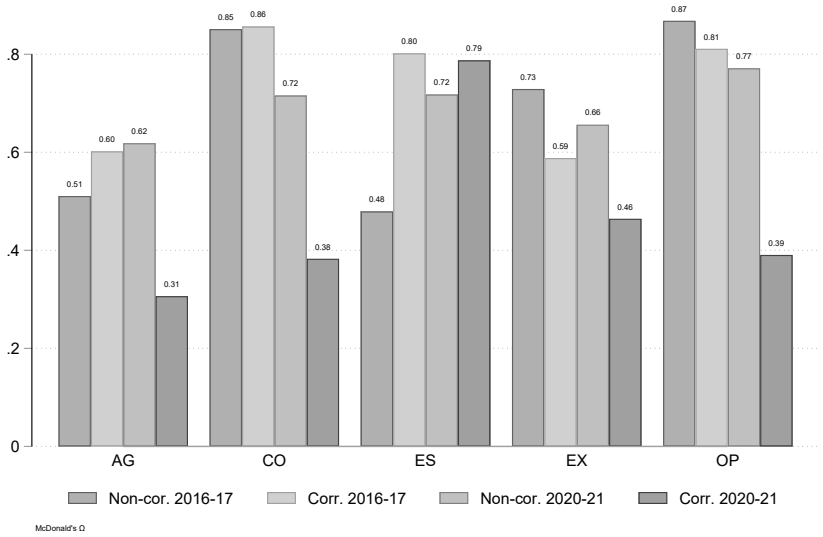

Figure 6: Internal consistency of Big-5 personality traits – Distribution of **?**'s ω through time and correction for 953 individuals in 2016-17 and 1,316 in 2020-21 from rural Tamil Nadu, India.
Source: NEEMSIS-1 (2016-17) & NEEMSIS-2 (2020-21); author's calculations.

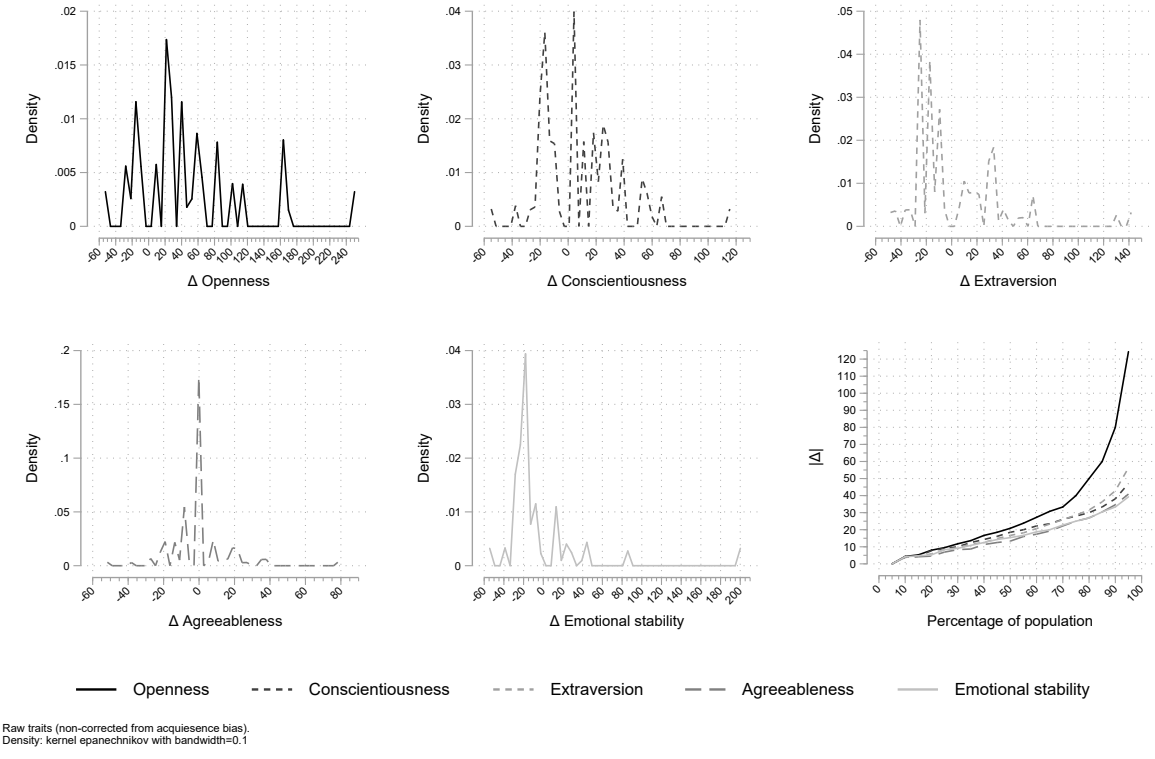

Figure 7: Stability over time of Big-5 personality traits non-correted from acquiescence bias – Distribution of variation rate between 2016-17 and 2020-21 for Big-5 personality traits non-corrected from acquiescence biais for 835 individuals from rural Tamil Nadu, India.
Source: NEEMSIS-1 (2016-17) & NEEMSIS-2 (2020-21); author's calculations.

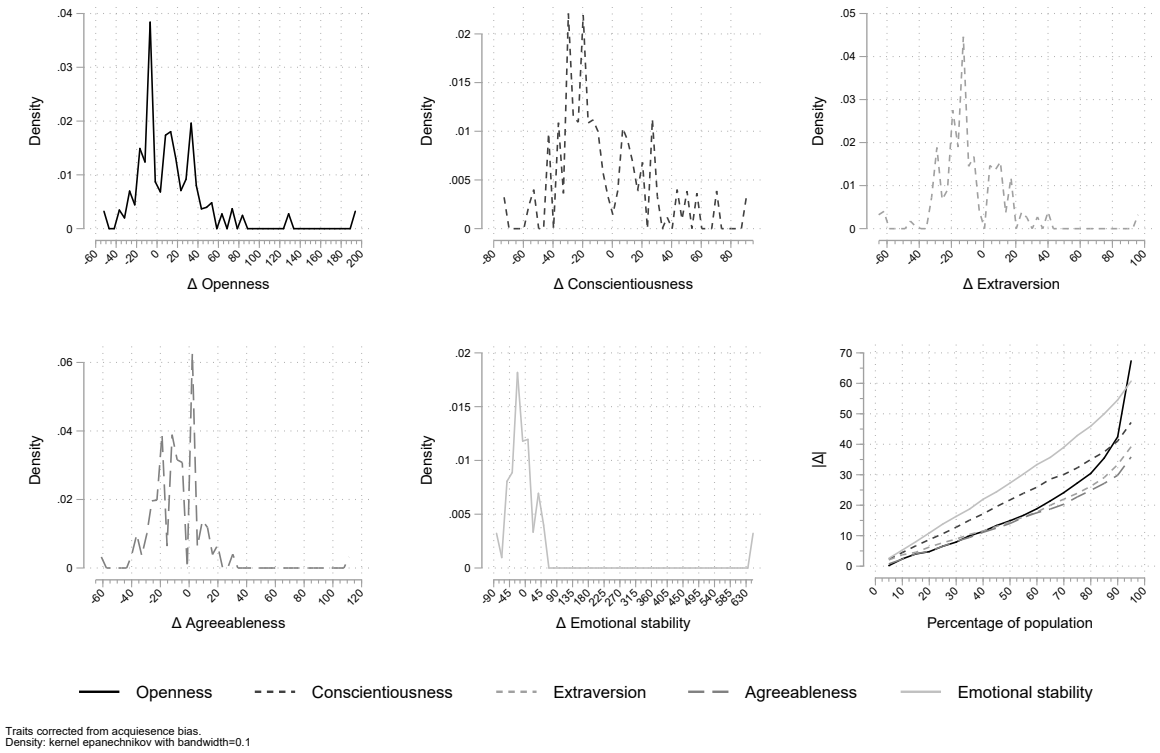

Figure 8: Stability over time of Big-5 personality traits correted from acquiescence bias – Distribution of variation rate between 2016-17 and 2020-21 for Big-5 personality traits corrected from acquiescence biais for 835 individuals from rural Tamil Nadu, India.
Source: NEEMSIS-1 (2016-17) & NEEMSIS-2 (2020-21); author's calculations.

C Factor analysis for personality traits

Table 9: Factor analysis results – Principal-components factors with oblique promax rotation (Kaiser off) of 953 individuals.

Factor	Variance	Proportion	Cumulative
Factor 1	7.22	0.21	0.21
Factor 2	6.33	0.18	0.39
Factor 3	4.13	0.12	0.51
Factor 4	3.00	0.09	0.59
Factor 5	2.39	0.07	0.66

Note: LR test: $\chi^2(595) = 16,000$ p-value=0.00
Source: NEEMSIS-1 (2016-17); author's calculations.

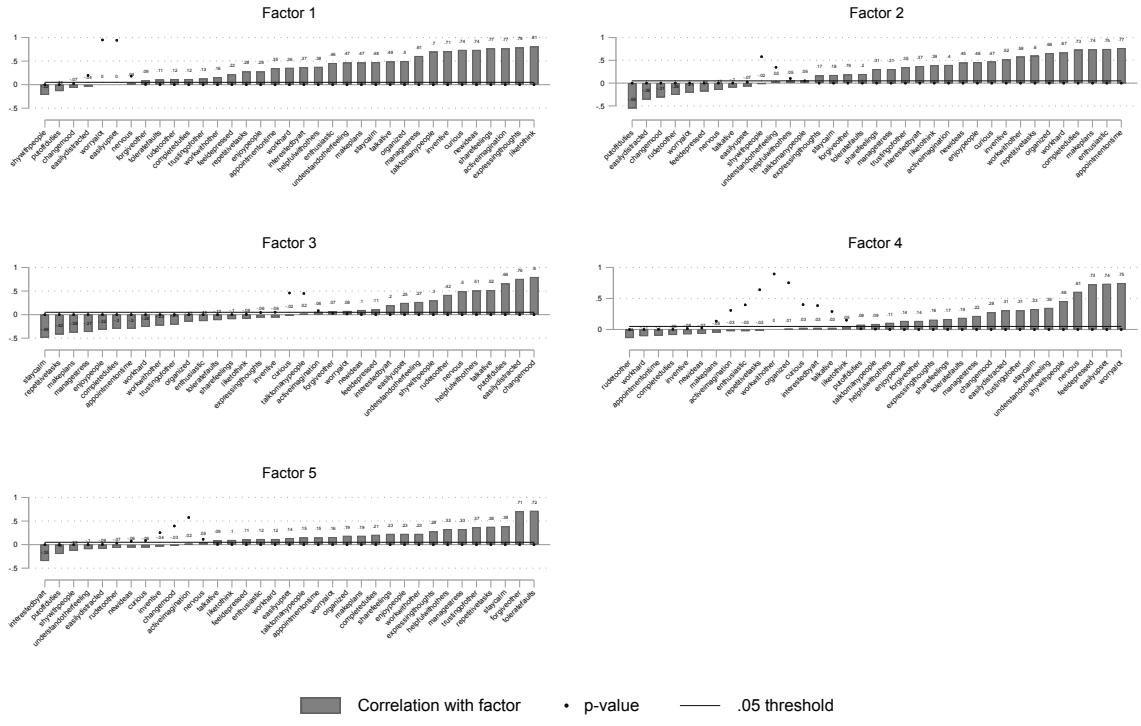

Figure 9: Results on factor of exploratory factor analysis
Source: NEEMSIS-1 (2016-17); author's calculations.

Table 10: Summary statistic for personality test questions

Variable	Question	Big-5 traits	N	Mean	SD	Min	Max
curious	Are you curious, interested in learning new things?	OP	953	2.92	1.18	1	5
interestbyart	Are you interested in nature, art or music?	OP	953	2.87	1.10	1	5
repetitivetasks	Do you prefer work that involves repetitive tasks and routines?	OP	953	2.88	0.95	1	5
inventive	Are you inventive, and discover new ways of doing things?	OP	953	3.23	1.02	1	5
liketothink	Do you like to think a lot, and reflect about ideas?	OP	953	3.16	0.97	1	5
newideas	Do you come up with original or new ideas?	OP	953	3.31	0.94	1	5
activeimagination	Do you have an active imagination?	OP	953	3.23	0.91	1	5
organized	Are you organized?	CO	953	2.63	0.95	1	5
makeplans	Do you make plans and stick to them?	CO	953	2.68	0.97	1	5
workhard	Do you work hard to do things well and on time?	CO	953	2.52	0.84	1	5
appointmentontime	Do you get to work and appointments on time?	CO	953	2.57	0.83	1	5
putoffduties	Do you put off your duties in order to relax?	CO	953	3.53	1.01	1	5
easilydistracted	Do you get easily distracted?	CO	953	3.55	0.96	1	5
completeduties	Do you complete your duties on time?	CO	953	2.73	0.83	1	5
enjoypeople	Do you enjoy being with people?	EX	953	1.88	0.86	1	5
sharefeelings	Do you easily share your thoughts and feelings with other people?	EX	953	2.80	1.04	1	5
shywithpeople	Are you shy with people?	EX	953	3.39	0.87	1	5
enthusiastic	Are you enthusiastic and full of energy?	EX	953	2.60	0.93	1	5
talktomanypeople	In social gatherings, do you like to talk to many people?	EX	953	2.67	0.99	1	5
talkative	Are you talkative?	EX	953	3.14	0.96	1	5
expressedthoughts	Are you comfortable expressing your thoughts and opinions to others?	EX	953	2.88	0.91	1	5
workwithother	Do you work well with other people?	AG	953	2.03	0.86	1	5
understandotherfeeling	Do you try to understand how other people feel and think?	AG	953	3.09	1.03	1	5
trustingofother	Are you generally trusting of other people?	AG	953	2.75	0.83	1	5
rudetoother	Do you tend to be rude to other people?	AG	953	4.62	0.82	1	5
toleratefaults	Do you tolerate faults in other people?	AG	953	3.05	0.71	1	5
forgiveother	Do you forgive other people easily?	AG	953	3.00	0.73	1	5
helpfulwithothers	Are you helpful with others?	AG	953	3.24	0.94	1	5
managestress	Do you manage stress well?	ES	953	2.65	0.93	1	5
nervous	Do you get nervous easily?	ES	953	3.30	0.87	1	5
changemood	Do you have sudden changes in your mood?	ES	953	3.52	1.03	1	5
feeldepressed	Do you feel sad, depressed?	ES	953	3.04	0.75	1	5
easilyupset	Do you get easily upset?	ES	953	3.10	0.76	1	5
worryalot	Do you worry a lot?	ES	953	3.05	0.75	1	5
staycalm	Do you stay calm in tense or stressful situations?	ES	953	2.62	0.91	1	5

Note:

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

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