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The Role of Personality, Cognition and Shocks in Determining Labor Outcomes of Young Adults in Madagascar

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Abstract

There is growing evidence that noncognitive skills affect economic, behavioral and demographic outcomes in the developed world. However, there is little such evidence in developing country contexts. This paper estimates the joint effect of five specific personality traits, and cognition measured through achievement test scores, on the age of entry into the labor market, labor market sectoral selection, and within sector earnings for a sample of young adults in Madagascar. The personality traits we examine are known as the Big Five Personality Traits: Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Additionally, we look at how these traits interact with household-level shocks in determining their labor market entry decisions. We find that personality, as well as cognitive test scores, have an effect on these outcomes of interest, and that their impact on labor supply is in part a function of how individuals respond to exogenous shocks.

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1. Introduction

There is ample evidence from economics and psychology that cognitive ability is an important predictor of a number of economic, demographic, and social outcomes of interest. The benefits of improved cognition in terms of economic and related outcomes presumably operate through enhancing information processing, learning, and decision-making. Recent, albeit more limited research suggests that 'noncognitive' skills, are also important for economic success, affecting labor market participation and earnings, as well as a broad range of related outcomes [1] including school attainment, crime participation, earnings, and participation in risky behaviors (Blau and Currie 2006; Cunha et al. 2006; Curley et al. 2011; Dawson et al. 2000; Heckman 2007; Knudsen et al. 2006; Marshall 2009; Meany 2001). Recent views hold that noncognitive skills may be equally or even more important in determining economic success than cognition (Brunello and Scholotter 2011).

In their landmark study, Heckman et al. (2006) found that for a variety of behavioral dimensions and labor market outcomes, a change in noncognitive skills from the lowest to the highest level had an effect that was comparable or even greater than a corresponding change in cognitive skill. They found that noncognitive skills raise wages through not only a direct effect on productivity, but also indirectly by affecting schooling and work experience. Moreover, it has also been found that the effect of noncognitive skills on wages is strongest for individuals at the lower end of the earnings distribution. One study found that at the tenth percentile, the effect of noncognitive skills on wages is between 2.5 and 4 times that of cognitive skills (Brunello and Scholotter 2011).

The term 'noncognitive' captures an extensive set skills and traits ranging from aspects of socio-emotional well-being to skills such as organization and concentration. Research in psychology and sociology examines the relationship between specific noncognitive traits and numerous outcomes of interest. One strand in this literature examines the importance of personality and what is referred to the Big Five Personality Traits: Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Findings from developed countries show that these five traits are important predictors of outcomes such as job

[1] Noncognitive ability encompasses the socio-emotional status of an individual and includes characteristics such as motivation, perseverance, self-control, time preference, self-esteem, and the ability to work with others.

performance, wages, academic achievement, occupational choice, and health (Barrick and Mount 1991; Chamorro-Premuszic and Furnham 2003; Hampson et al. 2006; Hogan et al. 1996; Hogan and Holland 2003; Robbins et al. 2006; Roberts et al. 2007; Ones et al. 2007; Schmidt and Hunter 1998).

When it comes to developing countries, there is limited, albeit growing evidence that points to the importance of cognitive ability,[2] not just education attainment, for economic success in developing countries. However, to date, we are not aware of any evidence linking personality and other noncognitive dimensions to outcomes of interest in a poor country context. There are a number of reasons why understanding the role of personality traits and noncognitive, in addition to cognitive, ability in economic success might have salience in a developing country context. In developing countries where schooling is not universal and school quality is generally lower, the importance of these traits and skills for success in life may be even greater than it is in developed countries. And more specifically, through direct effects as well as indirect effects through schooling choices and work experience, cognition and personality may be able to explain much in the way of labor market entry, whether an individual works in the formal or informal sector, earnings, and a number of demographic and health outcomes.

It is also the case that cognitive ability and personality traits may have important interaction effects with other determinants of economic and social outcomes. For example, in developing countries, shocks to a household's health and economic well-being present a real threat to a household's ability to build the human capital of its members through schooling.[3] There is ample evidence that households in developing countries often cope with negative shocks by taking children out of school to work in the labor market or household. This decision can have long-term consequences for a child's human capital accumulation and ultimate grade attainment. However, an unexplored issue is not only how individual personality directly affects educational and labor market outcomes, but also how personality interacts with a household shock to jointly affect educational and economic outcomes.

[2] For the remainder of the paper we assume that cognitive skills can be measured using scholastic achievement tests. Cognitive skills are thus a direct measure of human capital, and a function of "effective schooling" which is a function of actual years of schooling, as well as school characteristics and household characteristics such as parental education and assets, and unobserved individual ability.
[3] See Glick et al. (2015) for a discussion of the role of shocks on education in Madagascar.

In this analysis we thus explore how personality, cognition, and shocks jointly determine a sequence of labor outcomes for a group of young adults in Madagascar. Namely, we investigate the role of cognitive skills and personality traits in determining age of entry into the labor market, selection into labor market sectors, and the finally within sector earnings.

Since individuals in our sample are still relatively young, most between 21 and 23 years of age, many of them have not yet entered the job market. We therefore model age of entry into the labor market as a continuous time hazard with right censored observations. In modeling employment sector selection we use a multinomial approach to estimate selection into four categories: unemployed, informal sector employment, formal sector employment, and student. Then correcting for sectoral selection in the manner of Dubin and McFaddin (1984) we estimate the effect of these traits and skills on within sector earnings. As far as we know, our study is unique in that we are both able to focus directly on the role of human capital in the form of school attainment and achievement tests, as well as on the impact of noncognitive skills, specifically the five personality traits. Additionally, our focus on these measures of human capital and how they interact with household level shocks in determining outcomes adds to the limited literature on the role of shocks on labor market choices.

In the following section we discuss the relevant research on labor market entry, sectoral selection, earnings, and more broadly the role of personality and noncognitive skills, particularly as found in the economics literature. Then in Section 3 we discuss the Big Five Personality Traits and their relationship to economic outcomes. Section 4 describes our data and methods for measuring personality followed by a presentation of our empirical approach in Section 5. In Section 6 we discuss our results which is followed by our conclusions in Section 7.

2. Skills, Education and Labor Market Outcomes in Developing Countries

While school enrollment rates increased dramatically in the developing world over the last several decades, economic constraints and imperfect or incomplete credit markets still greatly hinder the human capital accumulation of many children in these poor countries. These market imperfections, especially in the face of negative economic or health shocks, force many households to take children out of school to either work in the household or be employed in the labor market (Glick et al. 2015; Beegle et al., 2006; Jacoby and Skoufias, 1997; Jensen, 2000).

This, in turn, can likely limit the employment options that child faces as an adult. What is less understood is how individual child skills, which are generally accumulated in school, and personality traits, determine labor outcomes, especially for young adults entering the work force.

The existing literature is sparse on the role a child's education, traits, and cognitive skill play in determining selection into different labor market segments, especially in developing countries. In addressing this important issue, we differentiate between the formal and informal sectors since these segments have been shown to differ by job quality and the nature of employment and it is likely that there is a difference in the rewards to skill sets and traits, in terms of the ease of job entry and remuneration (De Beyer and Knight, 1989; Glick and Sahn, 1997; Khandker, 1992; Nasir, 2005; Vijverberg, 1986, 1993). The existing studies that investigate determinants of labor market sectoral selection and within sector earnings generally focus on the role of schooling in this process (De Beyer and Knight, 1989; Gindling, 1991; Khandker, 1992; Vijverberg, 1986, 1993) Vijverberg (1993) finds that education and experience increase earnings, and that this is largely mediated by increasing the likelihood of being a formal wage earner. He surmises that human capital, either in the form of education or experience, has greater rewards (or has a greater marginal effect on productivity) in the formal labor market than in self-employment. Nasir (2005) uses a multinomial logit model to investigate employment sector selection for males and females in Pakistan. He finds that higher education is associated with being in a high paying job in the managerial, professional, teaching, and medical sectors. He also notes that education has less of an effect on sectoral selection as one moves down the occupational ladder. For women, the impact of education is also observed to be of greater importance than for men. Glick and Sahn (1997) investigate the urban labor market structure in the Guinean capital of Conakry. Also using a multinomial logistic approach, they look at four labor market sectors: self-employment, private-sector wage employment, public sector wage employment and non-participation or unemployment. Specifically, they explore whether labor market sectors differ in terms of entry determinants and earnings. They also look at sector-specific returns to schooling as well as gender differences in access to and earnings within each labor market sector. The authors find that for both men and women, more education reduces the likelihood of being self-employed while it strongly increases the likelihood of being in the public wage sector. They further report that accounting for labor market sectoral selection, school attainment differentially affects male and female within sector earnings. While these few

examples from developing countries provide some understanding of the role of individual characteristics in the process of selecting into different labor market sectors and earnings, none that we are aware of examine the role of cognitive ability and personality or other noncognitive skills in affecting these outcomes, the subject our this paper.[4]

As noted above, we are also interested in exploring whether shocks may have differential effects on a child's education and labor market outcomes depending on their personality type and cognitive ability. High Conscientiousness may positively effect a child's education if the household is experiencing robust income growth. However, in times of economic hardship, the conscientious child might be more likely to leave school in order to support the household. Similarly, one could easily envision that a child with greater cognitive ability would likely generate higher returns to education than a child with lower cognitive ability and would thus delay entry into the labor market in order to complete more education. However, if the returns to education are sufficiently low and a household's discount rate sufficiently high, then a household facing a negative economic shock might find greater value for those cognitive skills in the labor market than in the child completing further education.

While our exploration of the role of personality and cognitive ability, and their interaction with shocks, in determining the age of entry into the labor market as well as sectoral selection is unique, we do note the similarities with other studies that focus on how health as a measure of human capital affects labor market outcomes. Specifically, a series of studies explore the role of height as an indicator of human capital, trying to disentangle its role from education and cognition on labor market outcomes (Case and Paxson, 2006; Lafave and Thomas, 2013; Vogl 2014). Somewhat analogously, we focus on the question of whether personality traits have an independent impact on entry into work and the sector of participation, especially after controlling for education and cognition. Case and Paxon (2006) find that the height premium in earnings all but vanishes after controlling for cognitive ability for a sample of individuals in the United States and United Kingdom. They also find that taller workers tend to sort into occupations that require high levels of cognitive relative to physical skills, providing further evidence that the height

[4] Using the terminology of Behrman and Birdsall (1983), we are not just interested in schooling as a measure of human capital, but more specifically of "effective schooling" which is a function of actual years of schooling as well as school characteristics ('quality') and household characteristics such as parental education and assets, and unobserved individual ability.

premium is largely due to improved cognitive ability. Vogl (2014) finds that the height premium in Mexico is in part mediated by cognitive ability, and that adding cognitive test scores into the model only accounts for a limited part of the height premium. Taller workers also tend to sort into occupations with higher intelligence and lower strength requirements, although, education mediates nearly all of the relationship between height and occupational choice. LaFave and Thomas (2013), on the other hand find that although the height premium is mediated by dimensions of health, family background, education, and cognitive ability, it nonetheless persists after controlling for these factors in a sample of individuals in Indonesia. While all of these studies examine the effect of height, along with the role of schooling and/or cognitive ability on earnings through occupational sorting, we break new ground by explicitly investigating both the direct and indirect effects of schooling, cognitive skills and personality in determining the age an individual first enters the labor market, selection into labor market sectors of employment and finally on earnings within each sector in Madagascar.

2.1 Economic Importance of Noncognitive Skills

Among the groundbreaking studies in the economics literature that indicated the importance of noncognitive skills was a series of papers on the economic and behavioral outcomes of high school dropouts who completed a General Education Development (GED) Test in United States. Cameron and Heckman (1993) observed that although GED recipients have what are supposed to be equivalent cognitive qualifications as regular high school graduates, they earn much lower wages. Heckman et al. (2010) further demonstrate that after controlling for cognitive ability, GED recipient high school dropouts actually earn less, have lower hourly wages then high school dropouts who did not complete the GED. They attribute the performance gap between these two groups to some unmeasured element of noncognitive ability.

In another pioneering study, Heckman et al. (2006) explicitly estimate specific noncognitive skills and provide direct evidence for their importance in numerous behavioral and labor market outcomes. The noncognitive skills they investigate are self-esteem and locus of control. An individual's locus of control indicates the degree to which an individual feels he possesses control over his own life. They find that for a variety of the outcomes they measure, a change in noncognitive skills from the lowest to the highest level of the ability distribution

produces a comparable or even greater effect than a similar change in cognitive skills. For example, they found that if an individual moves from the 25th to the 75th percentile in the noncognitive skills distribution, their wages would increase approximately 10 percent for males and 40 percent for females. A similar movement in the cognitive skill distribution would increase wages about 20 percent for males and 40 percent for females. They found that noncognitive skills raise wages through not only a direct effect on productivity, but also through an indirect effect mediated by schooling and work experience. Once the authors controlled for the effects of schooling, they found that earnings respond more strongly to noncognitive skills than they do to cognitive.

Using ability measures resulting from Swedish military enlistment, Lindqvist and Vestman (2011) investigate the relationship between cognitive and noncognitive skills and labor market outcomes. Their noncognitive indicator is extrapolated from personality tests given at the time of enlistment and were designed to assess the conscript's ability to handle the psychological demands of serving in the military. The authors find that both cognitive and noncognitive skills are important predictors of labor market earnings. Moreover, they find that the effect of noncognitive skills on wages is strongest for individuals at the lower end of the earnings distribution. At the tenth percentile, the effect of noncognitive skills on wages is between 2.5 and 4 times that of cognitive skills. This result is partly explained by the fact that the men in the study with low noncognitive ability were more likely to be unemployed than were men with low cognitive ability. Men with low noncognitive ability were also more likely to experience longer spells of unemployment.

Gill and Prowse (2015) similarly find that the effect of cognitive ability and what they refer to as "character" skills on strategic game playing and learning varies depending on where an individual is on the skill distribution. They find that marginal changes in cognition mainly affects success in strategic game playing for individuals with high cognitive ability while marginal changes in character mainly influence success for those with low cognitive ability.

Carneiro et al. (2007) find that for a sample of individuals in Great Britain, a general measure of noncognitive skills was important in explaining a number of educational and employment outcomes including whether or not an individual drops out of school by age 16, whether a degree is obtained by age 42, employment status at 42, work experience, and wages. In this sample general noncognitive skill also explains risky behaviors such as teen smoking, teen

pregnancy, crime participation, health, truancy and exclusion from school. The authors then split noncognitive skill into twelve different domains. They found that `inconsequential behavior' at age 11 is associated with the likelihood of dropping out of school by age 16, teen smoking and later truancy and crime participation. They also found that depression at age 11 is associated with school attainment, teen smoking, school exclusion and adult depression.

While these studies all focus on the role of non-cognitive skills in affecting various labor market outcomes, we are aware of no such research from developing countries. This paucity of such work is especially acute since there is good reason to believe that personality will have important impacts on work where levels of schooling are low and the importance of cognitive skills may be less than in a more highly skilled workforce.

3. The Big Five Personality Trait Taxonomy

A widely accepted taxonomy of personality traits is found in the Five-Factor Model of Personality, also referred to as the Big Five Personality Traits. Most variables used to assess personality in the field of personality psychology can be mapped into one or more dimensions of the Big Five Personality Traits: Openness to Experience, Conscientiousness, Extroversion, Agreeableness, and Neuroticism (John et al., 2008; McCrae and Costa, 2008; Brunello and Schlotter, 2011). *Openness to Experience* is the degree to which a person is curious, needs intellectual stimulation, change and variety. It describes the complexity, depth, and originality of an individual. *Conscientiousness* captures the attitude of being hardworking, organized and dependable as opposed to lazy, disorganized and unreliable. People high in Conscientiousness tend to be able to delay gratification, follow the rules, adhere to norms and think before acting. It describes the characteristics behind task- and goal-oriented behavior. *Extroversion* captures the preference for human contact, empathy, gregariousness, assertiveness, and a wish to inspire people. Extroverted individuals have an energetic approach to social and material life. *Agreeableness* is the degree to which someone is cooperative, altruistic, modest, warm and agreeable, in contrast to being cold, disagreeable, and antagonistic. *Neuroticism* is the extent to which an individual is insecure, anxious, depressed and emotional rather than calm and self-confident (McCrae and Costa, 2008). These five personality traits are summarized in Table 1.

Historically, researchers in personality psychology were beset by a wide ranging array of personality scales with little guidance how to choose between or use them. The Five Factor Model of Personality first rose out of lexicographic studies describing personality (John et al., 2008). Since then the use of this model has increased substantially and the field of psychology has reached an initial consensus around the five factor framework (John et al. 2008). This has given way to replication and consistent definitions, even though there remain variations in methodology and data sources. The model has also been consistent, and argued to be relevant, across different periods of the adult lifespan (McCrae and Costa, 2008).

Evidence from sociology and psychology, which in fact is far greater and broader than economics, links the Big Five Personality Traits to educational outcomes, job performance, occupational choice, earnings, and health. Conscientiousness has been shown to be an important predictor of good health habits, health outcomes, and longevity, and is inversely related to participation in numerous risky behaviors (Hampson et al., 2006; John et al., 2008). Agreeableness negatively predicts heart disease. High Neuroticism is associated with less successful coping with and poorer reactions to illness. Extroversion, on the other hand, is associated with more social support and close relationships, which are important for coping with illness (John et al., 2008).

Studies demonstrate Conscientiousness is an important predictor of grades, years of education, job performance in a wide range of jobs, and leadership ratings (Borghans et al., 2008; Brunello and Schlotter, 2011; John et al., 2008). Furthermore, evidence shows that self-discipline (an aspect of Conscientiousness) accounts for more than twice as much of variation in grades than does IQ (Brunello and Schlotter, 2011). Research shows Openness to Experience to be the best personality predictor of the number of years of education. Agreeableness positively and Neuroticism negatively predict job performance where people work in groups. Openness predicts success in artistic jobs and Neuroticism is an important predictor of job satisfaction (Brunello and Schlotter, 2011; John et al., 2008).

A number of studies investigate the role of the Big Five Personality Trait taxonomy in explaining earnings in developed countries. Generally Openness to Experience and Conscientiousness is associated with higher earnings and selection into white-collar or higher paying jobs (Cobb-Clark and Tan, 2010; Gensowski, 2014; Ham et al., 2009; Heineck and Anger, 2010; Mueller and Plug, 2006). However, Genswoski (2010) further investigates the role

of these traits in earnings by decomposing their direct and indirect effect. She finds that while Openness to Experience has a positive indirect effect on male earnings through educational attainment, its direct effect is negative. Neuroticism and Agreeableness tend to negatively affect earnings and selection into white-collar occupations (Cobb-Clark and Tan, 2010; Gensowski, 2014; Ham et al., 2009; Heineck and Anger, 2010; Mueller and Plug, 2006)

4. Madagascar Life Course transitions of Young Adults Survey

The data used in this paper come from the *Madagascar Life Course Transitions of Young Adults Survey*. In 2011–12, the survey re-interviewed a cohort of 1749 young adults between the ages of 21 and 24 years, who were originally surveyed in 2004. The surveys were specifically designed to capture the transition from adolescence to young adulthood and contain detailed information on household characteristics, family background and health. Detailed community surveys were also conducted in 2004 and 2012 and the 2004 surveys also include a detailed module on local schools.

Of these individuals, 1733 were administered a personality questionnaire and approximately 1500 also took cognitive tests. The cognitive tests administered were designed to measure abilities in math and French, and involved both written and oral components.[5] For the purposes of this analysis we aggregate the scores of the math and French tests together and then standardize this aggregate using the data's sample moments.[6]

The surveys also measured household-level shocks using individual recall. The survey recorded whether or not the cohort member's parents were living and if not the time of their death. In both surveys all individuals in the household were asked if they suffered an illness or injury that prevented them from working or performing normal activities and the year this event occurred. Questions were also asked about unexpected losses or gains in crops and livestock, as well as non-farm revenues, both in 2004 and again in 2012. We use this information to construct eight household-level shocks: whether or not the cohort members mother or father died, whether

[5] In addition a 'life skills' test was given, which was designed to measure practical knowledge and covered topics such as health practices, nutrition, and civics.

[6] We also performed the following estimations using each cognitive test score individually, using separate math and French score aggregates and using separate oral and written score aggregates. None of these specifications had and meaningful difference with our reported results.

or not the mother or father experienced an illness or injury that prevented him or her from working or conducting normal activities, and whether or not the household experienced a positive or negative income shock during three stages of childhood. These stages were the period before the cohort member turned 10 years old, between the ages of 10 and 14, and finally after age 14. [7]

The 2012 questionnaire includes a module to characterize individual personality traits. This module has 116 questions designed to capture how individuals behave and respond to different situations. For each question in the personality module, individuals were asked to rate their response to a statement as 1-Strongly Disagree, 2-Somewhat Disagree, 3-Neither Agree or Disagree, 4-Tend to Agree, and 5-Strongly Agree. Using confirmatory factor analysis on these questions we generate an individual-level factor score for each of the five personality traits and then standardize those factor scores using the data's sample moments. A few examples of questions used to measure each personality trait can be found in Table 2. A more detailed description of how the personality factor scores were generated can be found in Appendix A. Tables A.1-A.5 in the appendix lists summary statistics for all the questions used to measure each personality trait. Tables A.6-A.10 report the estimated factor loadings of each question onto its respective personality trait. Table 3 gives the correlation matrix of each of the five personality traits and the standardized aggregate cognitive test score. Each of these variables are statistically significantly correlated at the one percent level. In particular, there is a high degree of correlation between Openness to Experience, Conscientiousness, and Extroversion. Of the five personality traits, the aggregate cognitive test score is most correlated with Openness to Experience.

. In this paper we estimate three models: one predicting the age of entry into the labor market, one predicting labor market sectoral selection, and one predicting within sector earnings. After accounting for missing variables at the individual and community levels, we are left with 1175, 1156, and 965 observations in each estimation sample, respectively. Table 4 compares individual characteristics across these samples and with the full sample of 1539 individuals who took the cognitive tests and personality module. Overall, there appears to be little to no difference in observed characteristics across the full sample, the job entry sample, and the

[7] We also conducted our analyses in which income shocks were disaggregated into different types of income shocks but that provided no substantive difference in our results. We also specified the shock variables as a count variable indicating the number of positive or negative income shocks. Again, this specification did not differ substantially from the results reported in this paper.

sectoral selection sample. Indeed, there are no statistically significant differences between any pairwise combination of variables across any two of these three samples. There are statistically significant differences on numerous characteristics between the earnings sample and the other three samples. The earnings sample is significantly lower in Openness to Experience, cognitive test scores, the 2004 asset index, parental education, grade, ever employed and percent living in an urban area. However, by construction, this sample is only made up of employed individuals and excludes students and the unemployed. Therefore, by construction, the earnings sample is a nonrandom subset of the other samples. These variables are all likely determinants of either working or being enrolled in school. Therefore to the best of our knowledge any individual exclusion from our working samples is largely random or by construction and unlikely to affect our core results.

Roughly 48 percent of our sample is male, approximately 26 percent live in an urban area, and the average age is around 22 years old. [8] The mean level of education for individuals in the sample is around 8.3 years and their mothers and fathers have attained an average of around 5 and 5.5 years of education, respectively.

Approximately 81 percent of our sample was employed at least once by the time of the 2012 survey. Of those previously employed, the average age at which they began their first job was 16 years. Approximately 53 percent of those previously employed started their first job before the age of 16, and among those who began working before the age of 16, started on at average 13 years old. The average of those who began working after age 16 was 19 years old. Table 5 describes the distribution of characteristics of the first jobs reported. Over half of the first jobs were working for a family-owned enterprise, although this was the case for 76 percent of the first jobs of individuals who began working before age 16. Only 3.8 percent of the first jobs for these individuals were in the formal sector. On the other hand, 31.32 percent of the first jobs for individuals who began working after age 16 were in the formal sector. The majority of first jobs were in the agricultural or livestock sector (85 percent of first jobs for individuals who started working before 16 and 42 percent for those who started working after 16). Another 49 percent of the first jobs of individuals who started working after age 16 were either in the service, high skill, or low skill sectors.

[8] The reported descriptive statistics are from the sample used to estimate labor market sectoral selection. These statistics do not substantively change if we report them using the age of labor market entry sample.

In this paper we model selection into four current categories: unemployed, employment in the formal sector, employment in the informal sector, and student (Table 6).[9] Most of our sample (57 percent or 663 individuals) is employed in the informal sector. These workers are predominately self-employed (mostly in agriculture or livestock) or are doing unpaid work in a family enterprise or as a caregiver or apprentice. Nineteen percent of our sample is working in the formal public or private sector and are largely working in skilled or semi-skilled jobs or are in upper or middle management positions.

Table 7 describes individual characteristics by employment sector. Comparing observed characteristics of individuals employed in the informal sector to the mean levels in the other three categories, we see that these individuals have lower cognitive test scores, lower hourly earnings, lower grade attainment, entered the labor market at a younger age, were less likely to live in an urban area and their parents had lower levels of education than the average of all these characteristics in the sample. They also exhibited lower levels of Conscientiousness, Extraversion, Openness, and Agreeableness and higher levels of Neuroticism. Individuals found in the other three sectors, on the other hand, had higher cognitive test scores, were more likely to live in an urban area, had more education and had better educated parents. Individuals employed in the formal sector were older than the sample average when they held their first job while students were younger. However, it is important to note that only 10 percent of students in the sample were ever employed before.

5. Estimation Strategy

In this section we discuss our estimation strategy used to model age an individual first enters the labor market, selection into different labor market sectors, and earnings within these sectors. In modeling these outcomes we first address some methodological challenges that revolve around concerns over endogeneity, especially of schooling and cognition, but also that we must deal with sector selection when estimating the within sector earnings model.

5.1 Endogeneity of Schooling and Cognition

[9] Very few individuals report that they are working and also enrolled in school. We categorize these individuals as students assuming that their main occupation is being a student.

Much of the literature investigating labor outcomes focuses on the role of education. In this paper we are particularly concerned about the endogeneity of school attainment and related cognitive ability. For example, being a student is a category in the labor market selection model we estimate. Clearly, by construction, people who have attained higher grades at the time of the survey are more likely to still be a student. Individuals may also work to achieve a certain level of education *in order* to obtain work in a particular occupation. Additionally, the decisions to terminate education and to enter the labor market may occur independently or they might be determined jointly. For example, in times of economic stress, a household may be forced to pull a child out of school so that she/he may begin to work and provide financial support to the household. Conversely, an individual may delay her entry into the labor market in order to complete higher levels of education. She might delay entry into the labor market in order to obtain informal training or experience. She might also choose to leave school in order to marry but not enter the labor market. Finally, the decision to leave school might have more to do with preferences for education than labor market conditions.

Because cognitive skills, particularly the math and French skills we measure, are, in part, learned in school, these skills are also endogenous to labor market outcomes of interest. To account for this endogeneity we use the rich information on local schools in 2004, when our sample of young adults were teenage children, that are available in these surveys to instrument for grade attainment and cognitive test scores in our three models.

To amplify, we model grade attainment, G_{ijr}, and cognitive test scores, θ_{ijr}^{C} of individual *i* in community *j* and region *r*,[10] as a function of the individual's personality, θ_{ijr}^{P}, household, X_{ijr} and community C_{ijr} controls, respectively, household level shock, S_{ijr}, and local school-level characteristics in the village where the child resided in 2004, SCH_j, which effectively serve as instruments for grade attainment and cognitive test scores in our labor market models.

$$(1) \qquad G_{ijr} = \alpha^{s} + \beta_1^{S} SCH_{jr} + \beta_2^{S}\theta_{ijr}^{P} + \beta_3^{S} S_{ijr} + \beta_4^{S} X_{ijr}^{s} + \beta_5^{S} C_{jr} + \beta_6^{S} r_r^{S} + u_{ijr}^{s}$$

$$(2) \qquad \theta_{ijr}^{Cog} = \alpha^{C} + \beta_1^{C} SCH_{jr} + \beta_2^{C}\theta_{ijr}^{P} + \beta_3^{C} S_{ijr} + \beta_4^{C} X_{ijr}^{s} + \beta_5^{C} C_{jr} + \beta_6^{C} r_r^{C} + u_{ijr}^{C}$$

[10] r_r in the model is thus a regional fixed effect.

The 2004 survey round includes rich information on the primary school closest to the center of town in the community in which the child resided in 2004. School-level instruments we include are the distance between the center of town and this primary school, whether or not this primary school participated in a government sponsored nutrition program, and a school facilities quality index. The facilities quality index is formed using factor analysis on indicators on the availability of electricity, medicine, toilets, separate toilets for boys and girls, recreation grounds, and clean water in the school. Finally, we also include an indicator for whether or not there is a private school in the community.

Note that the primary school conditions measured for our instruments are not necessarily measuring the conditions of the primary school attended by the sample individual. We instead use as instruments the characteristics and conditions of the primary school closest to the center of town so as to avoid the issue of school choice. Our exclusion restriction is based on the premise that primary school conditions in the area where the sample individual grew up are unlikely to directly affect the labor decisions of interest, but instead exert its influence only through the impact on education and cognitive ability. Furthermore, while communities in the sample generally have a primary school, many do not have a secondary school. Therefore, there is also weak correlation between primary school quality and secondary school quality, strengthening the case that our instruments meet the necessary exclusion restrictions. Indeed, only 57 percent of our sample communities have a secondary school.

These controls are included in our three main labor models and are thus described in more detail below. Results from our first-stage equation can be found in Appendix A in Table A.11. An F-test on the joint significance of our instruments is statistically significant at the one percent level with F-Statistics values of 9.72 and 17.13 for the grade and cognition first-stage equations, respectively.

5.2 Exogeneity Assumption of Personality Traits

In contrast to our treatment of schooling and cognition, we take the Big Five Personality Traits as exogenous. Currently, the empirical evidence as to how personality is formed in an individual is sparse. A growing body of evidence points to the interaction between environment

and inherited genetics in producing individual characteristics (Committee, 2000). However, there is no evidence that we are aware of that demonstrates the effects of childhood experiences and circumstances on the formation of adult personality. And likewise, there is little evidence of the relationship between personality traits or the temperament of children and those upon reaching adulthood. There is evidence, however, that the Big Five Personality Traits remain generally stable over adulthood (Costa and McCrae, 1988). Consequently, the literature estimating the effect of personality on economic outcomes largely treats personality as exogenous, a convention we follow in this paper. And while the literature's treatment of personality traits as exogenous is in part based on no clear evidence to the contrary, it is also the case that there may be unobserved variables that affect both our outcome variables of interest and the personality traits we measure in adulthood.

Like other researchers, there is little we can do to address this possibility other than checking the robustness of our result to the inclusion and exclusion of numerous control variables in each of our models. Table A.12 in the Appendix reports estimated coefficients for the age of entry hazard model with and without controls. Each column of this table incrementally adds an extensive set of individual-, school-, and community-level controls from different periods in the life-course. Incrementally adding each group of controls has little to no effect on the point estimates of our coefficients of interest. We similarly find that incrementally adding these controls in the sectoral selection and earnings models also has little effect on the estimated personality coefficients.[11] Therefore, if there is some unobserved factor impacting both personality and our dependent variables, it would have to be uncorrelated with our individual-, household-, and community-level controls. This greatly alleviates concerns that unobserved characteristics correlated with our control variables bias our estimated coefficients of interest.

5.3 Age of Entry into the Labor Market

We estimate entry into a first job using a Cox Proportional Hazard model (Cox 1972). Specifically, the hazard of an individual, *i*, in community, *j,* and region, *r,* entering the labor market at age *a* is:

[11] Results available upon request.

$$
\begin{aligned}
h_{ijr}(a) = h_o(a) * \exp(&\gamma_1\theta_{ijr} + \gamma_2 S^I_{ijr} + \gamma_3 Male_{ijr} + \gamma_4\theta_{ijr} \times S^I_{ijr} + \gamma_5\theta_{ijr} \times Male_{ijr} + \\
&\gamma_6 S^I_{ijr} \times Male_{ijr} + \gamma_7\theta_{ijr} \times S^I_{ijr} \times Male_{ijr} + \gamma_8 S^P_{ijr} + \gamma_9 X^l_{ijr} + \gamma_{10} G_{ijr} + \gamma_{11}\hat{u}^S_{ijr} \\
&+ \gamma_{12}\hat{u}^C_{ijr} + \gamma_{13} C_{jr} + \gamma_{14} r_r + u^l_{ijr})
\end{aligned} \tag{3}
$$

Where $h_o(a)$ represents the baseline hazard function for leaving the state of not working at age *a*. $\theta_{ijr} = \left[\theta^O_{ijr}, \theta^C_{ijr}, \theta^E_{ijr}, \theta^A_{ijr}, \theta^N_{ijr}, \theta^{Cog}_{ijr}\right]$ is a vector that includes the individual standardized factor scores for each of the Big Five Personality Traits and the standardized aggregate cognitive test score. S^I_{irj} is a vector containing the six income-related shock indicator variables: whether a positive or negative income shock occurred before the cohort members were 10 years old, whether it occurred between ages 10 and 14, and whether these shocks occurred after they were 14. The effects of an adolescent's personality and cognition might differ by gender. His personality type and cognitive ability and gender might also influence his labor-entry response to shocks. Therefore, we allow for differential labor responses across gender, personality type and cognition, and shock realizations. Accordingly, we include pairwise interactions between the personality factor and cognitive test scores, gender and the six household income shock variables and a triple interaction between personality and cognition, gender, and the income shock variables.

S^P_{ijr} is a vector of the four parental shock variables: whether or not the individual's father or mother died and whether or not the father or mother suffered an illness or injury preventing him or her from working and conducting normal activities. Interacting parental shocks with gender, personality, or cognitive ability did not yield substantively different results than excluding these interactions. Therefore, we exclude these interactions in order to preserve degrees of freedom.

X^l_{ijr} is a matrix of individual-level controls and includes gender, 2004 and 2012 household-level non-labor income in the form of transfers,[12] the highest grade attained by both the individual's mother and father, 2004 household size and number of children in the household under the age of 17 in 2004. Following Sahn and Stifel (2003), we include a 2004 household asset index constructed using factor analysis so as not to worry about the potential for reverse

[12] Non-labor income includes the value of in-kind and monetary transfers into the household both from individuals outside the household and from the government.

causality if we used a contemporaneous measure of wealth. G_{ijr} is highest grade attained by the 2012 survey.

C_{jr} is a vector of 2004 and 2012 community-level controls for community *j*. Given the large number of potential community controls, we create a number indices related to community quality and infrastructure using factor analysis. We include a 2004 community health index using indicators of whether or not there is a hospital or health center in the community, whether family planning services and contraception is available in the community and whether or not maternal health information is accessible in the community. We include a 2004 and 2012 community infrastructure index generated from variables indicating the availability of electricity, pumped water, and daily and weekly markets in the community. We include a 2004 remoteness index using information on distance to health services, banks, post offices, schools, taxis, courts, markets, inputs, extension services, veterinarians, access to national and provincial roads, utilities, media, and transportation. We also include variables indicating whether or not in 2004 one of the top three means of savings in the community is with a formal account and whether one of the top three sources of a large loan in the community is a bank. Finally, we include a 2012 urban indicator and an indicator for whether or not there is a secondary school present in the community in 2012.

As described above, we instrument school attainment and cognition since a child's decision to enter the labor market is partially determined by the decision to leave school. A traditional instrumental variable approach in which grade and cognitive test score are replaced by their first-stage predicted value will not yield a consistent estimate of γ_4 and γ_{10} due to the nonlinearity of the hazard function. Therefore, we employ a control function approach (also referred to as two-stage residual inclusion method), which remains consistent in the nonlinear hazard (Terza et al., 2008). $\hat{u}_{ijr}^{S}$ is the predicted residual from (1) and $\hat{u}_{ijr}^{C}$ is the predicted first-stage residual from instrumenting for cognitive skills.

5.4 Selection into Labor Market Sector

Our model of selection into different labor market sectors has four categories: unemployed, informal sector employment, formal sector employment, and student. Following

Dubin and Mcfadden (1984) we use a multinomial logistic model to estimate the probabilities that an individual will be found in each employment sector.

$$V_{ijrk} = \mu_k + \delta_{1k}\theta_{ijr} + \delta_{2k}Male_{ijr} + \delta_{3k}Male_{ijr} \times \theta_{ijr} + \delta_{4k}G_{ijr} + \delta_{5k}E_{ijr} \times A_{ijr} + \delta_{6k}X^m_{ijr} + \delta_{7k}C_{jr} + \delta_{8k}\hat{u}^S_{ijr} + \delta_{9k}\hat{u}^C_{ijr} + \delta_{10k}r_r + u^{mk}_{ijr} \quad (4)$$

V_{ijrk} is the utility received by individual *i*, in community *j* and region *r,* by being employed in market sector alternative *k*. θ_{ijr} is again a vector of the standardized factor scores for the five personality traits and cognitive test scores. G_{ijr} is highest grade attained. E_{ijr} is a dummy variable indicating whether or not the individual has ever been employed and A_{ijr} is the age at which the individual first entered the labor market. Thus, for individuals previously employed, δ_{5k} captures the effect of the age when he first began work. Because the effects of an individual's personality and cognitive ability might differ by gender, we also include interactions between each of these variables and gender.[13] X^m_i is a vector of individual-level controls that includes the same individual controls described in (3) excluding number of children under age 17 in the household in 2004. We also include individual age as an additional control. C_{jr} is the same vector of 2004 and 2012 community controls described for (3). Again, r_r is a regional fixed effect.

We instrument for grade and cognitive test scores using the same specification described for (3) employing the control function approach, which remains consistent in this framework.

Under the multinomial framework, an individual is assumed to select into employment sector $k \in \{1,2,3,4\}$ for which he receives the highest utility. Thus the probability that individual *i* selects into sector *k* is

$$P_{ik} = \Pr(V_{ik} > V_{il}) \text{ for all } k \neq l \,. \quad (5)$$

[13] Interactions of gender with grade and age of labor market entry did not produce substantively different results. We therefore excluded these interactions to preserve degrees of freedom.

Since the formulation of (5) is a function of differences in utilities derived from choosing each sector, some normalization is required. We therefore use working in the formal sector as the base category in our estimation. The estimated coefficients can therefore be interpreted as the effects of a variable on the utility of being in employment alternative *k* relative to the utility derived from the base category of working in the formal sector.

5.5 Within Sector Earnings

While much of the limited literature evaluating the effect of cognitive and non-cognitive skills on earnings in some way controls for occupation type, it does not explicitly correct for selection into different occupations or sectors and then estimate the effects of these characteristics on within sector earnings. However, different labor market sectors likely value the signaling of school attainment, skills, as well as other considerations such as experience, differently and therefore it is important to account and correct for selection into these sectors when evaluating the effect of skills and traits on earnings. To correct for the selection process we follow Dubbin and McFadden (1984) and model within sector earnings as follows.

$$(6) \qquad \ln(W_{ijr}^{k}) = \mu^{k} + \omega_{1}^{k} T_{ijr} + \omega_{2}^{k} Male + \omega_{3}^{k} Male \times T_{ijr} + \omega_{4}^{k} X_{ijr} + \omega_{5}^{k} C_{jr} + \omega_{6}^{k} r_{r} + \omega_{7}^{k} \lambda_{ijr}^{k} + u_{ijy}^{wk}$$

where $\ln(W_{ijr}^{k})$ is the log earnings of individual *i* in community *j* and region *r* who is employed in labor market sector *k*. $T_{ijr} = [\theta_{ijr}^{P}, \hat{\theta}_{ijr}^{Cog}, \hat{G}_{ijr}, A_{ijr},]$ is a vector of traits that includes the five personality traits, instrumented cognitive test score, instrumented grade attainment, and the age at first job. These variables are all interacted with a dummy variable for male to allow for differential returns to skills, traits and experience by gender. X_{ijr} includes the same individual controls described for (3). C_{jr} are the same community controls included in (4).

Following Dubin and McFaddin (1984) we use the probability of being employed in employment sector *k* predicted from (4) to calculate the selection correction term λ_{ijr}^{k}, such that

$$(7) \qquad \lambda_{ijr}^{k} = \sum_{j \neq k} \varphi_j \left[\frac{\hat{P}_j \ln(\hat{P}_j)}{1 - \hat{P}_j} + \ln(\hat{P}_k) \right]$$

6. Results

6.1 Hazard of Entry into the Labor Market

Table 8 reports the estimated coefficients in the Cox Proportional Hazard model predicting the age a child first enters the labor market. In Appendix Table A. 12 we report estimated coefficients for the hazard model where we incrementally add individual- and community-level controls. We find that doing so has little to no effect on the personality coefficients and other estimates of interest.[14] Therefore if there is unobserved heterogeneity biasing our personality coefficients, it would have to be uncorrelated with all of our control variables.

The first column of Table 8 reports the estimated coefficients without instrumenting for grade and cognitive test scores and the second column reports them with instrumenting for these characteristics.[15] The estimated coefficients can be interpreted as the marginal effect of the explanatory variable on the log of the relative hazard of entering the labor market and a younger age. The main difference to note between the two columns is that without instrumenting, the effect of grade and cognitive test scores on the relative log hazard is negative, meaning increasing grade attainment or cognitive test scores decreases the hazard of entering the labor market at a younger age. This result is fairly intuitive because, by construction, completing one more grade requires at least one year of education. Thus increasing a child's education delays his entry into the labor market as the adolescent completes more grades.

However, as reported in the second column of Table 8, once we instrument for grade attainment and cognitive test score, the effect of cognitive ability becomes positive and that of grade attainment is no longer statistically significant. In other words, after accounting for the

[14] The only substantive change that occurs is that the coefficient on Openness is statistically significant and larger in magnitude when grade attainment is not included. Once grade attainment is included as a control then its significance goes away and magnitude becomes smaller. This makes sense given the strong associations found between Openness to Experience and grade attainment.
[15] Full set of coefficients estimated from Equation 3 can be made available upon request.

simultaneity that exists between grade attainment and labor market entry, grade attainment no longer statistically significantly impacts the relative hazard of entering the labor market at a younger age. However, if we control for grade attainment, we find that increasing cognitive test scores *increases* the hazard of entering at a younger age. This indicates that while completing higher grades of education necessarily delays entry into the labor market, once grade is controlled for high cognitive ability adolescents are entering at a younger age than their low cognitive ability counterparts with the same school attainment. Therefore these high cognitive ability individuals are likely starting school earlier and progressing through grades more rapidly, thus allowing them to enter the labor market at a younger age.[16] Further, adolescents with higher cognitive ability are likely to be able to find employment sooner and higher paying jobs when they do enter. They are therefore likely to receive greater returns to entering the labor market and thus have higher opportunity costs of delaying entry. Indeed, as discussed below, we find that high cognitive ability individuals are more likely to select into the higher paying formal sector than the lower paying informal sector.

In Equation 3 the five personality traits and instrumented cognitive test score are each interacted with gender and household level income shocks to allow for differential personality effects across shocks realizations and gender. Table 9 reports the marginal effects of household shocks, themselves, by gender. Table 10 reports the marginal effects of each personality trait and cognitive ability across gender and shock realizations on the relative log hazard of labor market entry.[17][18] Figure 1 then plots the survival functions of males and females across income shock realizations, followed by Figures 2-5 which plot the survival functions of males and females with high and low levels of cognitive ability, Openness to Experience, Neuroticism and Conscientiousness across shock realizations.[19] [20]

[16] For this same sample of adolescents in Madagascar, Aubery and Sahn (2014) find that those with higher grade progression score better on the cognitive achievement tests.
[17] Due to the interactions, the personality and cognitive test score coefficients reported in Table 8 would represent their marginal effect on the relative hazard for only females in the event of no household income shock.
[18] Joint F-tests for the personality traits and their interactions range from 31.5 to 54.5.
[19] The corresponding survival curves for Extraversion and Agreeableness can be made available upon request. They do not appear to be particularly important determinants for entry in this context. We, therefore, exclude these graphs to conserve space.
[20] A high level of a skill or trait is calculated at two standard deviations above the mean whereas a low level is assumed to be at two standard deviations below the mean.

We see in Table 9 that a negative income shock after age 14 increases the hazard for both males and females entering the labor market at a younger age. Conversely, a positive economic shock after age 14 allows female adolescents to delay their entry into the labor market. In the face of unexpected economic pressure, older adolescents are likely expected to help support the household financially. Male adolescents' entry decision is additionally influenced by the economic circumstances during younger adolescence when he is between the ages of 10 and 14: a negative income shock during this period increases his hazard of beginning work at a younger age while a positive income shock reduces this hazard. This may be explained by the possibility that males receive higher returns to entering the labor market at younger ages than females, and that households are more reluctant to send their young girls off to work for reasons related to social norms and concern over the well-being of young girls and their vulnerability to physical harm, violence and stigma.

Looking at Figures 1-5, what is immediately striking is that the effects of a number of personality traits and cognitive skills on the hazard` of labor market entry are much stronger than those of the shocks themselves. For example, in Figure 1 we see that a negative income shock after age 14 reduces the survival (i.e., length of time before entry) for both males and females. However, in Figures 2-5 we see that the influence of this shock on the entry decision varies substantially depending on the traits and abilities of the adolescent.

As noted, the effect of cognitive test scores on the hazard of labor market entry is positive. This effect is large in magnitude and statistically significant for both sexes and across all shock realizations. For both males and females, across all shock all shock realizations, individuals with high cognitive ability have dramatically lower survival rates than individuals with low cognitive ability, all else equal. In other words, high cognitive ability adolescents are at much higher risk of entering the labor market at a younger age. Again, these high cognitive ability individuals likely complete more grades by a younger age, are able to get more desirable employment, receive higher returns to their labor, and spend less time searching for employment—all resulting in a higher likelihood of entering the labor market at a younger age. The effect of cognitive ability on the hazard of entering the labor market at a younger age is considerably larger than that of any of the personality traits examined as well as being larger than the effects of the shocks themselves.

After cognitive ability, Openness to Experience has the largest effect on the hazard of labor market entry. Openness generally reduces the hazard of entering the labor market for both sexes and its effect is substantial and statistically significant across most shock realizations. The effect of Openness appears to be particularly strong in the face of income shocks experienced during adolescence. So while a negative income shock after the age of 10 increases the hazard of males and females entering the labor market, those higher in Openness are largely protected from the entry effects of this shock. Neuroticism, on the other hand, increases the hazard of entry at a younger age and this effect is generally consistent across shock realizations.

Finally, in Figure 5 we can see the effect of Conscientiousness on the hazard of labor market entry varies by shock realization and gender. Across most shock realizations, higher Conscientiousness in females generally reduces their hazard of entering the labor market at a younger age. In the event of a negative income shock after age 14, however, high Conscientious females face an increased hazard of entering the labor market at a younger age than their low Conscientiousness counterparts. On the other hand, higher Conscientiousness in males tends to increase their hazard of entering at a younger age across all shock realizations. Highly conscientious individuals tend to be hardworking, responsible, organized and dutiful. It therefore appears that the more dutiful and responsible high Conscientious males tend to begin working at younger ages while their high Conscientious female counterparts tend to delay their entry. The exception to this tendency is if there is a negative income shock after 14, in which case high Conscientious females enter earlier, as do both high and low Conscientious males.

6.3 Labor Market Sectoral Selection

Table 11 reports the estimated average marginal effects of each of the five personality traits, instrumented cognitive test score, instrumented grade attainment and age of labor market entry on the probability of being employed in each of the four sectors of interest: the formal sector, the informal sector, student and unemployed. Included interactions with gender allow the average marginal effects of the five personality traits and cognitive test score to vary by gender. Including gender interactions with grade and age of entry did not substantively change our results and were thus excluded. The actual estimated coefficients for the multinomial logit estimation of selection into labor market sectors are found in Appendix Table A.13. As with the

hazards above, incrementally adding controls does not affect our estimated coefficients of interest.[21] It is therefore unlikely that unobserved characteristics correlated with our controls are biasing our results. The average marginal effects of grade and age of entry on the likelihood of being employed in each category do not vary by gender. Given the limited sample size for this four-sector model, we will highlight some results that do not meet standard levels of significance, and thus some caution is required in interpreting some of the findings.

In Table 11 we see that of the five personality traits, Agreeableness is a significant determinant of female sectoral selection while Extraversion is a significant determinant of male sectoral selection. Increasing Agreeableness by one standard deviation increases the probability a female is a student or works in the informal sector by 2.3 and 3.2 percent, respectively, and decreases the probability of females being employed in the formal sector by 3.5 percent. Increasing Extraversion in males by one standard deviation increases their likelihood of being employed in the informal sector by 6.2 percent and reduces their likelihood of formal sector employment by 5.4 percent. In addition to Extraversion, Openness to Experience also influences the probability of being employed in the formal sector. Increasing Openness by one standard deviation increases the probability of formal sector employment by 5.7 percent.

Intuitively, increasing grade attainment increases the likelihood that both males and females are still students at the time of the survey. Higher school attainment also decreases the likelihood of being unemployed at the time of the 2012 survey. Increasing grade attainment by one grade increases the likelihood of still being a student by 6 percent and reduces the likelihood of being unemployed by 5 percent. While the signal of grade attainment appears to influence whether or not an individual is employed it does not significantly influence sector of employment for those individuals who are employed. Grade does not significantly impact male or female selection into the formal or informal sector employment. Cognitive ability, on the other hand, does significantly influence selection into the formal or informal sector for both males and females. Increasing cognitive ability by one standard deviation increases the likelihood of working in the formal sector by 9 percent and 7 percent and reduces the likelihood of informal sector employment by 11 percent and 9 percent for females and males, respectively. Therefore the skill set signal of grade attainment does not appear to be as important for formal or informal sector selection while the cognitive ability, or the realized skill set, does.

[21] Results available upon request.

We also note that personality and cognitive ability indirectly affect sectoral selection through their effects on age of labor market entry. Increasing the age an individual begins their first job by one year increases the likelihood of working in the formal sector by 2.4 percent and reduces the likelihood of still being a student and informal sector employment by 2 and 0.4 percent, respectively.

6.2 Within Sector Earnings

Table 12 reports the marginal effects of personality, cognitive test scores, grade and age at first job for the informal sector (top panel), the formal sector (middle panel), and the two sectors pooled (bottom panel). The estimated coefficients from the hourly earnings model are found in Appendix Table A.14, where the first two columns report estimates for the returns to skills in which we do not correct for sectoral selection and pool the formal and informal sectors but include an indicator variable controlling for formal sector employment. While not shown, once again the point estimates for personality coefficients remain fairly consistent as we incrementally add a large number of individual- and community-level controls.[22]

The main result to note in the pooled model is that there is a large earnings premium for working in the formal sector. Working in the formal sector instead of the informal sector is associated with approximately a 75 percent earnings premium for females and 140 percent premium for males. Since selection into the formal sector is endogenous, this result cannot be interpreted causally. However, it is worth keeping in mind as we analyze the within sector earnings.

Interestingly, while cognitive ability, Agreeableness, and Extraversion all significantly determine male selection into the formal and informal sectors, none of the five personality traits, cognitive ability, or grade significantly determine male hourly earnings within the formal sector. Only Agreeableness significantly affects male informal sector earnings: a one standard deviation increase is associated with a decline in male informal sector earnings by approximately 37 percent. This is consistent with findings from developed countries, which also show Agreeableness to be negatively associated with male earnings (Gensowski 2014; Mueller and Plug 2006). Therefore the effects of personality and cognitive ability on male hourly earnings are

[22] Results are available upon request.

largely indirect through their effects on age of entry and subsequent sectoral selection. Given the large earnings premium for formal sector work, these indirect effects can nonetheless be substantial.

Similarly, none of the five personality traits, cognitive ability, or grade attainment significantly affect female hourly earnings in the informal sector. Increasing the age at first job by one year increases female informal sector earnings by 13 percent. Therefore, again, the effects of personality and cognitive ability on female informal sector hourly earnings are largely indirect through their effect on age of entry and sectoral selection. Conversely, personality significantly directly impacts female hourly earnings in the formal sector. Increasing Openness and Neuroticism by one standard deviation each reduces female formal sector earnings by approximately 8.1 percent. Gensowski (2014) also found evidence that Openness might have a positive indirect effect on earnings but a negative direct effect. In contrast, increased Conscientiousness has substantial returns for females working in the formal sector: a one standard deviation increase raises female formal sector earnings by 114 percent. This result is quite intuitive in that more responsible, dependable, and hardworking individuals are also likely more productive in their jobs. Numerous studies coming from developed countries also find Conscientiousness to be positively associated with job performance and earnings (Borghans et al. 2008; Hogan and Holland 2003; Mueller and Plug 2006). It is interesting however, that for earnings in this sample in Madagascar, Conscientiousness is only rewarded in females but not males.

7. Conclusion

In recent years there is an increasing interest in the effect of "noncognitive" dimensions of human capital on economic outcomes. Numerous studies from industrialized countries find that noncognitive skills can be as an important of a predictor of economic outcomes as cognition. In developing countries, it is reasonable to think that certain noncognitive skills may prove to be even more important to economic success than schooling and cognition since school quality and school enrollment rates are generally lower in these countries than in industrialized ones. Moreover, noncognitive traits may also affect how individuals and households respond to

economic and health shocks, which are persistent threats to households' economic well-being in this context.

For a sample of young adults in Madagascar, we estimate the effect of cognition and the Big Five Personality Traits on the age of labor market entry, employment sectoral selection, and within sector hourly earnings. We find that personality and cognitive ability directly impact each of the labor outcomes we investigate and that these impacts differ for males and females. Moreover we find that the importance of these skills to adult hourly earnings lies mainly in their indirect effect through the age of labor market entry and subsequent selection into labor sectors of employment rather than through direct effects on productivity as measured by earnings.

Like other studies, we find that household economic shocks affect the labor market entry decision for adolescents and that those effects vary by gender. Particularly noteworthy is that negative income shock increase the hazard for both males and females entering the labor market at a younger age, although among those under 14 years of age, this applies only to males. We suspect this gender different is explained by the possibility that boys receive higher returns to entering the labor market than females, and that households are more reluctant to send their young girls off to work.

However, among the most salient of our findings is that personality and cognition appear to be an even more influential determinant of the age an adolescent first enters the labor market than shocks. Moreover, the effect of household shocks on that first entry decision varies substantially not only by gender (as other studies have found) but also by the adolescent's personality type and cognitive ability. For example, while a negative household income shock during adolescence increases the hazard of a male child entering the labor market at a younger age, the effect of this shock is greatly exacerbated if this male is high in Conscientious and mitigated if he is low in Conscientiousness. But among all the personality traits, the one that appears to be generally most important in affecting timing of labor market entry is Openness to Experience which reduces the hazard of young adults entering the labor market in the face of negative income shocks. Neuroticism, not surprising increases the hazard of entry at a younger age across all shock realizations.

Our interest in understanding the determinants of the first labor market entry decision is motivated in part by another result of our research which shows that the timing of entry has important long-term welfare implications. The younger an adolescent is when she first begins

work increases the likelihood she will be finding a job working in the informal sector as a young adult rather than the formal sector where earnings are substantially higher. Delaying entry by one year increases the likelihood of formal sector employment by 2.5 percent and decreases the likelihood of informal sector employment by 2 percent. Delaying entry by one year further increases hourly earnings for females selected into the informal sector by over 13 percent.

High cognitive ability among adolescents is associated with delayed entry into the labor market since these individuals are completing more schooling (as indicated by the unistrumented hazard model estimates). However, once these individuals complete their education, they enter at younger ages than their low cognitive ability counterparts with the same school attainment. This is likely due to their ability to complete more grades by a younger age and find better quality jobs once they do enter. While entering at a younger age decreases the likelihood of formal vs informal employment, this effect is dominated by the substantial influence cognitive skills have on sectoral selection. Increasing cognitive ability by one standard deviation enhances the likelihood of formal sector employment 8.5 and 7 percent and reduces the probability of informal sector employment by 11 and 9 percent for females and males, respectively.

As with the entry hazard, our sector selection models also indicate the important of personality traits. For example, among males Extraversion increases their likelihood of being employed in the informal sector, while Openness to Experience increases the likelihood of being employed in the formal sector. However, the magnitude of the impact of traits tends to be smaller in sorting individuals into sector of work than the timing of their entry.

While our research shows that cognition and traits primarily affect the timing of labor market entry and the sector of employment, there are a few notable exceptions. Most prominent is the finding that Conscientiousness has substantial direct returns to earnings for females working in the formal sector. Likewise, Agreeableness is associated with a decline in male informal sector. Other traits have smaller affects on earnings, such as the finding that increasing Openness and Neuroticism reduce female formal sector earnings. We note that the direction of these findings are consistent with the evidence, albeit limited, from developed countries, despite the large differences in the nature of the labor market. However, we also need to interpret with caution the far smaller impact of personality, and lack of direct effect of cognition, on earnings for several reasons. First, it is unclear whether the labor market in a country like Madagascar will reward, or is even able to measure, productivity that is associated with greater skills, whether

they be cognitive or non-cognitive. Second, our focus is on young adults that are new entrants to the labor market. Thus, while their skills and traits have strong impacts on the timing of entry and nature of the job they take, their brief duration in the labor market may not have yet allowed for a differentiation of productivity, or rewards associated with higher productivity.

As research continues to evaluate the role of human capital in economic success and development, we need to consider more carefully the role of skills, not just schooling, as well as the noncognitive dimensions of human capital such as personality and elements of psycho-social well-being. As discussed earlier, little is known at this point about how personality is formed and thus how we can impact personality traits through policy. Thus, while the research on the formation of the traits is in its infancy and will largely be taken up by psychologists, there is much economists can contribute at this point in terms of understanding the role of personality in determining a range of social and economic outcomes. And this is particularly true to the extent that personality interacts with skills, shocks, and other characteristics, including gender, that we already have (although still require more) evidence on how to effectuate.

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Figure 1: Male and Female Age of Entry Survival Curves across Shock Realizations

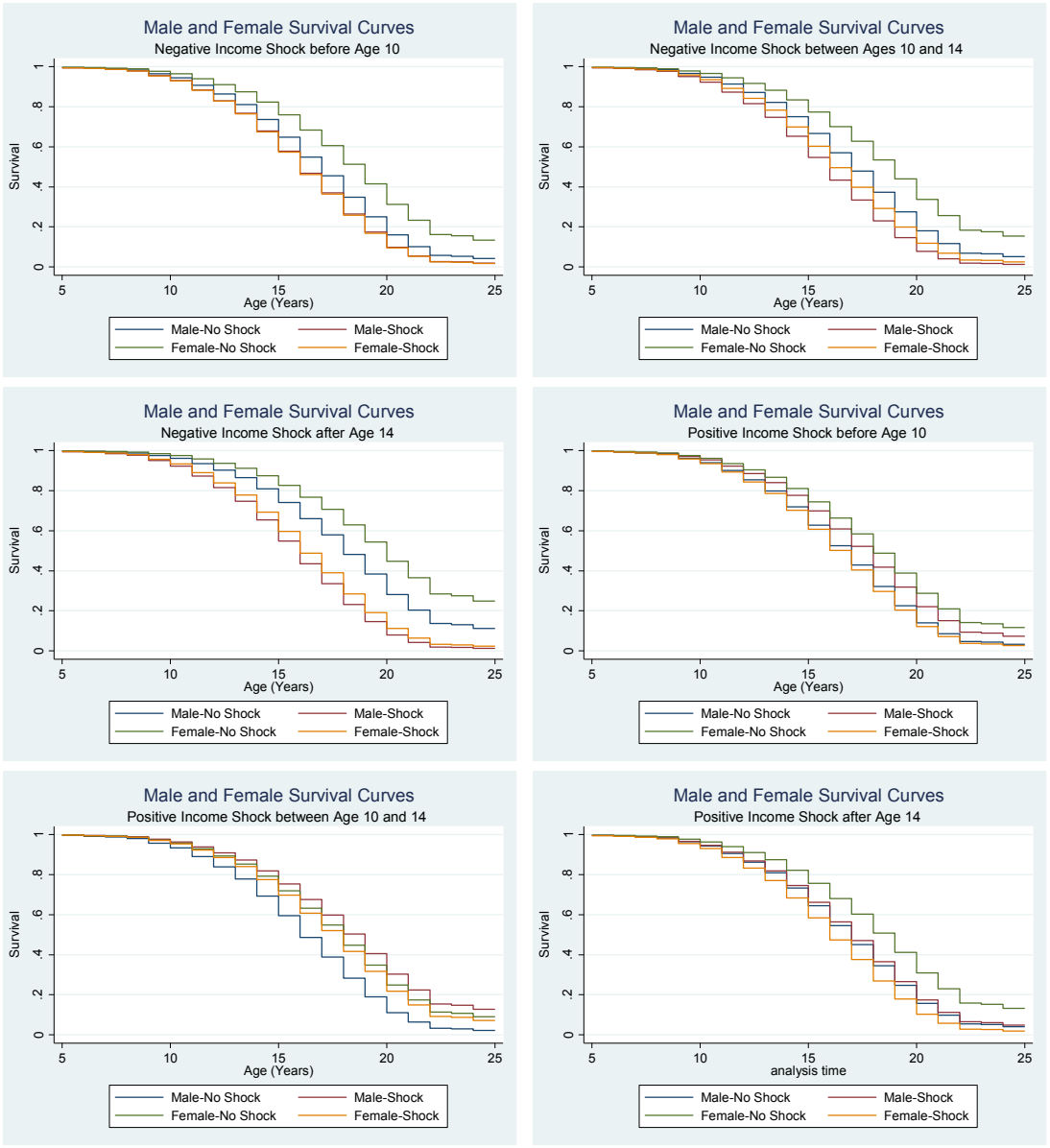

Figure 2: Age of Entry Survival Curves for High and Low Cognitive Ability Individuals across Shock Realizations

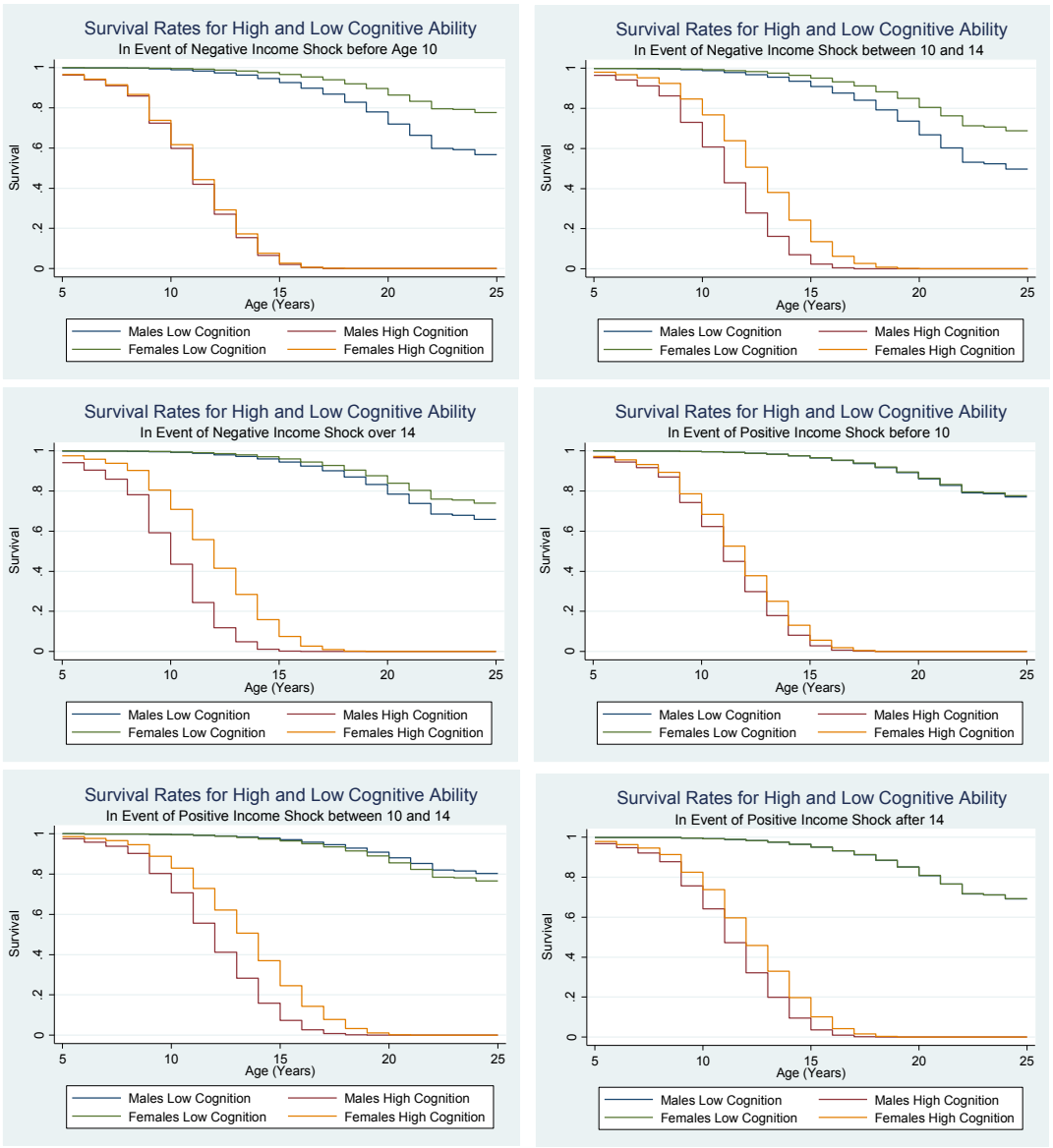

Figure 3: Age of Entry Survival Curves for High and Low Openness across Shock Realizations

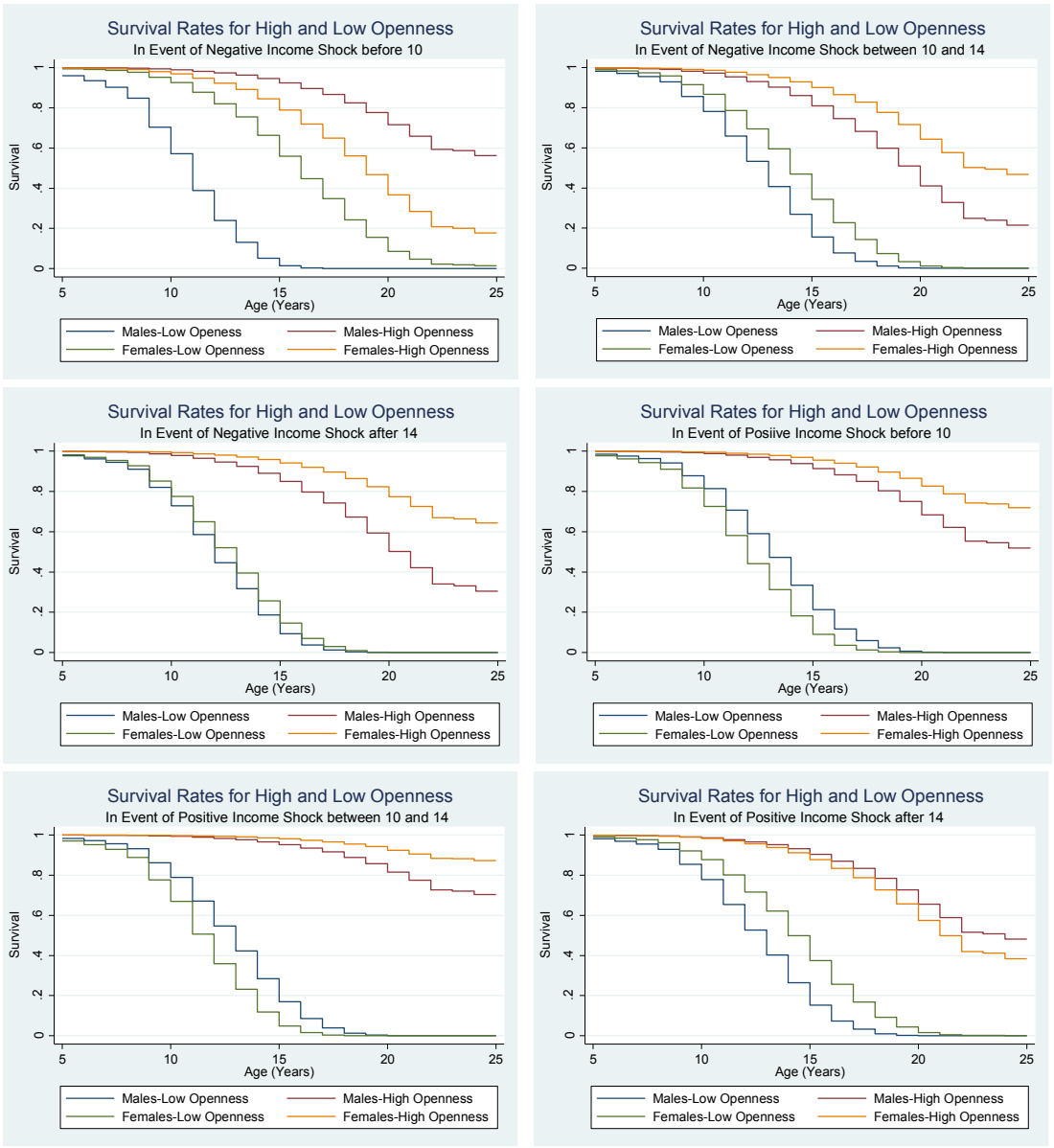

Figure 4: Age of Entry Survival Curves for High and Low Neuroticism across Shock Realizations

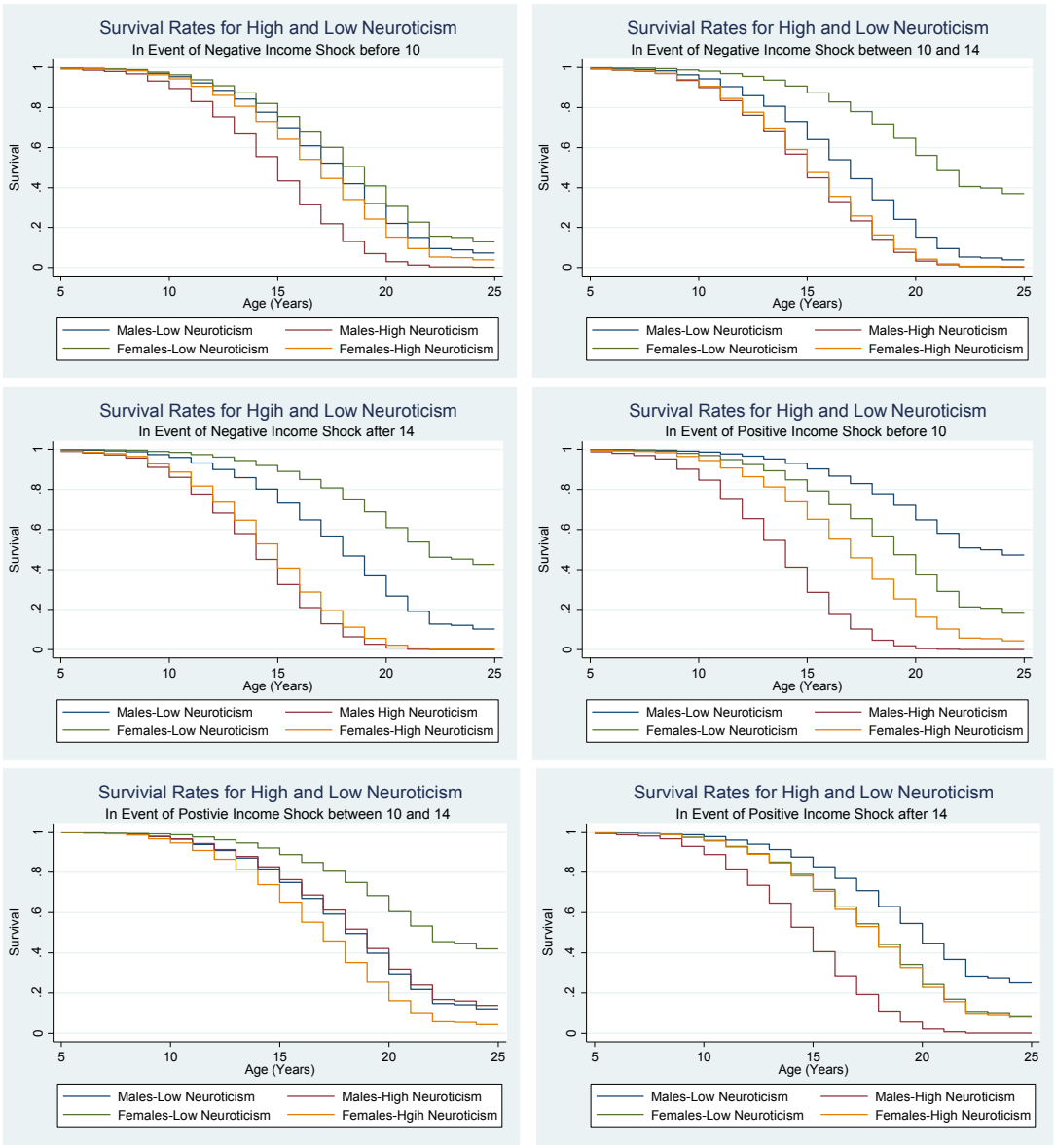

Figure 5: Age of Entry Survival Curves for High and Low Conscientiousness across Shock Realizations

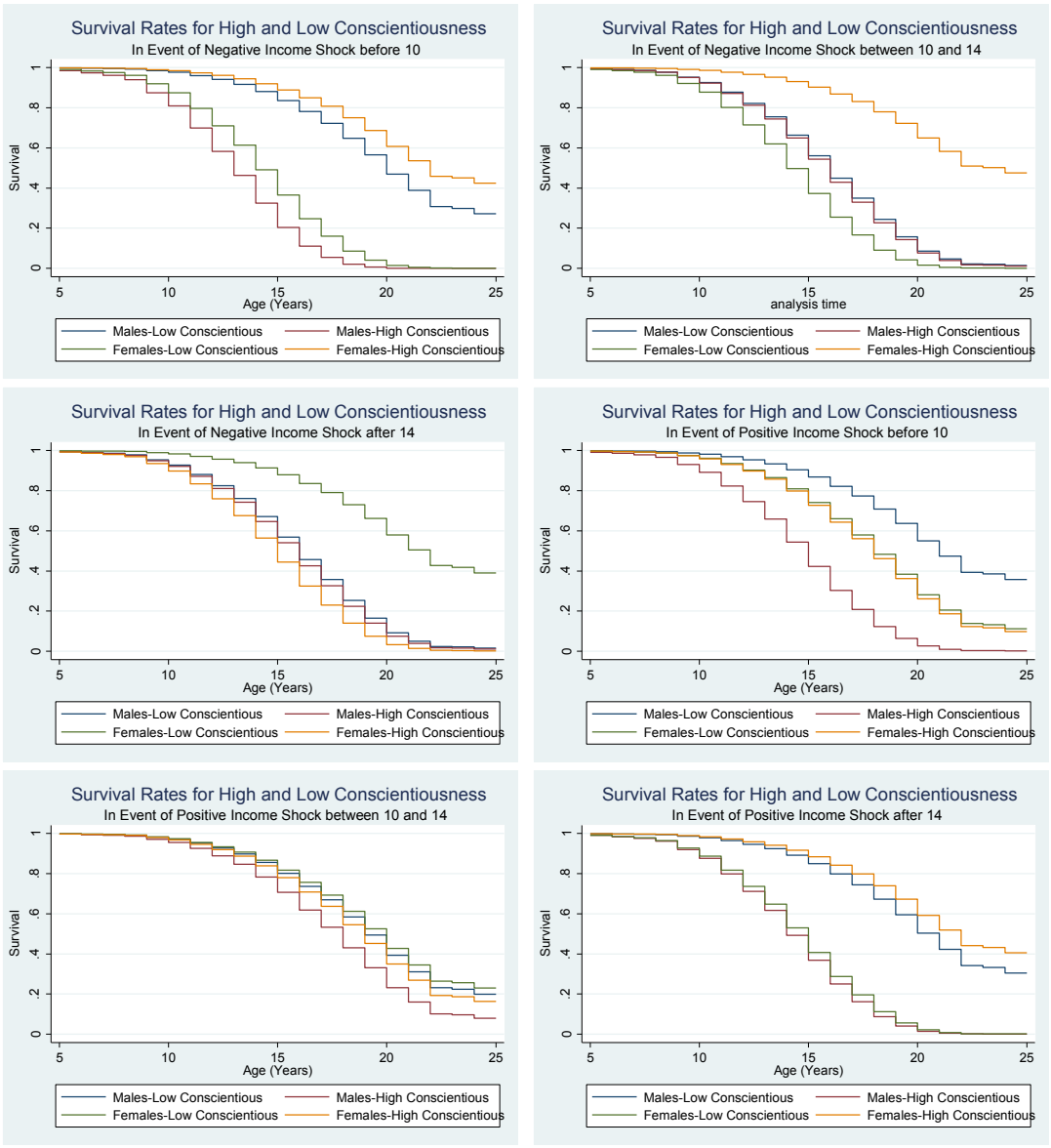

Table 1: Big Five Personality Traits

Personality Trait	Basic Tendencies	Characteristic Adaptations
Openness to Experience	a need for variety, novelty, and change	intellectual curiosity; interest in travel; many different hobbies; diverse vocational interests
Conscientiousness	strong sense of purpose and high aspiration levels	leadership skills; long-term planner; hardworking; organized; dependable
Extraversion	preference for companionship and social stimulation	social skills; numerous friendships; gregarious; assertive; talkative
Agreeableness	a willingness to defer to others during interpersonal conflict	forgiving attitude; belief in cooperation; warm
Neuroticism	sadness, hopelessness, guilt	Low self-esteem; pessimistic attitude; insecure; anxious; depressed

Table 2: Examples of Questions Measuring the Big Five Personality Traits

Openness to Experience
I find the world very interesting
In any situation I can find something interesting
I'm very interested in other countries and their cultures
Conscientiousness
I never leave a task without completing it
I do my job without waiting
I like to order things around me
I always keep my promises
Extroversion
I like to animate groups
I take the initiative in conversations
I always have something to say
I work better when I'm alone
Agreeableness
I respect the decisions of the group
I think honesty is the basis of trust
I am rarely angry
Neuroticism
I panic easily
I am often sad
I get discouraged easily
I am often worried

Table 3: Correlation Matrix of Personality Traits and Cognitive Test Score

	Openness to Experience z-score	Conscientiousness z-score	Extroversion z-score	Agreeableness z-score	Neuroticism z-score	Aggregate Math/French z-score
Openness to Experience z-score	1					
Conscientiousness z-score	0.66***	1				
Extroversion z-score	0.63***	0.75***	1			
Agreeableness z-score	0.52***	0.72***	0.75***	1		
Neuroticism z-score	-0.17***	-0.34***	-0.44***	-0.28***	1	
Aggregate Math/French z-score	0.23***	0.14***	0.18***	0.09***	-0.13***	1

*** p<0.01, ** p<0.05, * p<0.1

Table 4: Comparison of Observed Characteristics across Samples

	Full Sample N=1539	Job Entry Sample N=1175	Sector Selection Sample N=1156	Earnings Sample N=965
Conscientiousness z-score	0.01	0.05	0.05	-0.00
	(0.98)	(0.97)	(0.97)	(0.97)
Extraversion z-score	0.01	0.03	0.02	-0.01
	(0.98)	(0.97)	(0.97)	(0.97)
Openness to Experience z-score	0.03	0.06	0.06	-0.03
	(0.98)	(0.99)	(0.98)	(0.98)
Agreeableness z-score	0.00	0.02	0.02	-0.00
	(0.99)	(0.97)	(0.98)	(0.96)
Neuroticism z-score	0.02	0.02	0.03	0.00
	(0.99)	(1.01)	(1.01)	(0.98)
Aggregate Cognitive Test z-score	0.00	0.00	0.00	-0.20
	(1.00)	(0.99)	(1.00)	(0.95)
2004 Asset Index	0.11	0.11	0.10	-0.10
	(1.00)	(1.02)	(1.01)	(0.81)
Male	0.48	0.48	0.48	0.51
	(0.50)	(0.50)	(0.50)	(0.50)
Mother's Education	4.86	4.90	4.89	4.14
	(3.59)	(3.58)	(3.58)	(3.27)
Father's Education	5.57	5.53	5.51	4.68
	(3.95)	(3.95)	(3.97)	(3.61)
Age	21.93	21.95	21.96	21.98
	(1.35)	(1.24)	(1.24)	(1.25)
Highest Grade Attained in 2012	8.19	8.27	8.27	7.09
	(3.67)	(3.65)	(3.67)	(3.45)
Ever Employed Previously	0.81	0.81	0.81	1.00
	(0.39)	(0.39)	(0.40)	(0.00)
Age of Entry into Labor Market	15.98	15.96	15.91	15.86
	(3.70)	(3.70)	(3.70)	(3.67)
Urban	0.27	0.26	0.26	0.20
	(0.44)	(0.44)	(0.44)	(0.40)
Death of Mother	0.09	0.09	0.09	0.10
	(0.29)	(0.28)	(0.28)	(0.30)
Death of Father	0.17	0.17	0.17	0.18
	(0.38)	(0.38)	(0.38)	(0.39)
Mother Illness/Injury	0.17	0.17	0.17	0.17
	(0.37)	(0.37)	(0.37)	(0.38)
Father Illness/Injury	0.17	0.16	0.16	0.17
	(0.37)	(0.37)	(0.37)	(0.37)
Positive Income Shock before Age 10	0.20	0.21	0.21	0.21
	(0.40)	(0.41)	(0.41)	(0.41)
Positive Income Shock between Ages 10 and 14	0.25	0.27	0.26	0.27
	(0.43)	(0.44)	(0.44)	(0.44)
Positive Income Shock after Age 14	0.51	0.50	0.51	0.53
	(0.50)	(0.50)	(0.50)	(0.50)
Negative Income Shock before Age 10	0.21	0.21	0.20	0.20

	(0.41)	(0.41)	(0.40)	(0.40)
Negative Income Shock between Ages 10 and 14	0.37	0.39	0.39	0.38
	(0.48)	(0.49)	(0.49)	(0.49)
Negative Income Shock after Age 14	0.67	0.68	0.68	0.73
	(0.47)	(0.47)	(0.47)	(0.45)

Standard errors in parentheses

Table 5: Employment Distribution by Age Groups

	Full Sample of Ever Employed	Entered before Age 16	Entered after Age 16
	N=950	N=511	N=691
Proportion of Sample in Occupation Types			
Formal Sector Employment	16.21	3.78	31.32
Self-Employment	26.53	24.85	28.41
Work in Family Enterprise	51.16	66.40	34.00
Domestic Work in other Household	1.58	1.19	2.01
Other	4.53	4.77	4.25
Proportion of Sample in Employment Sectors			
Agriculture or Livestock	64.63	84.89	41.83
Mannual Labor	6.00	3.38	8.95
Service	11.58	7.16	16.55
High Skill	7.47	1.39	14.32
Low Skill	10.21	3.18	18.12
Other	0.11	0.00	0.22

Table 6: Proportion of Labor Sectors across Gender

	Total N=1156	**Females** N=599	**Males** N=557
Unemployed	0.10	0.13	0.07
Informal Sector	0.57	0.60	0.55
Formal Sector	0.19	0.11	0.26
Student	0.14	0.16	0.12

Table 7: Individual Characteristics across Labor Sectors

	Unemployed	Informal Sector	Formal Sector	Student
Conscientiousness z-score	0.16	-0.07***	0.22***	0.22***
	(1.09)	(0.98)	(0.88)	(0.90)
Extraversion z-score	0.15	-0.09***	0.20***	0.15*
	(1.09)	(0.96)	(0.88)	(0.93)
Openness to Experience z-score	0.16	-0.13***	0.33***	0.37***
	(1.15)	(0.95)	(0.88)	(0.93)
Agreeableness z-score	0.10	-0.06***	0.12*	0.14*
	(1.10)	(0.96)	(0.93)	(0.98)
Neuroticism z-score	0.06	0.08**	-0.13***	-0.03
	(1.07)	(1.02)	(0.85)	(1.06)
Aggregate Cognitive Test z-score	0.35***	-0.39***	0.35***	0.90***
	(0.90)	(0.91)	(0.88)	(0.70)
Hourly Earnings	298.01	143.47***	390.96***	0.00
	(1034.81)	(909.01)	(1634.79)	(0.00)
2004 Asset Index	0.39***	-0.19***	0.29***	0.86***
	(1.18)	(0.68)	(1.10)	(1.37)
Male	0.34***	0.46	0.68***	0.41**
	(0.48)	(0.50)	(0.47)	(0.49)
Mother's Education	6.29***	3.90***	5.50***	7.15***
	(3.65)	(3.02)	(3.67)	(3.99)
Father's Education	7.11***	4.45***	6.07**	7.99***
	(4.18)	(3.49)	(3.87)	(4.16)
Age	22.10	21.90*	22.19***	21.76**
	(1.24)	(1.23)	(1.22)	(1.28)
Highest Grade Attained in 2012	9.50***	6.80***	9.23***	12.20***
	(3.15)	(3.18)	(3.27)	(2.67)
Ever Employed Previously	0.30***	1.00***	1.00***	0.11***
	(0.46)	(0.00)	(0.00)	(0.31)
Age of Entry into Labor Market	16.34	15.29***	17.90***	14.18*
	(3.51)	(3.51)	(3.49)	(5.02)
Urban	0.43***	0.15***	0.37***	0.47***
	(0.50)	(0.36)	(0.48)	(0.50)
Death of Mother	0.09	0.09	0.09	0.05*
	(0.28)	(0.29)	(0.29)	(0.22)
Death of Father	0.19	0.17	0.21	0.13
	(0.39)	(0.37)	(0.41)	(0.33)
Mother Illness/Injury	0.26***	0.17	0.14	0.13
	(0.44)	(0.37)	(0.35)	(0.33)
Father Illness/Injury	0.18	0.17	0.13	0.15
	(0.39)	(0.38)	(0.34)	(0.35)
Positive Income Shock before Age 10	0.15	0.23*	0.18	0.21
	(0.36)	(0.42)	(0.39)	(0.41)
Positive Income Shock between Ages 10 and 14	0.21	0.27	0.29	0.26
	(0.41)	(0.44)	(0.46)	(0.44)
Positive Income Shock after Age 14	0.45	0.57***	0.42***	0.40***
	(0.50)	(0.49)	(0.49)	(0.49)
Negative Income Shock before Age 10	0.19	0.21	0.23	0.17
	(0.39)	(0.41)	(0.42)	(0.38)
Negative Income Shock between Ages 10 and 14	0.28***	0.40	0.38	0.41

	(0.45)	(0.49)	(0.49)	(0.49)
Negative Income Shock after Age 14	0.58***	0.76***	0.61***	0.54***
	(0.50)	(0.43)	(0.49)	(0.50)

Table 8: Hazard of Age of Entry into the Labor Market

	No IV	IV
Conscientiousness z-score	-0.3241**	-0.1594
	(0.159)	(0.184)
Extraversion z-score	-0.0630	-0.0883
	(0.157)	(0.161)
Openness to Experience z-score	0.0044	-0.7191
	(0.130)	(0.523)
Agreeableness z-score	0.2615*	0.1809
	(0.152)	(0.168)
Neuroticism z-score	-0.0839	0.2423
	(0.108)	(0.231)
Aggregate Cognitive Test z-score	-0.2204**	2.0425*
	(0.112)	(1.048)
Cognitive Test First-Stage Predicted Residual		-2.2867**
		(1.047)
Highest Grade Attained	-0.0882***	0.5275
	(0.016)	(0.631)
Grade First-Stage Predicted Residual		-0.6127
		(0.630)
Positive Income Shock before Age 10	0.4009**	0.0692
	(0.171)	(0.346)
Positive Income Shock between Ages 10 and 14	-0.0046	-0.3665
	(0.140)	(0.263)
Positive Income Shock after Age 14	0.1346	0.2074+
	(0.125)	(0.132)
Negative Income Shock before Age 10	0.0870	0.2511
	(0.151)	(0.228)
Negative Income Shock between Ages 10 and 14	-0.0605	0.2240
	(0.149)	(0.233)
Negative Income Shock after Age 14	0.1379	0.5452+
	(0.139)	(0.352)
Death of Mother	0.0761	-0.1445
	(0.123)	(0.164)
Death of Father	0.0837	0.0354
	(0.094)	(0.097)
Mother Illness/Injury	-0.0334	0.4395
	(0.101)	(0.388)
Father Illness/Injury	-0.0514	-0.4549
	(0.100)	(0.319)
Individual and Household Controls	X	X
2004 and 2012 Community Controls	X	X
Regional Dummies	X	X
Interactions of Income Shocks with Personality and Cognition	X	X
Interactions of Male with Personality and Cognition	X	X
Interactions of Male with Income Shocks	X	X
Interaction of Male with Income Shocks with Personality and Cognition	X	X

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1, +p<0.15

Table 9: Marginal Effect of Household Shocks on Relative Log Hazard of Labor Market Entry

	Female	Male
Positive Income Shock before Age 10	0.069	-0.262
	(0.346)	(0.352)
Positive Income Shock between Ages 10 and 14	-0.367	-0.609**
	(0.263)	(0.26)
Positive Income Shock after Age 14	0.207+	-0.056
	(0.132)	(0.125)
Negative Income Shock before Age 10	0.251	0.234
	(0.228)	(0.225)
Negative Income Shock between Ages 10 and 14	0.224	0.398*
	(0.233)	(0.222)
Negative Income Shock after Age 14	0.545+	0.693**
	(0.352)	(0.349)
Mother Illness/Injury	-0.145	-0.145
	(0.164)	(0.164)
Father Illness/Injury	0.035	0.036
	(0.097)	(0.097)
Death of Mother	0.440	0.440
	(0.388)	(0.388)
Death of Father	-0.455	-0.455
	(0.319)	(0.319)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1, +p<0.15

Table 10: Marginal Effects of Personality and Cognitive Ability on Relative Log Hazard of Labor Market Entry Across Shock Realizations

	No Shocks		Positive Income before 10		Positive Income between 10 and 14		Positive Income after 14	
	Females	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**
Conscientiousness z-score	-0.159	0.406*	0.015	0.452	0.053	0.112	-0.495*	0.454*
	(0.184)	(0.215)	(0.349)	(0.404)	(0.305)	(0.305)	(0.304)	(0.261)
Extraversion z-score	-0.088	-0.216	-0.168	-0.111	0.596*	-0.240	-0.127	-0.001
	(0.161)	(0.202)	(0.398)	(0.336)	(0.322)	(0.279)	(0.283)	(0.253)
Openness z-score	-0.719	-0.753+	-0.995*	-0.711	-1.272**	-0.901*	-0.503	-0.734
	(0.523)	(0.522)	(0.586)	(0.569)	(0.566)	(0.553)	(0.542)	(0.529)
Agreeableness z-score	0.181	-0.044	0.351	-0.002	-0.320	0.256	0.478*	-0.191
	(0.168)	(0.18)	(0.344)	(0.35)	(0.266)	(0.276)	(0.265)	(0.240)
Neuroticism z-score	0.242	0.346	0.152	0.625**	0.321	-0.016	0.010	0.390+
	(0.231)	(0.247)	(0.303)	(0.301)	(0.278)	(0.282)	(0.257)	(0.262)
Instrumented Aggregate Cognitive Test Score	2.042**	2.127*	2.209**	2.302**	1.823*	2.230**	1.91*	2.095**
	(1.048)	(1.044)	(1.082)	(1.061)	(1.060)	(1.055)	(1.058)	(1.048)
	Negative Income before 10		**Negative Income between 10 and 14**		**Negative Income after 14**			
	Females	**Males**	**Females**	**Males**	**Females**	**Males**		
Conscientiousness z-score	-0.536*	0.547*	-0.567**	0.013	0.459*	0.021		
	(0.333)	(0.321)	(0.275)	(0.307)	(0.278)	(0.221)		
Extraversion z-score	-0.270	-0.356	0.288	-0.308	-0.047	-0.050		
	(0.329)	(0.32)	(0.291)	(0.276)	(0.218)	(0.203)		
Openness z-score	-0.223	-0.994*	-0.583	-0.544	-0.864*	-0.669		
	(0.555)	(0.547)	(0.566)	(0.553)	(0.534)	(0.532)		
Agreeableness z-score	0.306	-0.034	-0.073	-0.137	-0.204	0.066		
	(0.322)	(0.272)	(0.278)	(0.257)	(0.219)	(0.192)		
Neuroticism z-score	0.115	0.212	0.424+	0.147	0.510**	0.321		
	(0.275)	(0.277)	(0.268)	(0.282)	(0.234)	(0.254)		
Instrumented Aggregate Cognitive Test Score	2.327**	1.952*	1.832*	1.835*	2.067**	2.347**		
	(1.058)	(1.051)	(1.059)	(1.052)	(1.046)	(1.048)		

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1, +p<0.15

Table 11: Average Marginal Effects on the Likelihood of Selection into each Labor Market Sector

	Unemployed		Informal		Formal		Student	
	Females	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**
Conscientiousness z-score	-0.006	-0.008	0.030	-0.027	-0.009	0.018	-0.015	0.017
	(0.028)	(0.025)	(0.041)	(0.026)	(0.031)	(0.021)	(0.02)	(0.025)
Extraversion z-score	0.010	0.018	-0.019	0.062*	0.009	-0.054+	0.00	-0.026
	(0.026)	(0.032)	(0.038)	(0.033)	(0.037)	(0.035)	(0.028)	(0.027)
Openness to Experience z-score	0.016	-0.001	-0.017	-0.039	0.025	0.057*	-0.024	-0.018
	(0.026)	(0.026)	(0.032)	(0.029)	(0.031)	(0.031)	(0.023)	(0.025)
Agreeableness z-score	-0.020	0.021	0.032*	0.00	-0.035*	-0.008	0.023+	-0.013
	(0.015)	(0.016)	(0.018)	(0.023)	(0.02)	(0.022)	(0.015)	(0.016)
Neuroticism z-score	-0.004	0.016	0.003	-0.024	0.001	0.004	0.00	0.005
	(0.024)	(0.03)	(0.041)	(0.03)	(0.035)	(0.029)	(0.017)	(0.025)
Instrumented Cognitive Test z-score	0.012	0.010	-0.106**	-0.091+	0.085**	0.07+	0.009	0.010
	(0.046)	(0.039)	(0.053)	(0.059)	(0.042)	(0.053)	(0.035)	(0.034)
Grade	-0.045*	-0.045*	-0.024	-0.024	0.011	0.011	0.058**	0.058**
	(0.028)	(0.028)	(0.026)	(0.026)	(0.028)	(0.028)	(0.025)	(1.025)
Age of Job Entry	-0.001	-0.001	-0.02***	-0.020***	0.024***	0.024***	-0.004*	-0.004*
	(0.002)	(0.002)	(0.004)	(1.004)	(0.005)	(0.005)	(0.002)	(1.002)

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1, +p<0.15

Table 12: Marginal Effects of Personality, Cognition, and Grade on Male and Female Earnings

	No Selection Correction				Selection Correction			
	OLS		IV		OLS		IV	
	Females	Males	Females	Males	Females	Males	Females	Males
Informal								
Conscientiousness z-score	-0.008	0.241	0.073	0.242+	0.023	0.316	0.100	0.294
	(0.159)	(0.262)	(0.165)	(0.165)	(0.181)	(0.272)	(0.167)	(0.273)
Extraversion z-score	0.050	-0.153	0.005	-0.097	0.085	-0.188	0.025	-0.103
	(0.217)	(0.261)	(0.234)	(0.230)	(0.241)	(0.278)	(0.208)	(0.257)
Openness z-score	0.204+	-0.199	0.151	-0.201	0.232+	-0.151	0.161	-0.192
	(0.135)	(0.160)	(0.182)	(0.153)	(0.160)	(0.182)	(0.178)	(0.177)
Agreeableness z-score	-0.044	-0.271	-0.086	-0.317*	-0.097	-0.354*	-0.137	-0.366*
	(0.166)	(0.211)	(0.145)	(0.167)	(0.171)	(0.215)	(0.179)	(0.207)
Neuroticism z-score	0.144	0.054	0.144	0.053	0.065	-0.018	0.100	0.021
	(0.116)	(0.137)	(0.136)	(0.139)	(0.139)	(0.172)	(0.147)	(0.138)
Cognitive Test Score Aggregate	0.177	-0.391*	-0.054	-0.143	0.193	-0.338**	-0.020	-0.198
	(0.174)	(0.166)	(0.581)	(0.558)	(0.178)	(0.167)	(0.511)	(0.577)
Grade	-0.110***	0.046	-0.036	-0.039	-0.102***	0.043	-0.093	-0.090
	(0.041)	(0.048)	(0.101)	(0.092)	(0.041)	(0.048)	(0.115)	(0.096)
Age at First Job	0.079***	0.007	0.090***	0.028	0.130***	0.067+	0.134***	0.063
	(0.028)	(0.028)	(0.028)	(0.029)	(0.042)	(0.047)	(0.039)	(0.046)
Formal								
	Females	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**
Conscientiousness z-score	0.975+	-0.030	1.100	-0.127	1.047+	-0.049	1.144**	-0.083
	(0.676)	(0.384)	(0.792)	(0.407)	(0.691)	(0.381)	(0.571)	(0.374)
Extraversion z-score	-0.460	-0.039	-0.459	0.006	-0.568	-0.106	-0.556	-0.036
	(0.570)	(0.531)	(0.455)	(0.524)	(0.603)	(0.578)	(0.581)	(0.561)
Openness z-score	-0.677	-0.320	-0.810+	-0.346	-0.579	-0.298	-0.806+	-0.351
	(0.568)	(0.341)	(0.530)	(0.332)	(0.630)	(0.378)	(0.503)	(0.365)
Agreeableness z-score	0.018	-0.174	-0.074	-0.203	-0.047	-0.189	-0.079	-0.202
	(0.370)	(0.353)	(0.402)	(0.359)	(0.368)	(0.359)	(0.393)	(0.311)
Neuroticism z-score	-0.464	0.470	-0.777**	0.504*	-0.552+	0.413	-0.814*	0.507
	(0.366)	(0.335)	(0.401)	(0.299)	(0.376)	(0.376)	(0.429)	(0.443)
Cognitive Test Score Aggregate	0.274	0.134	-1.869	0.525	0.263	0.164	-1.744	0.599
	(0.515)	(0.354)	(1.507)	(0.990)	(0.556)	(0.375)	(1.717)	(1.252)
Grade	-0.055	0.046	0.412*	-0.092	-0.024	0.031	0.398	-0.112
	(0.122)	(0.102)	(0.253)	(0.185)	(0.147)	(0.109)	(0.355)	(0.252)
Age at First Job	0.003	0.067	0.028	0.060	-0.002	0.063	0.023	0.043
	(0.085)	(0.077)	(0.084)	(0.072)	(0.142)	(0.114)	(0.146)	(0.125)
Formal and Informal Sectors Pooled								
	Females	**Males**	**Females**	**Males**				
Conscientiousness z-score	0.033	0.110	0.155	0.075				
	(0.161)	(0.212)	(0.163)	(0.181)				
Extraversion z-score	0.057	-0.066	0.021	-0.029				
	(0.215)	(0.229)	(0.194)	(0.202)				
Openness z-score	0.089	-0.266*	0.015	-0.247+				
	(0.153)	(0.143)	(0.185)	(0.158)				
Agreeableness z-score	-0.022	-0.230	-0.106	-0.262+				
	(0.153)	(0.176)	(0.130)	(0.172)				
Neuroticism z-score	0.100	0.155	0.069	0.166+				
	(0.110)	(0.133)	(0.126)	(0.116)				
Cognitive Test Score Aggregate	0.219	-0.222	-0.101	0.071				
	(0.174)	(0.167)	(0.482)	(0.409)				
Grade	-0.108***	0.059	-0.040	-0.050				
	(0.041)	(0.047)	(0.103)	(0.088)				

Age at First Job	0.066**	0.042+	0.082***	0.055*
	(0.027)	(0.028)	(0.027)	(0.029)
Works in Formal Sector	0.751**	1.437***	0.749**	1.395***
	(0.327)	(0.262)	(0.351)	(0.238)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1, +p<0.15

Appendix A

We model the Big Five Personality Traits as unobserved variables and used confirmatory factor analysis to uncover their latent distributions. By using confirmatory factor analysis we can estimate the latent joint distribution of our five personality traits using the variance-covariance structure of survey questions designed to measure each trait. Personality traits are then estimated using the following measurement system:

$$
\begin{aligned}
Z_j^O &= \mu_j^O + \lambda_j^O \theta^O + \varepsilon_j^O \quad \text{for } j \in \{1,\ldots,m_j^O\} \\
Z_j^C &= \mu_j^C + \lambda_j^C \theta^C + \varepsilon_j^C \quad \text{for } j \in \{1,\ldots,m_j^C\} \\
Z_j^E &= \mu_j^E + \lambda_j^E \theta^E + \varepsilon_j^E \quad \text{for } j \in \{1,\ldots,m_j^E\} \\
Z_j^A &= \mu_j^A + \lambda_j^A \theta^A + \varepsilon_j^A \quad \text{for } j \in \{1,\ldots,m_j^A\} \\
Z_j^N &= \mu_j^N + \lambda_j^N \theta^N + \varepsilon_j^N \quad \text{for } j \in \{1,\ldots,m_j^N\}
\end{aligned} \tag{1}
$$

Where O indexes Openness to Experience, C indexes Conscientiousness, E indexes Extraversion, A indexes Agreeableness, and N indexes Neuroticism. Z_j^p is the observed j^{th} measurement for latent trait θ^p. m^p is the number of observed measurements for latent trait p, $p \in \{O,C,E,A,N\}$. To ensure that the model is not underidentified, we normalize $\lambda_1^p = 1$ for all $p \in \{O,C,E,A,N\}$. This simply sets scale and is common practice in factor analysis. We also normalize $E[\theta^p] = 0$. Doing so centers the distribution of latent factors over zero and is also common practice. Since the factors do not have any cardinal value, this normalization does not have any implications for how we interpret our results. The $\varepsilon's$ are assumed to be mean zero, are uncorrelated with the factors and are independent across agents and factors. Using confirmatory factor analysis we estimate the factor loadings, λ_j^p, and predict a personality trait factor score for each individual in the sample. We then use the standardized factor scores to estimate their effect school completion, age of labor market entry, and selection into employment sectors. Estimated factor loadings, λ_j^p, and the intercepts, μ_j^p, from the measurement model can be found in Appendix Tables A.6-A.10.[23]

[23] Cronbach's α is a coefficient that measures the internal consistency or reliability of the measurements being used to estimate the five personality factors. Estimates for Cronbach's α for each personality trait is 0.71, 0.92, 0.80, 0.66, and 0.82 for Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism, respectively. Thus for the most part, our measurement instruments are reasonably consistent.

Table A.1: Openness to Experience Measurements

	Mean	Std. Dev.	Min	Max
I find the world very interesting	3.4311	1.066	1	5
I am never bored	3.8074	0.8355	1	5
I am proficient in several areas	3.019	1.0338	1	5
I am always busy with something interesting	3.6604	0.8602	1	5
I am interested in many things	3.1393	1.043	1	5
In any situation I can find something interesting	3.1142	0.9656	1	5
I think my life is very interesting	3.2809	0.9649	1	5
I am very interested in other countries and their cultures	3.2378	1.136	1	5
I am not very curious about what is happening in the world	2.6983	1.0739	1	5
I am interested in very few things	2.314	0.9426	1	5

Table A.2 : Conscientiousness Measurements

	Mean	Std. Dev.	Min	Max
I am always ready	4.232	0.7408	1	5
I love to bring order	4.1423	0.7	1	5
I do things quickly	3.7816	0.8333	1	5
I never leave a task without completing it	3.8899	0.8424	1	5
I like to step up to the plate	4.0562	0.7486	1	5
I am always up to my jobs/tasks	3.9795	0.7731	1	5
I always keep my promises	4.0287	0.7736	1	5
I like to tidy up	4.161	0.6693	1	5
I benefit well from my work	3.714	0.8906	1	5
I never leave work to be done	3.6405	0.8943	1	5
I do my job without waiting	3.8273	0.805	1	5
I like when everything is in its place	4.1706	0.654	1	5
I finish tasks no matter what obstacles encountered	3.5386	0.9475	1	5
I start work without delay	3.8589	0.8176	1	5
I like ordering things around me	3.8466	0.7961	1	5
I can clearly articulate ideas	3.6036	0.8498	1	5
I always keep my word	4.024	0.7492	1	5
I like order and regularity	4.1434	0.6939	1	5
I always act first	3.6447	0.8812	1	5
I work with conviction	4.1781	0.6612	1	5
I am a workaholic	3.4646	0.968	1	5
I am a planner	3.2162	1.0027	1	5
I can bounce back after challenges	3.7335	0.8795	1	5
I am faithful to my own values	3.8664	0.9077	1	5
I do things by following a plan	3.8049	0.8153	1	5
I quickly realize the tasks to do	3.6452	0.8407	1	5
I am not distracted when I work	3.7067	0.8846	1	5
I immediately begin my chores	3.8799	0.7526	1	5
I am a person who sets goals	4.082	0.7488	1	5
I pay attention to detail	3.8202	0.8217	1	5

Table A.3: Extraversion Measurements

	Mean	Std. Dev.	Min	Max
I get involved in community/collective activities	3.9918	0.8363	1	5
I like to animate groups	3.1517	1.095	1	5
I like belonging to a group	3.7278	0.9096	1	5
I can captivate people's attention	3.1598	0.9853	1	5
I can keep my cool	3.945	0.7471	1	5
I take the initiative in conversations	3.784	0.8354	1	5
I talk easily	3.2412	1.0591	1	5
I can clearly articulate ideas	3.6036	0.8498	1	5
I interact with different people when they are gathered	3.7458	0.8428	1	5
I am uncomfortable working in a group	2.1945	0.9444	1	5
I always have something to say	2.7206	0.9702	1	5
I like to draw attention to myself	2.8036	1.0521	1	5
I am not usually talkative	3.1003	0.997	1	5
I prefer to do it alone	2.5329	1.0009	1	5
I am not talkative	3.0592	0.9997	1	5
I have trouble expressing my feelings	2.693	1.0355	1	5
I work better when I'm alone	3.0568	1.0799	1	5
I do not like to take the lead	3.3175	1.0145	1	5
I wait for others to lead the way	2.587	1.0475	1	5
I keep to myself	3.1567	1.0937	1	5
I do not talk a lot	3.0439	1.0191	1	5
I rarely associate with others	2.0334	0.8765	1	5
I try not to attract attention to myself	2.864	1.1806	1	5
I'm afraid to draw attention to myself	2.7013	1.0785	1	5
I leave others to take the initiative	2.16	0.8988	1	5
I leave others to decide	2.2724	0.9446	1	5
I feel comfortable with people	3.8729	0.8385	1	5
I am a team player	3.9531	0.7876	1	5

Table A.4: Agreeableness Measurements

	Mean	Std. Dev.	Min	Max
I get involved in community/collective activities	3.9918	0.8363	1	5
I like belonging to a group	3.7276	0.9096	1	5
I think honesty is the basis of trust	4.1107	0.8364	1	5
I always keep my word	4.024	0.7492	1	5
I respect the decisions of the group	4.0698	0.7066	1	5

Table A.5: Neuroticism Measurements

	Mean	Std. Dev.	Min	Max
I have often worried	2.7822	1.0794	1	5
I am not often worried	3.1987	1.0505	1	5
I am often sad	2.2237	0.9623	1	5
I feel hopeless	2.2168	0.9887	1	5
I have mood swings	3.7036	0.9111	1	5
I can bounce back after challenges	3.7335	0.8795	1	5
I have a bad feeling about what is going to happen	2.2425	1.0305	1	5
I panic easily	2.2015	0.9466	1	5
I lie to get out of things	2.085	1.0118	1	5
I see problems everywhere	2.4671	1.0085	1	5
I am rarely angry	3.2019	1.1439	1	5
I get frustrated quickly	2.2806	0.941	1	5
I have trouble expressing my feelings	2.693	1.0355	1	5
I am a difficult person to understand	2.8143	1.0515	1	5
I give up easily	2.0234	0.8925	1	5
I get discouraged easily	2.0152	0.8768	1	5
I rarely worry	3.225	0.9958	1	5
I sometimes feel dishonest	1.8089	0.8451	1	5
I am easily intimidated	2.0299	0.8768	1	5
It's often difficult for me to have fun	2.3705	1.0309	1	5
I exaggerate my troubles	2.0709	0.8706	1	5
I fear the worst will happen	2.7825	1.1412	1	5
I am unflappable	3.2151	1.045	1	5
I have a lot of fun	2.9795	0.9856	1	5
I'm consumed by my own problems	2.2973	0.947	1	5

Table A.6: Openness to Experience Estimates

	Factor Loading	Constant
I find the world very interesting	1.0000	3.4310***
I am never bored	0.4714***	3.8080***
I am proficient in several areas	0.6707***	3.0206***
I am always busy with something interesting	0.7073***	3.6624***
I am interested in many things	0.6845***	3.1368***
In any situation I can find something interesting	0.8995***	3.1133***
I think my life is very interesting	0.7382***	3.2813***
I am very interested in other countries and their cultures	1.1427***	3.2372***
I am not very curious about what is happening in the world	-0.4902***	2.6976***
I am interested in very few things	-0.1742***	2.3147***

Table A.7: Conscientiousness Estimates

	Factor Loading	Constant
I am always ready	1.0000	4.2289***
I love to bring order	0.9489***	4.1407***
I do things quickly	1.2030***	3.7812***
I never leave a task without completing it	1.2790***	3.8906***
I like to step up to the plate	1.3252***	4.0532***
I am always up to my jobs/tasks	1.4385***	3.9787***
I always keep my promises	1.3067***	4.0272***
I like to tidy up	1.0557***	4.1591***
I benefit well from my work	1.3832***	3.7114***
I never leave work to be done	1.3590***	3.6387***
I do my job without waiting	1.3382***	3.8273***
I like when everything is in its place	0.9487***	4.1697***
I finish tasks no matter what obstacles encountered	1.4048***	3.5376***
I start work without delay	1.3734***	3.8587***
I like ordering things around me	1.1400***	3.8439***
I can clearly articulate ideas	1.3056***	3.5985***
I always keep my word	1.2625***	4.0219***
I like order and regularity	1.1098***	4.1431***
I always act first	1.1263***	3.6458***
I work with conviction	0.9899***	4.1750***
I am a workaholic	1.3058***	3.4624***
I am a planner	1.1236***	3.2170***
I can bounce back after challenges	1.5037***	3.7321***
I am faithful to my own values	1.2373***	3.8622***
I do things by following a plan	1.3231***	3.8025***
I quickly realize the tasks to do	1.2905***	3.6452***
I am not distracted when I work	1.0688***	3.7067***
I immediately begin my chores	1.2344***	3.8817***
I am a person who sets goals	1.2342***	4.0816***
I pay attention to detail	1.1054***	3.8196***

Table A.8: Extroversion Estimates

	Factor Loading	Constant
I get involved in community/collective activities	1.0000	3.9923***
I like to animate groups	0.9976***	3.1530***
I like belonging to a group	1.0798***	3.7271***
I can captivate people's attention	0.8997***	3.1607***
I can keep my cool	0.8390***	3.9468***
I take the initiative in conversations	1.0952***	3.7844***
I talk easily	0.7552***	3.2392***
I can clearly articulate ideas	0.9967***	3.6060***
I interact with different people when they are gathered	1.0291***	3.7460***
I am uncomfortable working in a group	-0.7069***	2.1955***
I always have something to say	0.5207***	2.7212***
I like to draw attention to myself	0.7325***	2.8021***
I am not usually talkative	-0.4272***	3.1010***
I prefer to do it alone	-0.2628***	2.5346***
I am not talkative	-0.5708***	3.0602***
I have trouble expressing my feelings	-0.6399***	2.6929***
I work better when I'm alone	0.0865	3.0561***
I do not like to take the lead	-0.1796***	3.3207***
I wait for others to lead the way	-0.3261***	2.5883***
I keep to myself	-0.1505**	3.1559***
I do not talk a lot	-0.5989***	3.0443***
I rarely associate with others	-0.7581***	2.0307***
I try not to attract attention to myself	-0.6578***	2.8641***
I'm afraid to draw attention to myself	-0.6918***	2.6988***
I leave others to take the initiative	-0.8393***	2.1577***
I leave others to decide	-0.7280***	2.2705***
I feel comfortable with people	0.8178***	3.8748***
I am a team player	0.9104***	3.9545***

Table A.9: Agreeableness Estimates

	Factor Loading	Constant
I get involved in community/collective activities	1.0000	3.9924***
I like belonging to a group	0.9792***	3.7273***
I think honesty is the basis of trust	0.5626***	4.1097***
I always keep my word	0.6772***	4.0240***
I respect the decisions of the group	0.6460***	4.0698***

Table A.10: Neuroticism Estimates

	Factor Loading	Constant
I have often worried	1.0000	2.7825***
I am not often worried	-0.5230***	3.1974***
I am often sad	1.0921***	2.4965***
I feel hopeless	1.1355***	2.2169***
I have mood swings	0.2514***	3.7021***
I can bounce back after challenges	-0.4762***	3.7305***
I have a bad feeling about what is going to happen	0.7088***	2.2470***
I panic easily	1.0688***	2.2045***
I lie to get out of things	0.5988***	2.0857***
I see problems everywhere	0.9497***	2.4675***
I am rarely angry	-0.0347	3.2033***
I get frustrated quickly	0.9652***	2.2825***
I have trouble expressing my feelings	0.9433***	2.6950***
I am a difficult person to understand	0.7272***	2.8174***
I give up easily	1.0426***	2.0266***
I get discouraged easily	1.1387***	2.0165***
I rarely worry	-0.1413***	3.2287***
I sometimes feel dishonest	0.9316***	1.8085***
I am easily intimidated	0.9783***	2.0307***
It's often difficult for me to have fun	0.7225***	2.3729***
I exaggerate my troubles	0.8541***	2.0751***
I fear the worst will happen	1.1304***	2.7843***
I am unflappable	-0.3405***	3.2122***
I have a lot of fun	-0.1185**	2.9775***
I'm consumed by my own problems	1.0307***	2.2991***

Table A.11: First-Stage Prediction for Grade Attainment and Cognitive Test Scores

	Grade	Cognitive Test Score
Conscientiousness z-score	-0.1285	-0.0789**
	(0.133)	(0.039)
Extraversion z-score	-0.0433	-0.0150
	(0.145)	(0.040)
Openness to Experience z-score	0.6090***	0.1695***
	(0.109)	(0.032)
Agreeableness z-score	0.1130	0.0227
	(0.127)	(0.035)
Neuroticism z-score	-0.2386***	-0.0954***
	(0.089)	(0.024)
Male	-0.2196	-0.0027
	(0.159)	(0.044)
Mother's Highest Grade	0.1913***	0.0467***
	(0.027)	(0.008)
Father's Highest Grade	0.1969***	0.0382***
	(0.027)	(0.007)
2004 Household Asset Index	0.5857***	0.1971***
	(0.123)	(0.031)
2012 Household Nonlabor Income	0.0001	0.0000
	(0.000)	(0.000)
2004 Household Nonlabor Income	0.0000***	0.0000***
	(0.000)	(0.000)
2004 Household Size	0.1042*	0.0415***
	(0.058)	(0.015)
Number of Kids<17 yrs in 2004	-0.2464***	-0.0703***
	(0.073)	(0.019)
2004 Primary School Facilities Quality Index	0.3871**	0.1398***
	(0.154)	(0.040)
2004 Distance between Town Center and Primary School	-0.0304	0.0079
	(0.067)	(0.022)
2004 Primary School Participation in Nutrition Program	-0.0856	0.0722
	(0.165)	(0.045)
2004 Private School in Community	0.2161	-0.0492
	(0.210)	(0.053)
2004 Community Health Index	-0.2113*	0.0119
	(0.125)	(0.037)
2004 Community Infrastructure Index	0.3943**	0.1497***
	(0.162)	(0.049)
2004 Remoteness Index	-0.3996***	-0.1045***
	(0.085)	(0.024)
Formal Account a Primary Savings Method	-0.5210*	-0.2454***
	(0.284)	(0.077)
Bank is a Primary Source for Large Loans	0.3399+	0.2161***
	(0.219)	(0.065)
Urban	-0.4625	-0.2920***
	(0.355)	(0.087)
2012 Community Infrastructure Index	-0.2398	-0.0928*

	(0.187)	(0.050)
2012 Access to Secondary School	0.5080**	0.3326***
	(0.219)	(0.059)
Death of Mother	-0.1516	0.1506*
	(0.288)	(0.087)
Death of Father	-0.0401	0.0094
	(0.223)	(0.061)
Mother Illness/Injury	-0.5805***	-0.1040*
	(0.221)	(0.063)
Father Illness/Injury	0.2357	0.0701
	(0.221)	(0.062)
Positive Income Shock before Age 10	0.3549+	0.0789
	(0.235)	(0.067)
Positive Income Shock between Ages 10 and 14	0.1852	0.1046*
	(0.204)	(0.058)
Positive Income Shock after Age 14	-0.0567	-0.0528
	(0.183)	(0.049)
Negative Income Shock before Age 10	-0.1938	-0.0230
	(0.221)	(0.062)
Negative Income Shock between Ages 10 and 14	-0.1271	-0.0827+
	(0.200)	(0.055)
Negative Income Shock after Age 14	-0.4772**	-0.0577
	(0.197)	(0.055)
Constant	7.3887***	-0.3869***
	(0.503)	(0.143)

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1, +p<0.15

Table A.12 Hazard of Age of Entry into the Labor Market

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Conscientiousness z-score	-0.0489	-0.1012*	-0.0547	-0.0600	-0.0469	-0.0555	-0.1394**	-0.0331	0.0688	-0.159
	(0.048)	(0.058)	(0.059)	(0.060)	(0.061)	(0.061)	(0.064)	(0.103)	(0.149)	(0.184
Extraversion z-score	-0.0325	-0.0022	-0.0095	-0.0043	0.0054	-0.0208	0.0162	-0.0074	-0.1360	-0.088
	(0.051)	(0.058)	(0.059)	(0.059)	(0.059)	(0.060)	(0.062)	(0.065)	(0.123)	(0.161
Openness to Experience z-score	-0.1924***	-0.0384	-0.1160**	-0.0478	-0.0760	-0.0588	0.0520	-0.3476	-0.4426	-0.719
	(0.038)	(0.047)	(0.049)	(0.052)	(0.057)	(0.059)	(0.084)	(0.466)	(0.491)	(0.523
Agreeableness z-score	0.0647	0.0323	0.0327	0.0453	0.0438	0.0534	0.0713	0.0371	0.1038	0.180
	(0.044)	(0.052)	(0.053)	(0.054)	(0.055)	(0.055)	(0.056)	(0.080)	(0.129)	(0.168
Neuroticism z-score	-0.0287	-0.0827**	-0.0168	-0.0240	-0.0069	-0.0051	-0.0386	0.1626	0.1789	0.242
	(0.031)	(0.037)	(0.039)	(0.039)	(0.042)	(0.043)	(0.050)	(0.190)	(0.209)	(0.231
Aggregate Cognitive Test z-score		-0.5560***	0.0822	0.6181***	0.7511***	0.6920***	0.1274	1.8581*	1.8350*	2.042
		(0.054)	(0.101)	(0.184)	(0.213)	(0.255)	(0.367)	(0.983)	(1.006)	(1.048
Cognitive Test First-Stage Predicted Residual		0.1792***	-0.4535***	-0.8028***	-0.9274***	-0.8838***	-0.3214	-2.0599**	-2.0595**	-2.286
		(0.069)	(0.109)	(0.194)	(0.222)	(0.259)	(0.367)	(0.986)	(1.011)	(1.047
Individual and Household Controls			X	X	X	X	X	X	X	X
Highest Grade Attained				-0.2416***	-0.2274***	-0.2227***	-0.2299**	-0.0031	0.0746	0.527
				(0.063)	(0.073)	(0.075)	(0.116)	(0.586)	(0.603)	(0.631
Predicted Residual from (1)				0.1595**	0.1433*	0.1421*	0.1517	-0.0729	-0.1550	-0.612
				(0.065)	(0.075)	(0.076)	(0.117)	(0.586)	(0.602)	(0.630
2004 Community Controls					X	X	X	X	X	X
2012 Community Controls						X	X	X	X	X
Provence Dummies							X	X	X	X
Positive Income Shock before Age 10								0.0425	-0.0078	0.069
								(0.306)	(0.316)	(0.346
Positive Income Shock between Ages 10 and 14								-0.3708*	-0.3730+	-0.366
								(0.228)	(0.234)	(0.263
Positive Income Shock after Age 14								0.0431	0.0239	0.207
								(0.088)	(0.091)	(0.132
Negative Income Shock before Age 10								0.1618	0.1531	0.251
								(0.186)	(0.191)	(0.228
Negative Income Shock between Ages 10 and 14								0.2247	0.2618	0.224
								(0.191)	(0.198)	(0.233
Negative Income Shock after Age 14								0.3583	0.4312	0.545
								(0.314)	(0.323)	(0.352
Death of Mother								-0.2758*	-0.2432+	-0.14
								(0.155)	(0.160)	(0.164
Death of Father								-0.0195	-0.0076	0.035

	(0.092)	(0.094)	(0.097
Mother Illness/Injury	0.1500	0.1640	0.439
	(0.365)	(0.373)	(0.388
Father Illness/Injury	-0.2511	-0.2808	-0.454
	(0.301)	(0.308)	(0.319
Interactions between Income Shocks with Personality and Cognition		X	X
Interactions between Gender with Personality and Cognition			X
Interactions between Gender with Income Shocks			X
Triple Interactions			X

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A.13: Estimated Multinomial Logistic Coefficients for Selection into Labor Market Sectors

	Unemployed	Informal Sector	Formal Sector	Student
Conscientiousness z-score	-0.3286	0.1629	**Base**	-0.5503
	(0.461)	(0.297)	**Outcome**	(0.514)
Extraversion z-score	0.1528	-0.1315		0.0818
	(0.523)	(0.321)		(0.578)
Openness to Experience z-score	-0.2584	-0.2710		-0.7795+
	(0.442)	(0.263)		(0.501)
Agreeableness z-score	-0.1069	-0.0012		-0.0877
	(0.404)	(0.262)		(0.455)
Neuroticism z-score	0.2491	0.4054**		0.7909**
	(0.288)	(0.188)		(0.317)
Aggregate Cognitive Test z-score	-0.3218	-1.0619**		-0.2307
	(0.783)	(0.431)		(0.923)
Cognitive Test First-Stage Predicted Residual	-0.1462	0.2631		0.3321
	(0.767)	(0.408)		(0.899)
Highest Grade Attained	-0.1465	-0.1537		1.2225**
	(0.445)	(0.237)		(0.512)
Grade First-Stage Predicted Residual	0.1008	0.1066		-0.9186*
	(0.442)	(0.237)		(0.505)
Never Employed	0.8711	-0.1100		0.7912
	(42.533)	(50.050)		(42.533)
Ever-Employed X Age at First Job	-0.1404**	-0.1690***		-0.3169***
	(0.060)	(0.030)		(0.081)
Individual and Household Controls	X	X		X
2004 and 2012 Community Controls	X	X		X
Regional Dummies	X	X		X
Male X Conscientiousness	0.3882	-0.3417		1.0177
	(0.695)	(0.372)		(0.791)
Male X Extraversion	0.1024	0.6193+		-0.5041
	(0.749)	(0.407)		(0.862)
Male X Openness	-0.5427	-0.1643		-0.3752
	(0.516)	(0.292)		(0.598)
Male X Neuroticism	0.1566	-0.3567+		-0.8098*
	(0.403)	(0.236)		(0.473)
Male X Agreeableness	0.7170	-0.0896		0.6649
	(0.647)	(0.341)		(0.737)
Male X Cognition	0.5096	0.4043*		0.5521
	(0.417)	(0.236)		(0.545)
Constant	0.2272	4.2429*		-5.8085
	(4.264)	(2.269)		(4.793)
Observations	1,156	1,156	1,156	1,156

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1, +p<0.15

Table A.14: Estimated Coefficients on within Sector Earnings

	Pooled		Informal			
			No Selection Correction		Selection Correction	
	OLS	IV	OLS	IV	OLS	IV
	1	2	3	4	5	6
Conscientiousness z-score	0.0332	0.1555	-0.0075	0.0733	0.0229	0.0999
	(0.161)	(0.163)	(0.159)	(0.165)	(0.181)	(0.167)
Extraversion z-score	0.0573	0.0215	0.0498	0.0050	0.0851	0.0248
	(0.215)	(0.194)	(0.217)	(0.234)	(0.241)	(0.208)
Openness to Experience z-score	0.0893	0.0146	0.2044+	0.1510	0.2318+	0.1609
	(0.153)	(0.185)	(0.135)	(0.182)	(0.160)	(0.178)
Agreeableness z-score	-0.0216	-0.1057	-0.0438	-0.0859	-0.0971	-0.1375
	(0.153)	(0.130)	(0.166)	(0.145)	(0.171)	(0.179)
Neuroticism z-score	0.0996	0.0689	0.1441	0.1442	0.0648	0.0995
	(0.110)	(0.126)	(0.116)	(0.136)	(0.139)	(0.147)
Male	-0.8860	0.6469	-0.1147	1.0513	-0.0096	1.1932
	(0.733)	(1.200)	(0.772)	(1.128)	(0.803)	(1.431)
Standardized Cognitive Test Score	0.2194	-0.1009	0.1765	-0.0544	0.1928	-0.0204
	(0.174)	(0.482)	(0.174)	(0.581)	(0.178)	(0.511)
Grade	-0.1080***	-0.0401	-0.1098***	-0.0357	-0.1021**	-0.0931
	(0.041)	(0.103)	(0.041)	(0.101)	(0.041)	(0.115)
Age of Job Entry	0.0663**	0.0825***	0.0788***	0.0903***	0.1300***	0.1341***
	(0.027)	(0.027)	(0.028)	(0.028)	(0.042)	(0.039)
Works in Formal Sector	0.7511**	0.7485**				
	(0.327)	(0.351)				
Male X Conscientiousness	0.0765	-0.0808	0.2482	0.1691	0.2932	0.1943
	(0.267)	(0.245)	(0.305)	(0.215)	(0.321)	(0.314)
Male X Extraversion	-0.1235	-0.0509	-0.2026	-0.1018	-0.2732	-0.1275
	(0.314)	(0.253)	(0.340)	(0.329)	(0.354)	(0.317)
Male X Openness	-0.3550*	-0.2613	-0.4034*	-0.3521+	-0.3829*	-0.3534**
	(0.210)	(0.230)	(0.207)	(0.241)	(0.214)	(0.180)
Male X Agreeableness	-0.2080	-0.1567	-0.2267	-0.2310	-0.2573	-0.0784
	(0.234)	(0.245)	(0.268)	(0.229)	(0.274)	(0.138)
Male X Neuroticism	0.0557	0.0971	-0.0901	-0.0910	-0.0828	-0.2285
	(0.173)	(0.159)	(0.179)	(0.197)	(0.184)	(0.274)
Male X Cognition	-0.4413*	0.1722	-0.5674**	-0.0889	-0.5310**	-0.1771
	(0.229)	(0.551)	(0.230)	(0.468)	(0.233)	(0.491)
Male X Grade	0.1670***	-0.0101	0.1562**	-0.0036	0.1450**	0.0035
	(0.061)	(0.152)	(0.061)	(0.134)	(0.061)	(0.139)
Male X Age of Entry	-0.0245	-0.0279	-0.0722*	-0.0618*	-0.0627+	-0.0708*
	(0.039)	(0.039)	(0.040)	(0.037)	(0.044)	(0.040)
Male X Works in Formal Sector	0.6857*	0.6468				
	(0.422)	(0.457)				
Selection into Unemployment					0.5504	0.7846
					(2.992)	(3.366)
Selection into Informal Employment						
Selection into Formal Employment					2.3873*	2.3205+
					(1.436)	(1.477)
Selection into Student					-3.9200*	-4.7205**
					(2.067)	(1.877)
Individual and Household Controls	X	X	X	X	X	X
2004 and 2012 Community Controls	X	X	X	X	X	X

Constant	-0.3919	-0.9700	0.4008	-0.1870	-1.0283	-1.3324
	(1.046)	(1.285)	(1.080)	(1.273)	(1.169)	(1.493)

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1, +p<0.15

Table A.14 (cont.): Estimated Coefficients on within Sector Earnings

	Formal			
	No Selection Correction		Selection Correction	
	OLS	IV	OLS	IV
	7	8	9	10
Conscientiousness z-score	0.9751+	1.1003	1.0471+	1.1438**
	(0.676)	(0.792)	(0.691)	(0.571)
Extraversion z-score	-0.4597	-0.4588	-0.5681	-0.5564
	(0.570)	(0.455)	(0.603)	(0.581)
Openness to Experience z-score	-0.6768	-0.8105+	-0.5788	-0.8055+
	(0.568)	(0.530)	(0.630)	(0.503)
Agreeableness z-score	0.0182	-0.0739	-0.0468	-0.0790
	(0.370)	(0.402)	(0.368)	(0.393)
Neuroticism z-score	-0.4641	-0.7772*	-0.5519+	-0.8136*
	(0.366)	(0.401)	(0.376)	(0.429)
Male	-1.0303	4.4113+	-0.5308	4.7897
	(2.040)	(2.868)	(2.273)	(4.849)
Standardized Cognitive Test Score	0.2745	-1.8686	0.2632	-1.7445
	(0.515)	(1.507)	(0.556)	(1.717)
Grade	-0.0548	0.4124*	-0.0236	0.3981
	(0.122)	(0.253)	(0.147)	(0.355)
Age of Job Entry	0.0035	0.0279	-0.0019	0.0233
	(0.085)	(0.084)	(0.142)	(0.146)
Works in Formal Sector				
Male X Conscientiousness	-1.0054	-1.2268	-1.0964	-1.2264*
	(0.789)	(0.890)	(0.807)	(0.684)
Male X Extraversion	0.4211	0.4652	0.4623	0.5200
	(0.763)	(0.675)	(0.771)	(0.727)
Male X Openness	0.3566	0.4646	0.2809	0.4543
	(0.656)	(0.642)	(0.688)	(0.631)
Male X Agreeableness	-0.1922	-0.1293	-0.1420	1.3207***
	(0.507)	(0.578)	(0.510)	(0.492)
Male X Neuroticism	0.9338*	1.2811***	0.9653**	-0.1227
	(0.492)	(0.455)	(0.486)	(0.429)
Male X Cognition	-0.1407	2.3937+	-0.0995	2.3431
	(0.601)	(1.523)	(0.648)	(1.863)
Male X Grade	0.1009	-0.5042*	0.0548	-0.5098
	(0.156)	(0.287)	(0.178)	(0.462)
Male X Age of Entry	0.0632	0.0318	0.0653	0.0198
	(0.115)	(0.108)	(0.131)	(0.132)
Male X Works in Formal Sector				
Selection into Unemployment			-4.1637	-3.9432
			(6.118)	(5.398)
Selection into Informal Employment			-0.4691	1.1350
			(2.303)	(2.515)
Selection into Formal Employment				
Selection into Student			4.8174	2.6692
			(5.321)	(5.544)
Individual and Household Controls	X	X	X	X
2004 and 2012 Community Controls	X	X	X	X
Constant	-1.8241	-6.0348	-1.1574	-4.7060
	(2.858)	(4.309)	(4.781)	(7.767)

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1, +p<0.15