Self-Employment, Family Production and the Returns To Cognitive and Non-Cognitive Skills in Rural Bangladesh

Shyamal Chowdhury, University of Sydney

John C. Ham, NYU Abu Dhabi

Hannah Schildberg-Hörisch, University of Düsseldorf

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Abstract:

While there have been many studies looking at the effect of cognitive and non-cognitive factors on earnings, the vast majority of these is for developed countries. In this paper we extend this literature to the effect of cognitive and non-cognitive factors on family income and family expenditure for rural families in Bangladesh. In doing so we need to recognize that these farms are essentially family farms, and that family income and expenditures from these farms potentially will be affected by the characteristics of both the husband and wife.

To carry out this analysis we collected our own data on families in rural Bangladesh. In addition to collecting data on IQ for the husband and wife, we elicit a whole slew of non-cognitive factors for both spouses including the Big 5, locus of control, social preference, time preference and risk aversion; at best most studies have access to only some of the above variables. We also collect data on land holdings since income and expenditure are likely to reflect a return to the family capital in the form of land.

When we consider family income, we find that the wife's IQ and land holdings are always statistically significant, while the husband's IQ is significant most of the time. However, we get a slight reversal when we consider family expenditure. Specifically, we find that the husband's IQ and land holdings are always statistically significant, while the spouse's IQ is significant most of the time. Interestingly, we are able to estimate these separate effects even though there is considerable correlation between husband's IQ, wife's IQ, and land holdings. Our analysis shows the importance of controlling for both the husband's and wife's IQ in our context.

In this draft we only consider the non-cognitive factors for the husband, and find that our measure of husband's altruism is consistently statistically significant. However, none of the other non-cognitive factors consistently play a role in our analysis.

Keywords: personality traits, economic preferences, ability, life outcomes, developing countries, the family, self-employment

JEL Codes: C20, C21, C91, D10, D91, I12, J24, J43

1. Introduction

There has been an outpouring of work on the relationship between cognitive skills, non-cognitive skills and key outcomes in life as diverse as educational and labor market attainment, health, and well-being. By now, there seems to be broad consensus that both cognitive skills such as IQ and non-cognitive skills such as personality traits and economic preferences are strong predictors of individual behaviors and important life outcomes (e.g., Almlund et al. 2011; Bowles, Gintis, and Osborne 2001; Caspi, Roberts, and Shiner 2005; Chabris et al. 2008; Cooper and Kagel 2014; Dohmen et al. 2011; Golsteyn, Grönqvist, and Lindahl 2013; Feliz-Ozbay et al 2016; Heckman, Stixrud, and Urzua 2006; Judge et al. 1999; Kautz et al. 2014; Schmidt and Hunter, 2004; Strenze, 2007; Sutter et al. 2013). While the available evidence is extensive, it largely relies on data from a few developed countries of the Western world. Due to a lack of suitable data, we know much less about the interplay of cognitive ability, personality traits, economic preferences and outcomes in developing countries in general and their rural areas in particular.

Data from developing countries and/or rural environments allow studying contexts with a much wider variability of conditions to investigate whether the strong predictive power of cognitive and non-cognitive skills for life outcomes holds universally - or whether it is restricted to the relatively uniform contexts in developed countries. For example, many families in the rural areas of developing countries will (at least partially) be self-employed farmers with few or no employees. Non-cognitive skills might be less important in this setting since there is no need to function well with other employees. Moreover, rural areas in developing countries might offer their inhabitants only limited scope to live up to their full potential, e.g., due to restrictions in access to land, credits, insurance etc., possibly reducing the importance of non-cognitive skills. On the other hand, farms are likely to be family farms and are likely to report family expenditure instead of wage rates, which suggests that the cognitive and non-cognitive characteristics of both the husband and wife are relevant.

In this study, we partially address the gap in knowledge concerning the role of cognitive and non-cognitive skills in determining family welfare in rural Bangladesh. We use a new data set that we collected on families with children in rural Bangladesh that encompasses comprehensive measures of IQ, personality traits and economic preferences for more than 600 families. In particular, we elicited the Big Five personality traits and locus of control with well-established survey instruments (Costa and McCrae, 1992; John, Donahue, and Kentle 1991;

Rotter 1966) and time, risk, and social preferences in incentivized choice experiments following procedures by Anderson and Mellor 2008, Bauer, Chytilová, and Pertold-Gebicka 2014, Binswanger 1980, Fehr, Bernhard, and Rockenbach 2008, Fehr, Glätzle-Rützler, and Sutter 2013. Our measure of IQ is based on the Wechsler Adult Intelligence Scale which is a widely used test for cognitive ability, allowing comparability between our results and those for developed countries. Thus, we are able to rely on exceptionally rich data that not only contain measures of cognitive and non-cognitive skills but also cover both the personality and preference dimension of non-cognitive characteristics. This allows us to overcome a weakness that is shared by many studies that analyze the role of non-cognitive skills but use the term 'non-cognitive skills' as a rather opaque label of whatever data is available in a given data set (Humphries and Kosse 2016).

Moreover, we have information on a broad set of outcome variables, allowing for a thorough investigation of whether key results on the interplay of cognitive skills, non-cognitive skills and life outcomes carry over to rural Bangladesh, a context beyond the developed Western world. The outcomes variables include monthly family income per capita, monthly per capita non-food consumption, monthly calorie consumption per capita, the probability of being in poverty, savings, credit, expenditures for cigarettes, and general self-assessed mental health. In this paper we focus on the determinants family income and non-food consumption.

We also have data on land holdings, and include it in many runs. The idea here is that if the family inherited the land, we may overestimate the effect of IQ on family consumption, if we do not control for land holdings, since such holdings are likely to be a function of parental IQ which will be correlated with the subjects' IQ. On the other hand, the subjects may have purchased the land, and higher IQ may lead to greater land purchases by the subjects; in this case we would be understating the impact of IQ by controlling for land holdings.

Our first contribution, hence, is to contribute to a better understanding whether and why the predictive power of preferences and traits might be weaker in some contexts than others. Our starting point is the assumption that cultural, social, and economic contexts may well modify the effects of individual traits on life outcomes (compare Kankaras 2017). Given the broad consensus among academics and politicians alike that cognitive and non-cognitive skills are a key explanatory factor for many life outcomes and their development should be

fostered[1], it is crucial to investigate whether role of these skills holds universally or is mitigated in contexts beyond the Western, developed and urban world (in which the impacts of these skills have been primarily studied). Our data from rural and poor areas of Bangladesh provide a unique opportunity for such an investigation. As we have noted above, there is reason to believe that the institutional features of rural Bangladesh differ from those in the Western economies in such a way as to make non-cognitive factors less important but increase the importance of a partner's cognitive ability.

Second, what sets our paper apart from existing studies is that we can study the role of cognitive skills, personality traits and economic preferences for a broad set of outcomes (ranging from income, savings, credit, and poverty to health and well-being) in the same sample for both husbands and wives, and within a coherent framework. This is important, as no economic decision involves only one preference, trait or cognitive aspect. For example, addictive behaviors such as smoking involve risk considerations, but also a trade-off between immediate and delayed utility (Ida and Goto 2009; Sutter et al. 2013). In this respect, our approach will offer a more holistic view of economic decision-making.

In line with results for developed countries, we find that, in rural Bangladesh, more intelligent individuals have a higher household income and higher expenditures; interestingly the intelligence of both the husband and wife generally affects family income and non-food consumption. In contrast, we find little role for personality traits and economic preferences besides altruism for predicting the two outcomes under consideration here. This finding casts doubt on whether non-cognitive skills in a primarily self-employment context with few or no employees are as important as in Western developed countries, where most people work with others.

The remainder of the paper is organized as follows. Section 2 contains our literature review. Next, in section 3, we describe the composition of our sample, the data collection process, and our measures of IQ, personality traits including economic preferences and our two economic outcomes. Section 4 outlines our empirical strategy and section 5 provides our empirical results. In the final section, we discuss the implications of our findings and conclude.

[1] See, e.g., Kautz et al. 2014, OECD 2015 and recent initiatives of OECD or the World Bank such as the World Bank's STEP Skills Measurement Program (STEP) or the OECD Education 2030 Initiative.

2. Literature Review

For developed countries, it is well-established that more intelligent individuals achieve higher levels of education, income, occupational status, job performance, and better health outcomes (e.g., Almlund et al. 2011; Cawley et al. 2011; Hanushek and Woessmann 2008; Strenze 2007; Schmidt and Hunter 2004).[2] The returns to cognitive skills for labor market outcomes might be even larger in developing than in developed countries (see, e.g., Hanushek and Woessmann 2008 and the evidence summarized in Table B1 in Appendix B).

Concerning personality traits, a clear picture emerges for developed countries: personality traits predict a broad range of life outcomes including educational, labor market, and health outcomes, with conscientiousness and emotional stability being the most predictive facets for many outcomes (Almlund et al. 2011). In particular, more conscientious, emotionally stable individuals and those with a higher internal locus of control perform better at work across all occupations (Barrick et al. 2001; Hurtz and Donovan 2000; Judge and Bono 2001; Ng et al. 2006). Higher levels of emotional stability and a higher internal locus of control also map into higher income (Nyhus and Pons 2005; Ng et al. 2006; Bowles et al. 2001). Entrepreneurial performance increases in conscientiousness, openness and emotional stability, and, to a lesser extent in extraversion (Zhao et al. 2010). Conscientiousness, openness, and agreeableness predicts academic achievement (decreasing effect sizes) and correlations between conscientiousness and academic achievement are largely independent of intelligence (Poropat 2009). Regarding health, low levels of conscientiousness, emotional stability, extraversion, and agreeableness translate into worse health outcomes and reduced longevity (Caspi et al. 2005; Ozer and Benet-Martinez 2006). For example, neuroticism and conscientiousness are reliable predictors of risky health-related behaviors such as smoking, substance abuse, risky driving (Bogg and Roberts 2004) and mental disorders (Kotov et al. 2010). Finally, among the Big Five, emotional stability is the strongest predictor of life satisfaction, but conscientiousness, extraversion, openness, and agreeableness are positive and significant correlates of life satisfaction as well (DeNeve and Cooper 1998; Ozer and Benet-Martinez 2006). Finally, there may be important interactions between IQ and non-cognitive

[2] Since the evidence on the relation between IQ, Big Five, locus of control and outcomes for developed countries is very extensive, we largely rely on meta-analyses and surveys when summarizing it. The corresponding evidence for economic preferences is less comprehensive, such that we refer the reader to the original evidence.

skills; Feliz-Ozbay et al. (2016) find that the effects of the Big Five change substantially in a laboratory experiment once they control for IQ.

Table A1 in the Appendix summarizes the scarce empirical evidence on the relation between personality traits, economic preferences and outcomes that is based on developing or non-Western countries. The available evidence is largely restricted to the relation between the Big Five and labor market outcomes and is rather mixed.

In terms of the individual studies, using urban samples from Columbia and Peru, Acosta et al. (2015) and Cunningham et al. (2016) confirm that cognitive skills are strongly associated with higher earnings and holding a formal job or a high-qualified occupation, while the Big Five have little explanatory power for labor market outcomes. Díaz et al. (2012) find that cognitive skills and emotional stability are significantly positive correlates of earnings, while higher agreeableness is associated with lower earnings in urban Peru. In contrast, using a sample from rural China, Glewwe et al. (2013) document that neither cognitive nor non-cognitive skills (self-esteem, internalizing and externalizing behavior, depressive symptoms, resilience, educational aspirations) measured at ages 9-21 affect wages at age 17-21, while they do influence the decision to stay in school or to enter the labor force. Hilger et al. (2016), Nomura and Adhikari (2017), and Nordman et al. (2015) use the Bangladesh Enterprise-Based Skills Survey (ESS) that provides matched employer-employee data from formal sector firms in the industrial and manufacturing sectors and analyze the relation between cognitive, non-cognitive skills (including the Big Five) and wages. They find that cognitive skills are important in determining wages, while personality traits have less explanatory power. Moreover, Nomura and Adhikari (2017) document that correlations between wages and personality traits are more prominent among large firms than among small or medium-sized firms. In sum, the limited evidence available from low income countries finds some support of positive returns to IQ for labor market outcomes but much less consistent evidence for the role of personality traits. Moreover, the evidence is largely restricted to formal sector employment, while our data will provide new insights on the importance of skills in the family-centered rural self-employment context which is very common in Bangladesh and many other developing countries.

In contrast, similar to results for IQ and personality traits empirical evidence for developed countries has established a robust link between economic preferences and many important outcomes in life. More patient individuals have higher educational attainments, occupational success, wealth (e.g., Cadena and Keys, 2015; Della Vigna and Paserman, 2005;

Eckel et al., 2005; Golsteyn et al., 2014; Ventura, 2003) and better health outcomes (e.g., Bickel et al. 1999; Cadena and Keys 2015; Chabris et al. 2008; Fuchs 1982; Golsteyn et al. 2014; Kirby et al. 1999; Kirby and Petry 2004). Risk preferences predict labor market and health outcomes, investing, and addictive behaviors including smoking, for example (e.g., Bonin et al. 2007; Dohmen et al. 2011; Becker et al. 2012; Dohmen and Falk 2011; Barsky et al. 1997; Anderson and Mellor 2008; Dawson and Henley 2015; Hong et al. 2004; Hsieh et al. 2017; Kimball et al. 2008; Jaeger et al. 2010). Finally, social preferences that reflect altruistic and more generally other-regarding behaviors are associated with success and cooperative behaviors at the work place (Burks et al. 2016; Deming 2017).

Evidence on economic preferences and outcomes in non-Western countries is mainly available for social preferences, demonstrating that social preferences predict success in market interactions and cooperative behaviors in various domains of life including the work place, donating, repayment of loans, or management of common pool resources (Carpenter and Seki 2011; Karlan 2005; Leibbrandt 2012; Rustagi et al. 2010).[3] Moreover, Dohmen et al. (2016) and Falk et al. (2015) have collected data on time, risk, and social preferences in representative samples from 76 countries around the world. Taking an aggregate perspective, they demonstrate that the preference measures are predictive of a wide range of individual-level behaviors and outcomes when pooling all countries from their culturally and economically heterogeneous sample. For example, on average, more patient individuals are more likely to save and have higher levels of education, more risk-taking individuals are more likely to be self-employed and to smoke, and more altruistic individuals are more likely to engage in prosocial behaviors like donating or helping strangers.[4] However, at the more disaggregated country level, associations between preferences and outcomes are not significant in 25 to 50% of the countries under consideration.

[3] Bauer et al. (2012) find that, conditional on borrowing from any source, women with present-biased preferences are more likely than others to borrow through microcredit institutions.

[4] Note that this differs from our focus on how cognitive and non-cognitive factors affect family income and non-food consumption.

3. Data

We use household survey data comprised of about 1,000 households. The households were drawn from rural areas of nine sub-districts of four districts (Chandpur, Gopalgonj, Netrokona, and Sunamgonj) of Bangladesh. The selected districts represent four major administrative divisions of the country. The selection of households followed a three-step random sampling procedure. First, 150 villages were randomly selected from nine sub-districts. Second, 30 households from each village were randomly selected for inclusion in a large household survey study.[5] Third, of those 30 selected households, one-third was randomly selected for further data collection.[6] Out of this subsample, all households with young children (aged 6 to 16 years) in 2014 took part in a detailed data collection, which results in data from 999 households that we use in this paper ("core sample").

In terms of timeline, data collection started with a village and household survey conducted in March-May 2014 comprising all 150 villages and 4,500 households. The household survey was similar to the household income and expenditure survey (HIES) of the government of Bangladesh that the country conducts regularly to measure living standards, especially to estimate national and regional poverty rates.[7] The HIES questionnaire was augmented with detailed modules on education, anthropometry, and marriage, similar to the Demographic and Health Survey (DHS). In addition, for the smaller sample, cognitive skills of household heads and their spouses were measured in Oct-Nov 2014. Out of the 999 eligible households in the core sample, 774 household heads and 731 of their spouses were successfully re-interviewed to measure their cognitive skills, resulting in a sample size of 774 households if we only use the heads' score and 731 households if we use the spouse's score. To investigate the possibility of nonrandom attrition, we compared the means of the observable variables for whole sample and the samples for which we measured cognitive ability, in Appendix table A1. We see no evidence of nonrandom attrition in this table.

In March-May 2016, two years after the first household survey, the household and village surveys were repeated for both the large and small sample. In addition, for the small

[5] The original 4,500 households were sampled as part of a larger study intended to measure labor supply, productivity, well-being, and returns to cognitive and non-cognitive skills, among other outcomes, in a poor country such as Bangladesh. Chowdhury et al. (2014) provide details of the survey.

[6] The sample was reduced to one-third solely due to budget constraints. A comparison of this one-third to the full sample shows no meaningful differences in the observed household characteristics.

[7] The HIES is similar to the living standard measurement survey (LSMS) popularized by the World Bank.

sample, we measured non-cognitive skills (Big Five personality traits, locus of control), time, risk and social preferences as well as mental well-being (using the General Health Questionnaire (GHQ-12)) for household heads and their spouses. Due to migration, temporary absence due to travel etc., 750 households were re-interviewed in the follow-up survey in 2016. Appendix table A2 documents that there is no evidence for selective attrition based on households' observed characteristics. Table 1 presents the summary statistics of the variables used in this paper.

[Insert Table 1 about here]

2.1 Cognitive Skills

Our measure of cognitive skills relies on the well-established Wechsler Adult Intelligence Scale (WAIS), which is used to measure cognitive skills in a variety of settings (Ernst et al. 2003, Azzopardi et al. 2014, Khan et al. 2014). We adapted the scale to the context of Bangladesh with the help of local experts.[8] The WAIS measures include administering 11 core subtests, which map into four composite indices that characterize different dimensions of IQ: (i) Verbal Comprehension Index (VCI), (ii) Perceptual Reasoning Index (PRI), (iii) Working Memory Index (WMI), and (iv) Processing Speed Index (PSI). We add all four indices (VCI, PRI, WMI, and PSI) to construct an overall measure of cognitive skills, labelled Full-Scale IQ (FSIQ).[9] All four indices are highly correlated with FSIQ and each other – the pairwise correlation coefficient varies between 0.36 and 0.91, and all of these are correlation coefficients are statistically significant (see Appendix Table A1).

Figure 1 presents the distribution of FSIQ scores for the whole sample of household heads (top-left corner), divided into older and younger age groups (top-right corner), by gender of the head (bottom-left corner)[10], and by education (bottom-right corner). Younger and more educated household heads have a higher FSIQ compared to their older and less educated counterparts. The male-female difference could be misleading since our sample

[8] We worked with local academics with expertise in the adoption and use of WISC version IV. In particular, Professor Salim Hossain of the Department of Psychology, Dhaka University, and his team have adapted both WISC and WAIS to the local context.

[9] Since the modules are adapted to the local context, the scores are similar but not directly comparable to FSIQ measured using the standard scale.

[10] We have relatively few female heads so the results for women should be viewed cautiously.

contains only very few female household heads, which are older and less educated than the average household head in the sample.

2.2 Non-cognitive Skills

All measures of non-cognitive skills were elicited for both household heads and their spouses. Respondents answered the corresponding questions asked by an interviewer in a face-to-face interview (Big Five and locus of control) or made decisions in incentivized experiments (time, risk and social preferences).

Big Five personality traits: We used a 15-item questionnaire in order to measure the Big Five personality traits: openness, conscientiousness, extraversion, agreeableness, and neuroticism. (In what follows we will interchange high (low) neuroticism with low (high) emotional stability.) The items stem from John et al. (1991) and are evaluated in Gerlitz and Schupp (2005) among others.

Locus of control (LOC): We measured LOC based on a 28-item questionnaire by Rotter (1966), using a five-point Likert Scale. 14 items refer to internal and external locus of control, respectively. The answers to the respective 14 items were added to construct an external index (reflecting the belief that life is controlled by outside factors beyond own control) and an internal index (representing the belief that one is in control of one's own life). The overall LOC Index is obtained by subtracting the internal index from the external index.

Time preferences: Time preferences were measured using a protocol that Bauer et al. (2012) implemented in a rural setting in India. Participants faced tradeoffs between a sooner but smaller reward and a later but larger reward. Each participant faced three choice sets that each contained six choices represented in a single choice list format. Thus, participants made 18 choices in total. The order of choices was randomly determined by rolling a dice. The choice sets varied in terms of payment delay; the earlier payment was received the day after the experiment in the first set, after one month in the second set and after one year in the third set. The later payments were made after three months, four months, and one year three months

in the first, second and third set, respectively.[11] For the current purpose, we use the total number of later but larger payments chosen by a participant out of all 18 choices as a measure of individual time preference or patience.

Risk preferences: Risk preferences were measured using the risk elicitation protocol pioneered by Binswanger (1980) in developing country settings and employed by Bauer et al. (2012), among others. In an incentivized experiment, participants had to choose one out of six gambles that yielded either a high or a low payoff with an equal probability of 50%. The low payoff was decreasing and the high payoff was increasing for each successive gamble such that higher numbered gambles are riskier (they are characterized by an increase in expected earnings and in the variance of earnings; Appendix C provides a more detailed description). A participant's willingness to take risks is measured by the *gamble number* picked, which is a number from 1 to 6. Higher numbers are associated a higher willingness to take risks.

Social preferences: We adopted an experimental protocol inspired by Fehr, Bernhard, and Rockenbach (2008) and extended by Fehr, Glätzle-Rützler, and Sutter (2013) and Bauer, Chytilová, and Pertold-Gebicka (2014), for example. Each participant played four incentivized dictator games. In each game, participants chose one of two options. Each option describes an allocation of x tokens to the decision maker and y tokens to an anonymous recipient (of same gender and of roughly same age).[12] In each of the four choices, one allocation (x, y) was always the allocation (1,1). The four games are the following: i) costly pro-social game: (1,1) versus (2,0); ii) costless pro-social game: (1,1) versus (1,0); iii) costless envy game: (1,1) versus (1,2); iv) costly envy game: (1,1) versus (2,3). In order to classify participants as altruistic, we use a dummy variable that equals 1 if the participant choses (1,1) instead (2,0) in the costly prosocial game and 0 otherwise.[13]

[11] Appendix C contains a more detailed description of all experiments that we run to measure time, risk and social preferences.

[12] Receivers were from villages outside of the sample. They were similar to the experimental participants, but not known or connected to them. Both decision maker and receiver remained anonymous throughout the game and the receivers indeed got the allocated money.

[13] An alternative classification that takes into account all four games is the following. Participants are classified as: (i) *altruistic* if they maximize the recipient's payoff (y) in all four games; (ii) *egalitarian* if they always minimize

The summary statistics for the measures of non-cognitive skills are shown in Table 1. Table A3 displays the pairwise correlations among the different non-cognitive skills. Unlike the high positive correlations observed among the cognitive skill task scores, the pairwise correlation coefficients among non-cognitive skills are, with few exceptions, often small, statistically insignificant and negative. This low correlation persists in Table A4 that documents correlation between cognitive and non-cognitive skills.

2.3 Control variables

The data set contains information on each household head's and spouse's age, education and occupation, household size and the amount of land owned by the household, and on sample village population in 2014.

Mental well-being and smoking: In addition, the data set contains information on smoking habit and mental well-being at the individual level. We use the General Health Questionnaire (GHQ-12) score (Goldberg and Williams, 1988) to measure mental well-being. The GHQ-12 consists of 12 questions related to the respondents' well-being in the past few weeks, such as their ability to concentrate and the occurrence of worry, stress, depression, and self-confidence.[14] Answers are provided on a scale from 1 and 4, where a higher value refers to a more negative feeling. Each respondent's answers have been summed to an index score ranging from 0 to 36, which is reversed such that higher values of the final score indicate better mental health.[15]

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the differences in payoffs between themselves and the recipient; (iii) *spiteful* if they always minimize the recipient's payoffs; and (iv) *selfish* if they maximize their own payoffs in the first and the fourth game (the payoff of the decision maker is the same in both options in the other two games).

[14] In particular, the questions are: (1): Been able to concentrate on whatever you are doing, (2): Lost much sleep over worry, (3): Felt that you are playing a useful part in things, (4): Felt capable of making decisions about things, (5): Felt constantly under strain, (6): Felt you couldn't overcome your difficulties, (7): Been able to enjoy your normal day to day activities, (8): Been able to face up to your problems, (9): Been feeling unhappy and depressed, (10): Been losing confidence in yourself, (11): Been thinking of yourself as a worthless person, (12): Been feeling reasonably happy, all things considered.

[15] Reversing the GHQ scale in the empirical analysis is common. See, for example, Clark (2003) and Akay et al. (2014).

2.4 Life Outcomes

Economic outcomes: The current data set does not allow calculating wage or income at the individual level. Unlike urban households, rural households surveyed here are often engaged in multiple economic activities. Many of such activities are performed jointly at the household level. For example, even if an individual is employed full time as a primary school teacher, it is likely that she earns additional income from agriculture where she allocates part of her labor, while other household members allocate their labor across multiple activities as well. Many of the economic activities such as agriculture and business are essentially household enterprises, jointly run by household members, which makes it difficult to assign profit or income to a particular individual. As a consequence, we focus here on household Income per capita per month and household non-food expenditures per capita per month.

Table 1 presents the summary statistics of the variables used in this paper.

[Insert Table 1 about here]

3. Empirical strategy

Our main regression specification takes the form

$$y_{ik} = \beta_{0k} + \beta_{1k} Cog_i^h + \beta_{2k} NC_i^h + \beta_{3k} X_i + f_{dk} + e_{ik}, \text{ k=1,...,K..} \quad (1)$$

In (1), y_{ik} denotes outcome k of household i in 2016, Cog_i^h denotes our standardized measure of cognitive skills for the head of household, NC_i^h denotes a vector containing the non-cognitive characteristics discussed above for the head of household, and X_i contains control variables such as age of the household head, land ownership, household size, and village population. Finally, the f_{dk} terms denote district fixed effects (each district has xxx villages) and e_{ik} is an error term.

We focus on 2016 economic outcomes, since the non-cognitive factors were collected in 2016 and hence could have been affected by shocks to the economic outcome variables, i.e. would be endogenous if the economics outcome was measured in 2014.

We also consider an equation where we add the wife's cognitive ability Cog_i^w to (1)

$$y_{ik} = \alpha_{0k} + \alpha_{1k} Cog_i^h + \alpha_{2k} NC_i^h + \alpha_{3k} X_i + \alpha_{4k} Cog_i^w + l_{dk} + v_{ik} \quad \text{k=1,...,K.} \qquad (2)$$

5. Results

In Table 2a we consider versions of (1) and (2) when the dependent variable is the level of family income, while in Table 2b we consider versions of (1) and (2) when the dependent variable is the log of family income. The results are quite consistent across Tables 2a and 2b, and we describe the results as (briefly for this draft): (i) the wife's IQ is always statistically significant when it is included;): (ii) the husband's IQ is always statistically significant when the wife's IQ is not included and is statistically significant two-thirds of a time when the wife's IQ is included and (iii) land holdings are always statistically significant. Altruism is consistently significant, but we do not see an impact of any other non-cognitive factors (for the husband).

[Tables 2a and 2b here.]

Tables 3a and 3b present the results of estimating versions of (1) and (2) when the dependent variable is the level and log of family non-food consumption. Again, the results are quite consistent across Tables 3a and 3b. The results are slightly different than in Tables 2a and 2b in that we find: (i) the wife's IQ is always statistically significant two-thirds of the time - the husband's IQ is always also included; (ii) the husband's IQ is always statistically significant and (iii) land holdings are always statistically significant. Again altruism is consistently significant, but we do not see an impact of any other non-cognitive factors (for the husband).

[Tables 3a and 3b here.]

6. Conclusion

Both the husband's and wife's IQ are important in determining family welfare in rural Bangladesh. One may be concerned that the variables play slightly different roles in Tables 2a and 2b than in Tables 3a and 3b, but it is important to note here that there is quite strong assertive matching on IQ in our data, as the correlation between husbands and wife's IQ is 0.43, which not surprisingly is very statistically significant. Although we collected data on a large number of non-cognitive variables, only the husband's altruism consistently affects family welfare. In future work we will consider what role the wife's non-cognitive characteristics affect our outcomes of interest.

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Tables and Figures

Figure 1: Cognitive Skills

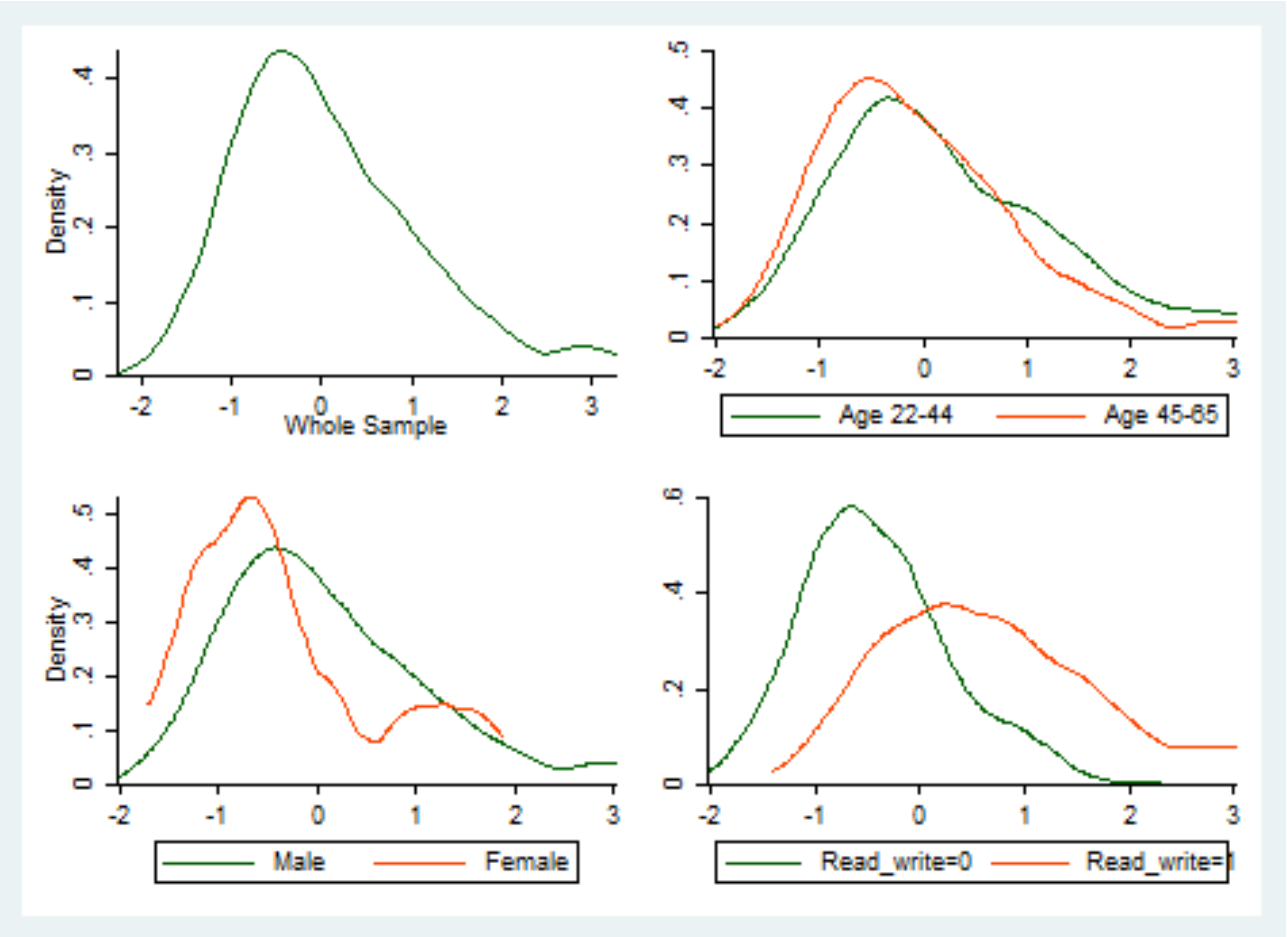
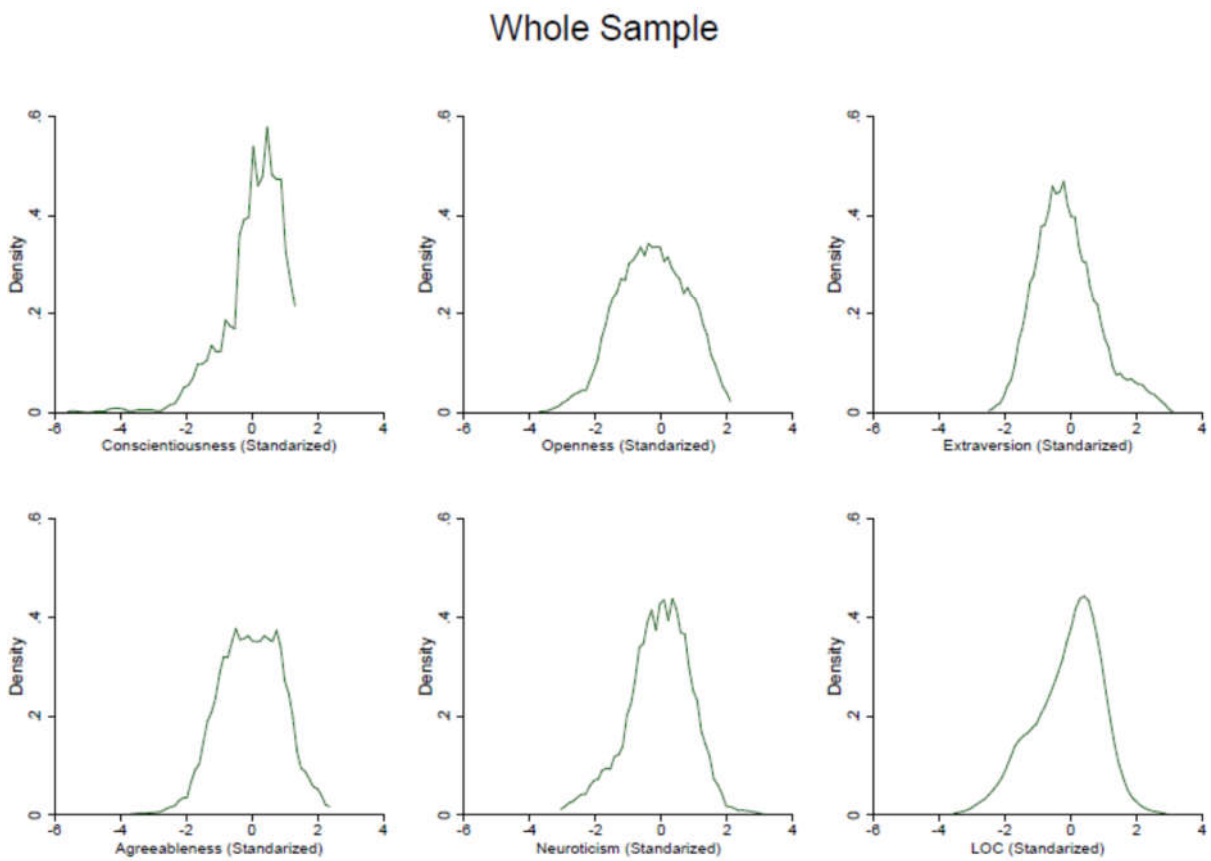


Figure 2: Non-cognitive skills



Tables

Table 1: Summary Statistics

VARIABLES	(1) mean	(2) sd	(3) min	(4) max	(5) N
Income per cap per month in 2014 (in Tk.)	3,927	5,440	0.0295	58,789	774
Income per cap per month in 2016 (in 2014 Tk.)	3,978	4,126	0.0262	42,262	750
Non-food exp. per cap per month in 2014 (in Tk.)	4,178	5,318	602.1	76,321	774
Non-food exp per cap per month in 2016 (in 2014 Tk.)	3,758	1,519	781.4	11,340	750
Daily calorie intake per person per day	2,030	578.2	347.7	6,074	750
Living below food povertyline=1, 0 otherwise	0.247	0.431	0	1	750
Savings per capita per month in 2014 (in Tk.)	236.3	587.1	0	5,208	774
Savings per capita per month in 2016 (in 2014 Tk.)	325.6	732.0	0	9,077	750
Total outstanding credit per capita per month in 2014	84.90	414.2	0	3,354	732
Primary occupation is agriculture	0.509	0.500	0	1	774
Primary occupation is business	0.326	0.469	0	1	774
Household head has a professional job	0.0672	0.251	0	1	774
Household head is a housewife	0.0194	0.138	0	1	774
Expenditure on smoking in 2016 (in 2014 Tk.)	161.5	120.1	0	808.5	750
GHQ aggregate score in reverse scale	23.42	5.259	3	36	754
All things considered, feeling happy	2.985	0.733	1	4	754
Dropped out from school or not	0.623	0.485	0	1	770
Male=1, Female=0	0.977	0.151	0	1	774
Age of household head in 2014	46.16	9.938	26	110	774
Household head can read or write, 0 otherwise	0.438	0.496	0	1	774
Household size in 2014	5.791	1.453	3	12	774
Household size in 2016	5.717	1.547	2	14	750
Housheold land ownnership in 2014	0.730	1.683	0	26	774
height in cm	159.6	11.87	-33	178.9	417
Village population in 2014	1,735	1,906	43	11,036	774
IQ (Standarized)	0.0667	1.026	-2.037	3.054	774
FSIQ_std_spouse	-0.0856	0.981	-1.992	3.054	731
Conscientiousness (Standarized)	0.0204	0.913	-4.562	1.152	645
Extraversion (Standarized)	-0.131	0.938	-2.269	2.872	645
Agreeableness (Standarized)	-0.0567	0.947	-3.495	2.144	645
Openness (Standarized)	-0.285	1.045	-3.465	1.851	645
Neuroticism (Standarized)	-0.0577	0.960	-2.832	2.876	645
LOC (Standarized)	-0.0962	0.999	-3.293	2.668	645
Standardized values of (patient_choices)	-0.0575	1.008	-1.032	1.553	646
Indicator for time consistency	0.731	0.444	0	1	646
Standardized values of (binswanger)	0.0554	1.003	-1.773	1.280	646
Subject picked lottery 6 in Binswanger	0.257	0.437	0	1	646
Spiteful=1, 0 otherwise	0.178	0.383	0	1	646
Egalitarian=1, 0 otherwise	0.206	0.405	0	1	646
Altruistic=1, 0 otherwise	0.0944	0.293	0	1	646
Selfish=1, 0 otherwise	0.291	0.455	0	1	646

Table: 2a - Dependent Variable: the Level of Family Income

VARIABLES	(2) All non-cog	(3) all together	(4) all w/o land	(5) +edu	(6) +edu - land	(7) +spouseIQ	(8) spouseIQ -lan	(9) -Head's IQ
IQ (Standarized)		679.105***	774.072***	571.924***	627.916***	478.992**	512.817**	
		(205.579)	(200.440)	(209.876)	(208.829)	(242.209)	(242.536)	
Age (Year) in 2014	168.490	203.301	228.293	195.389	216.489	197.859	222.424	193.415
	(156.086)	(150.412)	(152.152)	(149.182)	(150.758)	(151.634)	(152.870)	(159.410)
age_square	-1.553	-1.766	-1.959	-1.675	-1.829	-1.583	-1.753	-1.505
	(1.668)	(1.587)	(1.611)	(1.574)	(1.598)	(1.609)	(1.626)	(1.703)
Household size in 2016	72.428	153.960	183.593*	153.818	181.734*	126.348	150.902	83.747
	(112.223)	(108.365)	(109.234)	(108.213)	(108.728)	(112.574)	(113.055)	(115.757)
Conscientiousness (Standarized)	245.665	129.910	144.494	113.198	121.717	155.792	169.337	239.701
	(183.162)	(200.971)	(203.574)	(201.905)	(204.405)	(202.652)	(204.440)	(185.967)
Extraversion (Standarized)	-221.053	-76.839	-76.519	-75.540	-74.830	-49.154	-48.331	-188.699
	(177.053)	(186.499)	(188.039)	(186.704)	(188.241)	(188.661)	(190.022)	(179.587)
Agreeableness (Standarized)	-62.026	-14.217	-4.696	-18.424	-10.760	-10.861	7.310	-5.530
	(171.829)	(178.958)	(180.253)	(178.325)	(179.239)	(186.906)	(187.946)	(177.300)
Openness (Standarized)	141.689	114.920	119.404	118.309	123.602	99.909	100.197	113.148
	(204.559)	(205.475)	(206.753)	(206.743)	(208.000)	(212.042)	(212.942)	(209.875)
Neuroticism (Standarized)	-327.792	-271.843	-251.864	-263.740	-242.347	-263.472	-242.858	-258.950
	(210.667)	(236.495)	(237.554)	(237.585)	(238.247)	(237.560)	(238.485)	(217.924)
LOC (Standarized)	-259.713	-52.678	-24.673	-62.842	-39.606	-31.297	-9.517	-214.267
	(198.292)	(211.192)	(213.940)	(214.169)	(217.234)	(213.166)	(214.996)	(202.151)
Standardized values of (patient_choices)	-255.563	-104.401	-150.791	-98.192	-140.015	-65.868	-103.543	-262.847
	(161.337)	(161.000)	(159.746)	(160.670)	(159.343)	(164.012)	(162.688)	(161.140)
Standardized values of (binswanger)	157.657	183.472	211.456	197.441	228.227	224.170	249.765	188.264
	(178.851)	(196.763)	(199.547)	(195.080)	(198.331)	(198.950)	(200.894)	(181.054)
Altruistic based on decision sheet 1	933.765***	899.094***	843.798**	908.036***	858.666**	857.435**	798.713**	738.099**
	(319.290)	(344.787)	(346.083)	(344.284)	(345.503)	(349.071)	(349.415)	(327.441)
Land owned in 2014 (in acres)	402.854***	319.791***		306.046***		279.252**		
	(130.131)	(117.639)		(116.297)		(115.834)		
Education (read and write=1)				469.793	617.129*			

				(371.915)	(371.823)			
FSIQ_std_spouse						440.471**	545.477**	811.540***
						(221.411)	(223.047)	(170.838)
Constant	-1,140.215	-2,943.468	-3,747.726	-2,998.490	-3,774.598	-2,903.308	-3,722.203	-2,493.391
	(3,784.115)	(3,781.604)	(3,809.746)	(3,793.642)	(3,811.416)	(3,810.455)	(3,831.270)	(3,878.347)
Observations	691	595	595	595	595	576	576	665
R-squared	0.071	0.099	0.082	0.102	0.086	0.103	0.090	0.074
Restricted to 22-65?	No	No	No	Yes	Yes	No	No	No
District Fixed-effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Winsorized at top and bottom one percent?	No	No	No	No	No	No	No	No
Mean	3982	3861	3861	3861	3861	3871	3871	3996

Robust standard errors. *** p<0.01

** p<0.05

* p<0.1.

Table: 2b -- Dependent Variable: the Log of Family Income

VARIABLES	(2) All non-cog	(3) all together	(4) all w/o land	(5) +edu	(6) +edu - land	(7) +spouseIQ	(8) spouseIQ -lan	(9) -Head's IQ
IQ (Standarized)		0.282**	0.319***	0.154	0.173	0.142	0.153	
		(0.110)	(0.107)	(0.124)	(0.124)	(0.137)	(0.138)	
Age (Year) in 2014	0.139*	0.152	0.162*	0.143	0.150	0.176*	0.184*	0.171**
	(0.084)	(0.094)	(0.096)	(0.093)	(0.095)	(0.094)	(0.096)	(0.085)
age_square	-0.001	-0.001	-0.001	-0.001	-0.001	-0.002	-0.002	-0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Household size in 2016	0.027	0.052	0.064	0.052	0.062	0.031	0.039	0.022
	(0.061)	(0.064)	(0.065)	(0.064)	(0.065)	(0.066)	(0.066)	(0.063)
Conscientiousness (Standarized)	0.168	0.155	0.161	0.135	0.138	0.140	0.144	0.138
	(0.123)	(0.138)	(0.139)	(0.137)	(0.137)	(0.134)	(0.134)	(0.120)
Extraversion (Standarized)	0.010	0.081	0.081	0.082	0.082	0.056	0.056	-0.003
	(0.086)	(0.093)	(0.093)	(0.093)	(0.094)	(0.090)	(0.091)	(0.085)
Agreeableness (Standarized)	0.043	0.075	0.079	0.070	0.072	0.059	0.066	0.039
	(0.089)	(0.097)	(0.097)	(0.095)	(0.096)	(0.098)	(0.098)	(0.090)
Openness (Standarized)	0.155**	0.110	0.112	0.114	0.116	0.102	0.102	0.144*
	(0.075)	(0.083)	(0.084)	(0.083)	(0.084)	(0.085)	(0.085)	(0.078)
Neuroticism (Standarized)	0.032	0.076	0.084	0.086	0.093	0.111	0.118	0.087
	(0.086)	(0.097)	(0.097)	(0.096)	(0.097)	(0.096)	(0.096)	(0.087)
LOC (Standarized)	-0.145	-0.095	-0.084	-0.107	-0.099	-0.104	-0.096	-0.141
	(0.090)	(0.100)	(0.100)	(0.101)	(0.102)	(0.098)	(0.098)	(0.090)
Standardized values of (patient_choices)	-0.034	0.007	-0.011	0.014	-0.000	0.040	0.027	-0.004
	(0.085)	(0.094)	(0.092)	(0.094)	(0.092)	(0.092)	(0.089)	(0.080)
Standardized values of (binswanger)	0.049	0.057	0.067	0.073	0.084	0.104	0.113	0.081
	(0.094)	(0.106)	(0.107)	(0.107)	(0.108)	(0.104)	(0.105)	(0.094)
Altruistic based on decision sheet 1	0.342**	0.386**	0.365*	0.397**	0.380**	0.396**	0.376**	0.293*
	(0.170)	(0.191)	(0.192)	(0.191)	(0.192)	(0.189)	(0.189)	(0.170)
Land owned in 2014 (in acres)	0.151***	0.125***		0.109**		0.095**		

	(0.048)	(0.048)		(0.047)		(0.048)		
Education (read and write=1)				0.565**	0.617***			
				(0.224)	(0.221)			
FSIQ_std_spouse						0.298**	0.334***	0.393***
						(0.130)	(0.127)	(0.088)
Constant	3.325	2.610	2.296	2.544	2.269	1.924	1.644	2.211
	(2.019)	(2.283)	(2.331)	(2.270)	(2.308)	(2.293)	(2.341)	(2.063)
Observations	691	595	595	595	595	576	576	665
R-squared	0.045	0.066	0.058	0.076	0.070	0.079	0.074	0.061
Covariate set?	Small	Small	Small	ge + Read_W	ge + Read_W	Small	Small	Small
Restricted to 22-65?	No	No	No	Yes	Yes	No	No	No
District Fixed-effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Winsorized at top and bottom one percent?	No	No	No	No	No	No	No	No
Mean	7.401	7.342	7.342	7.342	7.342	7.361	7.361	7.416

Robust standard errors. *** p<0.01

** p<0.05

* p<0.1.

Table: 3a - Dependent Variable: The Level of Family Non-Food Expenditure

VARIABLES	(2) all non-cog	(3) all together	(4) all w/o land	(5) +edu	(6) +edu - land	(7) +spouse's IQ	(8) spouseIQ -lan	(9) -Head's IQ
IQ (Standarized)		234.128***	269.015***	182.279***	202.556***	184.732***	197.590***	
		(58.857)	(59.481)	(63.952)	(64.913)	(67.172)	(69.381)	
Age (Year) in 2014	75.210	110.506*	119.687**	106.678*	114.320*	105.739*	115.077*	97.084*
	(55.550)	(58.471)	(59.663)	(58.377)	(59.407)	(58.668)	(59.853)	(55.613)
age_square	-0.612	-0.959	-1.030	-0.915	-0.971	-0.883	-0.948	-0.731
	(0.594)	(0.623)	(0.635)	(0.622)	(0.633)	(0.626)	(0.638)	(0.597)
Household size in 2016	-47.457	3.657	14.543	3.589	13.698	0.497	9.831	-29.591
	(41.084)	(40.721)	(40.262)	(40.986)	(40.562)	(41.174)	(40.709)	(40.946)
Conscientiousness (Standarized)	101.708*	53.469	58.826	45.384	48.469	55.958	61.107	88.642
	(59.124)	(62.280)	(63.917)	(62.207)	(63.514)	(63.295)	(64.827)	(61.298)
Extraversion (Standarized)	-54.806	-50.373	-50.255	-49.744	-49.487	-49.297	-48.984	-41.448
	(69.178)	(63.618)	(64.778)	(63.851)	(65.008)	(66.145)	(67.257)	(72.113)
Agreeableness (Standarized)	14.083	31.069	34.566	29.034	31.809	35.449	42.357	31.780
	(54.146)	(56.472)	(56.684)	(56.578)	(56.792)	(59.269)	(59.103)	(55.409)
Openness (Standarized)	26.939	-25.798	-24.151	-24.159	-22.242	-24.517	-24.407	9.629
	(52.908)	(56.587)	(57.559)	(56.794)	(57.773)	(58.522)	(59.329)	(55.034)
Neuroticism (Standarized)	-155.289**	-93.602	-86.263	-89.682	-81.936	-98.903	-91.066	-140.912**
	(69.050)	(63.858)	(64.042)	(63.883)	(64.077)	(63.907)	(63.896)	(68.510)
LOC (Standarized)	-76.416	-34.244	-23.956	-39.161	-30.746	-19.172	-10.893	-59.638
	(62.409)	(67.764)	(69.978)	(68.331)	(70.448)	(68.784)	(71.101)	(65.407)
Standardized values of (patient_choices)	-71.437	-81.111	-98.152*	-78.107	-93.252	-75.772	-90.093	-82.018
	(54.098)	(57.442)	(57.895)	(57.659)	(58.089)	(59.420)	(59.827)	(55.663)
Standardized values of (binswanger)	-32.226	-9.864	0.416	-3.106	8.042	8.500	18.230	-5.154
	(52.396)	(55.281)	(55.402)	(54.947)	(54.980)	(55.447)	(55.414)	(52.396)
Altruistic based on decision sheet 1	220.902**	266.813**	246.500**	271.139**	253.261**	268.972**	246.649**	177.024
	(106.373)	(109.771)	(112.836)	(109.586)	(112.368)	(111.571)	(114.730)	(109.753)
Land owned in 2014 (in acres)	152.824**	117.478**		110.829*		106.156*		

	(62.536)	(57.853)		(56.940)		(60.662)		
Education (read and write=1)				227.265*	280.620**			
				(126.672)	(129.258)			
FSIQ_std_spouse						128.350	168.267**	295.602***
						(84.334)	(78.874)	(64.190)
Constant	2,343.223*	1,006.144	710.693	979.526	698.473	1,115.756	804.458	1,538.532
	(1,355.935)	(1,403.737)	(1,424.108)	(1,395.421)	(1,414.282)	(1,402.553)	(1,423.445)	(1,335.518)
Observations	691	595	595	595	595	576	576	665
R-squared	0.214	0.230	0.213	0.234	0.219	0.238	0.224	0.226
Covariate set?	Small	Small	Small	Small	Large	ge + Read_W	Small	Small
Restricted to 22-65?	No	No	No	No	Yes	Yes	No	No
District Fixed-effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Winsorized at top and bottom one percent?	No	No	No	No	No	No	No	No
Mean	3797	3761	3761	3761	3761	3772	3772	3803

Robust standard errors. *** p<0.01

** p<0.05

* p<0.1.

Table: 3b - Dependent Variable: The Log of Family Non-Food Consumption

VARIABLES	(2) All non-cog	(3) all together	(4) all w/o land	(5) +edu	(6) +edu - land	(7) +spouse's IQ	(8) spouseIQ -lan	(9) -Head's IQ
IQ (Standarized)		0.061***	0.070***	0.048***	0.053***	0.051***	0.054***	
		(0.014)	(0.014)	(0.016)	(0.016)	(0.016)	(0.017)	
Age (Year) in 2014	0.027*	0.036**	0.038**	0.035**	0.037**	0.033**	0.036**	0.031**
	(0.015)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.015)
age_square	-0.000	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Household size in 2016	-0.012	0.000	0.003	0.000	0.003	-0.001	0.002	-0.008
	(0.010)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Conscientiousness (Standarized)	0.027*	0.018	0.019	0.016	0.016	0.018	0.019	0.024
	(0.016)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.016)
Extraversion (Standarized)	-0.015	-0.009	-0.009	-0.009	-0.009	-0.009	-0.009	-0.013
	(0.016)	(0.016)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Agreeableness (Standarized)	0.007	0.010	0.010	0.009	0.010	0.011	0.013	0.011
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.016)	(0.016)	(0.015)
Openness (Standarized)	-0.001	-0.015	-0.015	-0.015	-0.014	-0.014	-0.014	-0.005
	(0.014)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.016)	(0.014)
Neuroticism (Standarized)	-0.036**	-0.024	-0.023	-0.023	-0.021	-0.026	-0.024	-0.033**
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.015)
LOC (Standarized)	-0.016	-0.006	-0.004	-0.007	-0.005	-0.002	0.000	-0.012
	(0.015)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.015)
Standardized values of (patient_choices)	-0.017	-0.017	-0.021	-0.016	-0.020	-0.017	-0.020	-0.020
	(0.014)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.014)
Standardized values of (binswanger)	0.005	0.010	0.012	0.012	0.014	0.015	0.017	0.012
	(0.013)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Altruistic based on decision sheet 1	0.051*	0.065**	0.060**	0.066**	0.062**	0.065**	0.060**	0.040
	(0.027)	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)	(0.030)	(0.028)
Land owned in 2014 (in acres)	0.036***	0.028**		0.026**		0.026**		

	(0.013)	(0.012)		(0.012)		(0.013)		
Education (read and write=1)				0.057	0.070**			
				(0.035)	(0.035)			
FSIQ_std_spouse						0.028	0.037**	0.071***
						(0.019)	(0.018)	(0.015)
Constant	7.600***	7.262***	7.191***	7.255***	7.188***	7.325***	7.249***	7.434***
	(0.369)	(0.390)	(0.392)	(0.389)	(0.391)	(0.386)	(0.388)	(0.360)
Observations	691	595	595	595	595	576	576	665
R-squared	0.221	0.239	0.224	0.242	0.230	0.246	0.234	0.236
Covariate set?	Small	Small	Small	Small	Large	ge + Read_W	Small	Small
Restricted to 22-65?	No	No	No	No	Yes	Yes	No	No
District Fixed-effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Winsorized at top and bottom one percent?	No	No	No	No	No	No	No	No
Mean	8.165	8.155	8.155	8.155	8.155	8.157	8.157	8.165

Robust standard errors. *** p<0.01

** p<0.05

* p<0.1.

Tables and Figures

Appendix A – Additional Tables and Figures

Appendix B - Related Literature

Table B1: Evidence from non-Western countries on the role of IQ, time, risk, social preferences, Big Five, locus of control or other personality traits for outcomes

Paper	Data Set	Outcomes	Country	Results	IQ	Big Five	LOC	Time	Risk Preferences	Social Preference	Other
Acosta et al. (2015)	STEP	Labor Market, Education	Colombia	▪	○	□	□	□	□	□	□
Carpenter and Seki (2011)	Private	Labor Market	Japan	□	□	□	□	□	□	□	□
Cunningham et al. (2016)	ENHAB	Labor Market	Peru	□	□	□	□	□	□	□	□
Díaz et al. (mimeo)	Private	Labor Market	Peru	□	□	□	□	□	□	□	□
Dohmen et al. (2016)	Private	Labor Market, Education	Multiple (76)	□	□	□	□	□	□	□	□
Falk et al. (2015)	Private	Labor Market, Education, Health, Personal Finance, Social Interaction	Multiple (76)	□	□	□	□	□	□	□	□
Glewwe et al. (2013)	GSCF	Labor Market, Education	China	▪	○	□	□	□	□	□	□
Ha and Kim (2013)	KGGS	Life Satisfaction	South Korea	□	□	□	□	□	□	□	□
Hanushek and Woessmann (2008)	Multiple	Labor Market	Multiple	□	○	□	□	□	□	□	□

Hilger et al. (2016)	Bangladesh EES	Labor Market	Bangladesh	□	◉	□	□	□	□	□	□
Karlan (2005)	Private	Personal Finance	Peru	□	□	□	□	□	□	□	□
Kosfeld and Rustagi (2015)	Private	Labor Market	Ethiopia	□	□	□	□	□	□	□	□
Leibbrandt (2012)	Private	Labor Market	Brazil	□	□	□	□	□	□	□	□
Nomura and Adhikari (2017)	Bangladesh ESS	Labor Market	Bangladesh	■	◉	□	□	□	□	□	□
Nordman et al. (2015)	Bangladesh EES	Labor Market	Bangladesh	■	◉	□	□	□	□	□	□
Rustagi et al. (2010)	Private	Labor Market	Ethiopia	□	□	□	□	□	□	□	□
Semikyna and Linz (2007)	Private	Labor Market	Russia	□	□	□	□	□	□	□	□

Table shows papers that demonstrate the role of IQ, time preferences, risk preferences, social preferences, Big Five, locus of control or other traits for outcomes, using data from non-Western countries.

□ – Significant effects. ■ – Mixed effects. ◉ – Used. – Somewhat used. □ – Not used.

Bangladesh ESS - Bangladesh Enterprise-Based Skills Survey, ENHAB - National Skills and Labor Market Survey (Encuesta Nacional de Habilidades), Peru, GSCF - Gansu Survey of Children and Families, KGGS – Korean General Social Survey, STEP - Skills toward Employment and Productivity (STEP) Household Survey

Appendix C – Experimental Protocols

Below, we provide detailed descriptions of the experimental protocols that we used to measure time, risk, and social preferences. They correspond to the instructions and decision sheets that we used in the field.

Risk, Time and Other Regarding Preferences for adults, March – May, 2016
(Both parents for selected households will take part in these experiments)

General setting:

- **Age**: Parents will participate in a sequence of 3 experiments: a) time preference, b) risk attitudes, and c) other regarding preferences.
- **Order**: The order of the experiments will be randomly determined by the administrators, which is explained at the beginning of the experiments.
- **Incentive**: Each adult will receive a token (a star) as a show-up fee, which s/he will be able to convert into money at the end of the experiments. In addition, they would be able to earn money during the experiment as all the experiments are incentivized. However, only one of the experiments will be paid out through a lottery that will be explained soon.
- **Venue**: The experiments will take place at home; a male administrator will deal with males and a female administrator will deal with females.
- **Instructions**: All the enumerators/instructors must memorize the instructions and explain the game to the adults. While they will not read the text word by word, however, they will stick closely to the wording of the experimental instructions. In addition, the explanation will involve control question to check for understanding.
- **Timing**: Members belong to the same household will sit simultaneously on separate parallel sessions. It is an important task of the interviewer to ensure that the decisions of a household member truly reflect own decisions only and that other household members do not try to influence the decisions, e.g., place them back to back or in separate rooms.
- **Control questions that check understanding**: Subjects' understanding of rules of various experiments will be documented.

General instructions: My name is.... Today I have prepared three games for you. In these games, you can earn money. Before we start, I will explain the rules of our games. How much money you will earn depends mainly on your decisions. At the end, only one of the games will

be paid. Which game will be paid will be determined randomly. You will draw one number out of three numbers that will represent three games. Only after drawing a number, you will see which one you have drawn. The drawn number will determine whether the first, second, or third game will be paid for. It is important that you understand the rules of our all games and play each of them carefully because each of them could be the one that is paid. Please listen carefully now. I will frequently stop during my explanation and allow you to ask questions. Therefore, please interrupt me anytime in case you have a question.

Are you okay so far? Leave time for questions and answer them privately.

1. Determine the sequence by rolling a dice, and write the sequence at which experiments are being conducted:

[1=risk, time, social,

2=risk, social, time,

3= time, risk, social,

4=time, social, risk,

5=social, time, risk,

6=social, risk, time]

Time Preference Experiment

Let us start with this game. Before we start, let me explain the rules of our game. In this game you can earn money. As I mentioned at the beginning, it is important to note that at the end only one of the games will be paid and you will draw a number to determine it. That's why it is important that you understand the rules of our game. Please interrupt me anytime in case you have a question.

Are you okay so far? Leave time for questions and answer them privately.

1. Determine the order of explanation by rolling a dice and write it do

[1=choice set 1, choice set 2, choice set 3

2= choice set 1, choice set 3, choice set 1

3= choice set 2, choice set 3, choice set 1

4= choice set 2, choice set 1, choice set 3

5= choice set 3, choice set 1, choice set 2

6 = choice set 3, choice set 2, choice set 2]

The game works as follows:

The game consists of 3 choice sets. There are six choices in each choice set. You need to make a choice between two payment options: Option A or Option B. In each choice set, there are six such decisions that you need to make. Each decision is a paired choice between Option A and Option B. You will be asked to make a choice between these two payment options in each decision row. For example, (*assuming the first choice set is being randomly picked first*) in the first row, you need to make a choice between payment option A and payment option B where payment option A pays you Taka 100 tomorrow and option B pays you Taka 105 after three months from today. In the second choice, option A pays you Taka 100 tomorrow, and option B pays you Taka 110 in three months. In the third choice, option A pays you Taka 100 tomorrow, and option B pays you Taka 120 in three months. Notice that option A remains unchanged while option B is increasing.

If you go for Taka 100 tomorrow, you will need to tick option A. If selected, one of us will come to your home and to deliver the money in an envelope with your name marked on it. If

you wait, you will get Taka 105 after three months. Again, one of us will come to your home and to deliver the money in an envelope with your name marked on it.

Could you please repeat the rules of the game? (*If the respondent is unable to repeat, please explain the game again; the respondent has to be able to repeat the correct meaning of the game autonomously*).

2. Respondent understood the game after: |__|

1= first explanation, 2= second explanation, 3= third explanation, 4= did not understand

The second choice set is very similar to the first choice set. However, Option A now pays in one month, and Option B pays in four months. If you go forTaka 100 in one month, you will need to tick option A. If selected, one of us will come to your home and deliver the money in an envelope with your name marked on it. If you wait four months, you will get Taka 105 after four months. Again, one of us will come to your home and deliver the money in an envelope with your name marked on it.

Could you please repeat the rules of the game? (*If the respondent is unable to repeat, please explain the game again; the respondent has to be able to repeat the correct meaning of the game autonomously*).

3. Respondent understood the game after: |__|

1= first explanation, 2= second explanation, 3= third explanation, 4= did not understand

The third choice set is very similar to the second and first choice set. However, Option A now pays in one year, and Option B pays in one year and three months. If you go forTaka 100 in one year, you will need to tick option A. If selected, one of us will come to your home and to deliver the money in an envelope with your name marked on it. If you wait one year three months, you will get Taka 105 after one year three months. Again, one of us will come to your home and to deliver the money in an envelope with your name marked on it.

As I mentioned at the beginning, it is important to note that at the end only one of the games will be paid for where you will draw a number to determine it. If this game is paid, only one of the three chocie sets counts. The selection will be made by rolling a six sided dice twice – first to decide the set, and the second to decide the choice. After your decisions, you will roll a dice (*please demonstrate*). In the first draw, if 1, 2 or 3 is rolled, you will receive the money from the particular choice set, if 4, 5 or 6 is rolled, you will not receive any money. Depending on the

outcome of the first draw, the second draw would determine the particular choice that you would be paid for. For example, if 3 is rolled in the second draw, you will receive the money from your decision concerning the third payoff alternative (third row) of the relevant choice set.

Could you please repeat the last part? Will you receive the money for all three choice sets or all six choices? Do you need to make a decision for each of them? (If the respondent answers incorrectly the experimenter has to repeat the explanation of this part)

4. Respondent understood the game after: |__|

1= first explanation, 2= second explanation, 3= third explanation, 4= did not understand

Please take your decision for each of the choice sets now (*place the decision sheets side by side on the table*). Start with this part (*point at the first decision sheet (depending on the order of explanation) and continue with this part (point at the second decision sheet)* and finally make your decision in this part (point at the final decision sheet). Take as much time as you need. In the meantime I will turn around so that I do not disturb you. Just call me when you are done.

Choice set 1

Payoff alternative	Payment Option A (pays amount below tomorrow)	Payment Option B (pays amount below after 3 months)	Annual interest rate in %	Preferred Payment Option (A or B)
1	100	105	20%	
2	100	110	40%	
3	100	120	80%	
4	100	125	100%	
5	100	150	200%	
6	100	200	400%	

Choice set 2

Payoff alternative	Payment Option A (pays amount below after 1 month)	Payment Option B (pays amount below after 4 months)	Annual interest rate in %	Preferred Payment Option (A or B)
1	100	105	20%	
2	100	110	40%	
3	100	120	80%	
4	100	125	100%	
5	100	150	200%	
6	100	200	400%	

Choice set 3

Payoff alternative	Payment Option A (pays amount below after 1 year)	Payment Option B (pays amount below after 1 year 3 months)	Annual interest rate in %	Preferred Payment Option (A or B)
1	100	105	20%	
2	100	110	40%	
3	100	120	80%	
4	100	125	100%	
5	100	150	200%	
6	100	200	400%	

5. Results of first draw (if applicable):
6. Results of second draw (if applicable):
7. Is this game paid for? .....1=yes, 2=no.

Risk Preferences

Let us start with this game. Before we start, I will explain the rules of our game. Similar to other games, you can earn money in this game as well. How much money you will earn depends mainly on your decisions. As I mentioned at the beginning, it is important to note that at the end only one of the games will be paid. You will draw a number out of three to determine which game will be paid. That's why it is important that you understand the rules of our game, and play each of them carefully. Please listen carefully now. I will frequently stop during my explanation and allow you to ask questions. Therefore, please interrupt me anytime in case you have a question.

Are you ok so far? Leave time for questions and answer them privately.

In this game, you need to select the gamble you would like to play from among six different gambles, which are listed below. You must select one and only one of these gambles.

If this game is selected for payment, you will have a 1-in-6 chance of receiving the money. The selection will be made by rolling a six sided dice twice – first, you will roll the dice to decide the gamble, and the second to decide the outcome of the particular gamble. For example, if you selected gamble # 4, then if the first roll of the dice is 4, you would receive one of the payoffs of gamble 4, which will be determined in the second roll. If the first roll of the dice is not 4 and you have chosen gamble # 4, you would not receive any payments. Depending on the outcome of the first roll, the second roll would determine the outcome of the selected gamble. Each gamble has two possible outcomes – low and high. If 1, 2 or 3 is rolled, the outcome of the selected gamble is the low one, and if 4, 5 or 6 is rolled, the outcome of the gamble is the high one, and you would receive money accordingly.

Notice that the low outcome is decreasing and the high outcome is increasing for each successive gamble. For example, in the first gamble, both outcomes are identical. If you select it and then this number is rolled in the first roll, your payoff would be 125 Taka. If on the other hand, you had selected gamble # 2, and if it is rolled on the first roll, your payoff could be 110 Taka or 240 Taka. In the second roll, if 1, 2 or 3 is rolled, you would receive 110 Taka, whereas if 4, 5 or 6 is rolled, you would receive 240 Taka.

1. Ask the respondent to repeat the game. Respondent understood the game after: |__|

1= first explanation, 2= second explanation, 3= third explanation, 4= did not understand

Before you select the actual gamble involving money, we will have a practice session with candies. There are two gambles from which you need to select one:

	Outcome	Payoff	Chances	Your Selection
Gamble 1	LOW	1	50%	
	HIGH	1	50%	
Gamble 2	LOW	0	50%	
	HIGH	2	50%	

Both gambles have two outcomes. The first gamble pays 1 candy in both states, while the second gamble pays no (0) candy in the low state and 2 candies in high state. Which gamble would you like to play? Once you make your selection, you will roll the dice to decide the gamble, and again to decide the outcome. First, you will roll the dice to decide the gamble, and the second to decide the outcome of the particular gamble. For example, if you selected gamble #2, then if the first roll of the dice is 2, you would receive one of the payoffs of gamble #2, which will be determined in the second draw. In the second draw, if 1, 2 or 3 is rolled, the outcome of the selected gamble is the low one, which is 0 here. That means, you will not receive any candy. However, if 4, 5 or 6 is rolled, the outcome of the gamble is the high one, and you will receive two candies. Let us start this now.

2. Gamble number picked involving candies:

3. Outcome in the first draw for candies:

4. Outcome in the second draw for candies (if applicable):

Mark the gamble selection with an X in the last box across from your preferred gamble (mark only one):

	Outcome	Payoff	Chances	Your Selection
Gamble 1	LOW	125	50%	
	HIGH	125	50%	
Gamble 2	LOW	110	50%	
	HIGH	240	50%	
Gamble 3	LOW	100	50%	

	HIGH	300	50%	
Gamble 4	LOW	75	50%	
	HIGH	375	50%	
Gamble 5	LOW	25	50%	
	HIGH	475	50%	
Gamble 6	LOW	0	50%	
	HIGH	500	50%	

5. Gamble number picked:
6. Outcome in the first draw (if applicable):
7. Outcome in the second draw (if applicable):
8. Amount won in the lottery in Taka (if applicable):
9. Is this game paid for? .....1=yes, 2=no.

Social preferences

In this game you can earn stars, which you can convert into money. Each star is equal to Taka 100. The more stars you will earn, the more money you will get. As I mentioned at the beginning, it is important to note that at the end only one of the games will be paid for where you will draw a number to determine it. That's why it is important that you understand the rules of all our games, and play each of them carefully because each of them could be the one that is paid. Please listen carefully now. I will frequently stop during my explanation and allow you to ask questions. Therefore, please interrupt me anytime in case you have a question.

Are you ok so far? Leave time for questions and answer them privately.

In this game you have to decide how to divide stars that between yourself and another person similar to you but from a different village. You will never know who exactly the other person is and the other person will not get to know you. However, I will ensure that the other person does indeed receive the money that corresponds to the stars that you will give to him/her.

You will get four different decision sheets. You will need to decide how to divide stars between yourself and this person similar to you.

Are you ok so far? Leave time for questions and answer them privately.

There are two possible ways to allocate the stars: the option on the left-hand side and the option on the right-hand side.

Please look at the decision sheet. With option "left" you get one star and the person from another village with whom you are randomly matched gets one star. One star equals 100 Taka. With option "right" you get two stars and the person from another village gets 0 stars.

Are you ok so far? Leave time for questions and answer them privately.

Depending on which option you want to choose, you should check the box at the left- or the right-hand side. You can choose either option "left" or option "right". If you would like to divide the stars according to option "right", which box would you have to check? Right, the box at the "right" side. How much would you earn and how much would the person from the other village with you are randomly matched earn in this case? Right, you would get 100 Taka and the other person similar to you would get nothing.

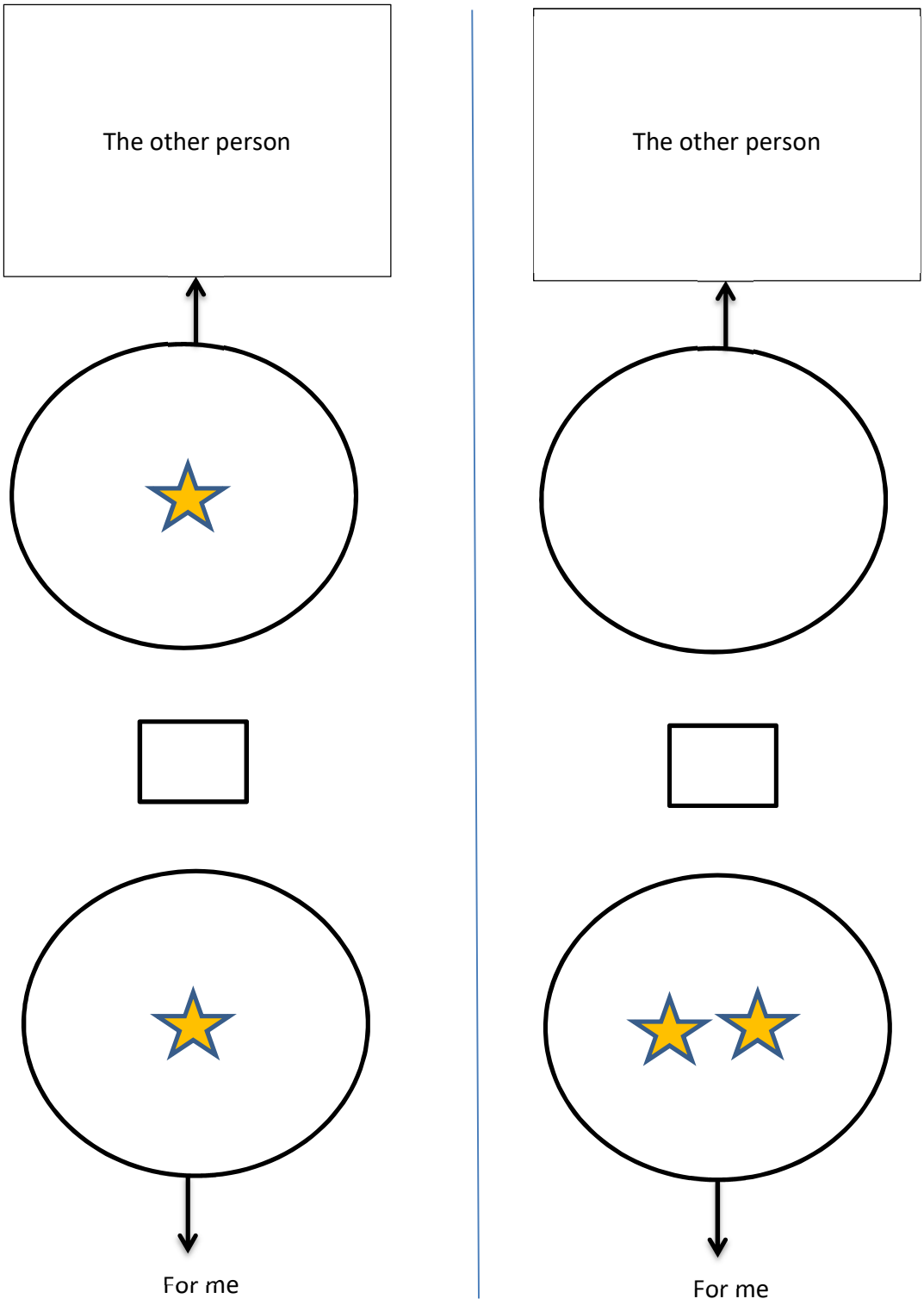
1. Respondent understood the game after: |__|

1= first explanation, 2= second explanation, 3= third explanation, 4= did not understand

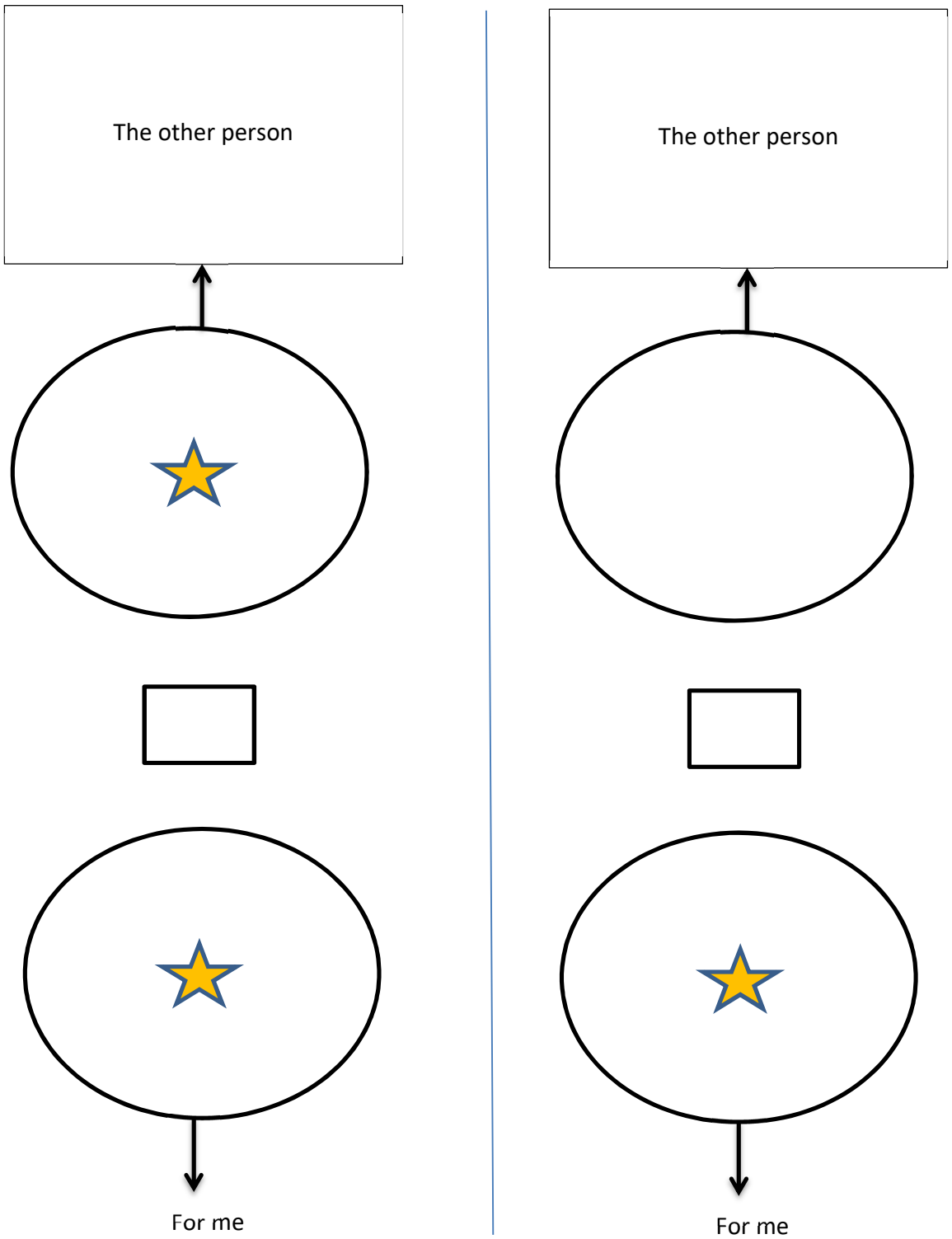
Are you ok so far? Leave time for questions and answer them privately.

As I mentioned earlier, you will get four decision sheets. The decision sheets differ from each other in the amounts of stars that can be divided between you and the other person. Please choose one of the two options for each decision sheet. At the end of the game, you will blindly draw one decision sheet out of four (*show the process*If this game is selected for payment, you and the other person will be paid according to the selected decision sheet.

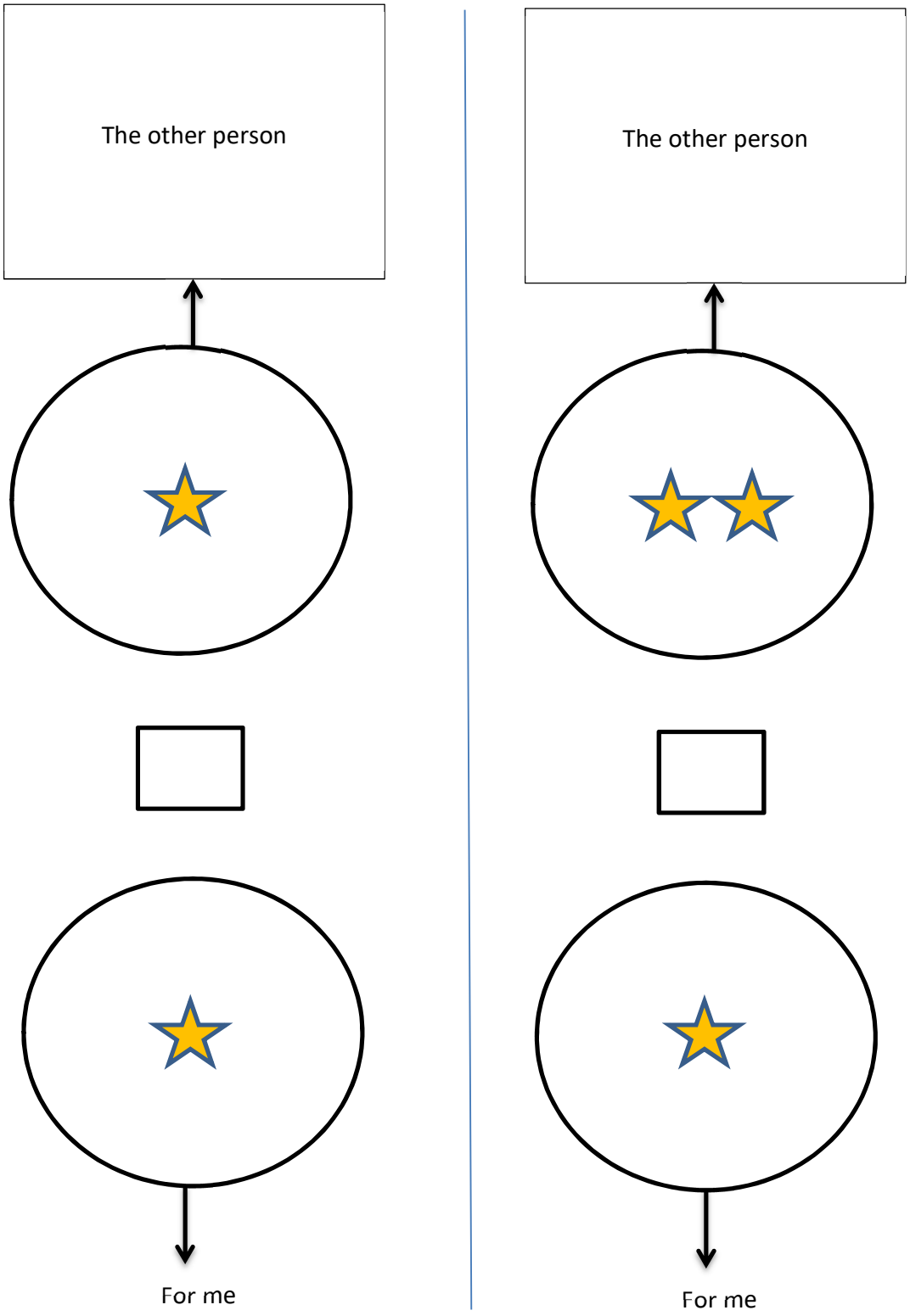
Decision sheet 1



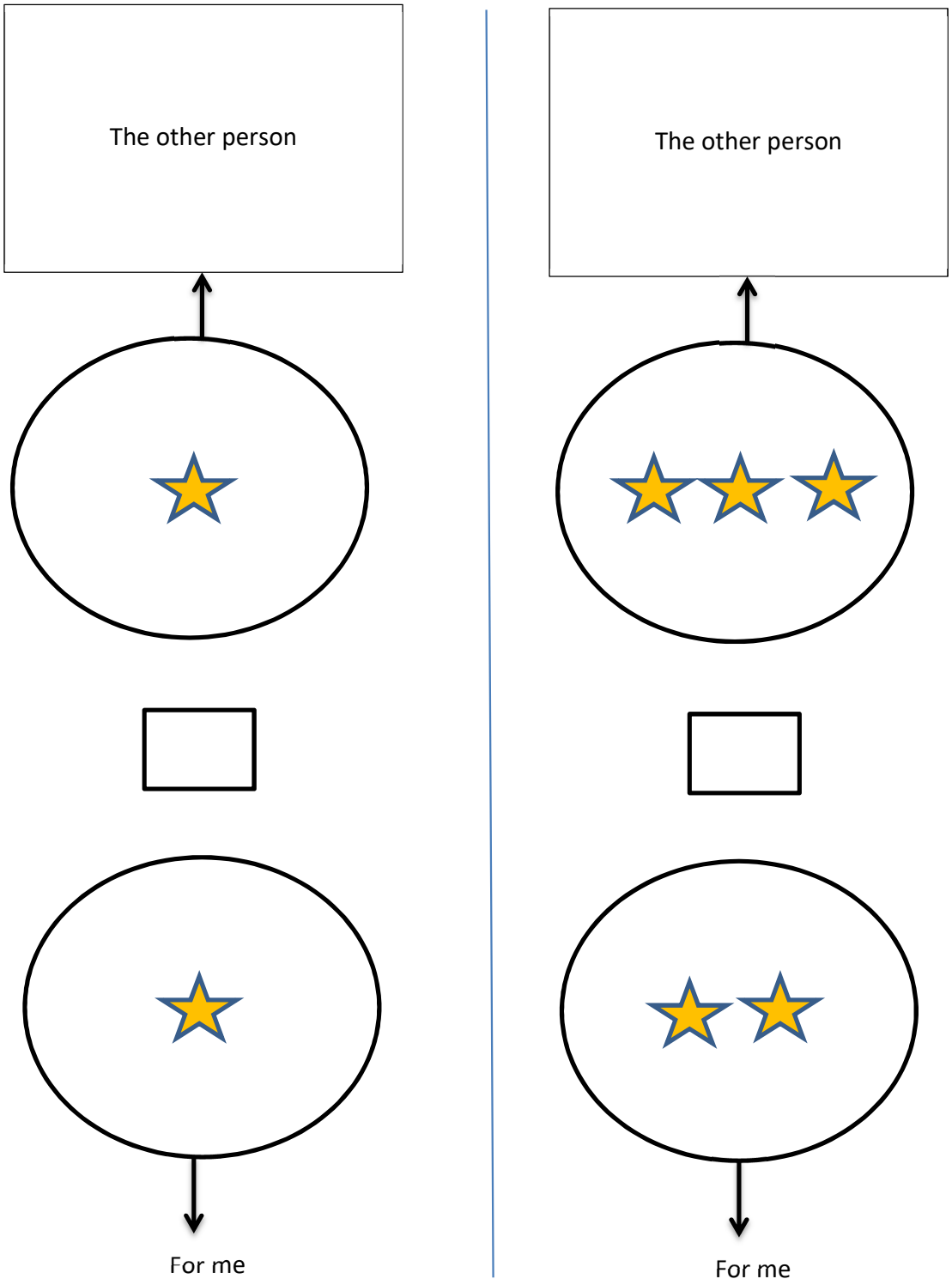
Decision sheet 2



Decision sheet 3



Decision sheet 4



2. Decision in first sheet: (1=left, 2=right)

3. Decision in second sheet: (1=left, 2=right)

4. Decision in third sheet: (1=left, 2=right)

5. Decision in fourth sheet: (1=left, 2=right)

6. Decision sheet that has been drawn (if applicable):

7. Is this game paid for? .....1=yes, 2=no.