Entrepreneurship and Self-employment in Developing Countries: Evidence From Indonesia

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Current Version: November 25, 2019

Abstract

I use the Indonesia Family Life Survey to study selection into entrepreneurship as well as the returns to entrepreneurial activity. I first distinguish between entrepreneurs — the self-employed who hire permanent workers — and other self-employed. I find that both entrepreneurs and wage workers are positively selected in terms of education and cognitive skills relative to the self-employed. I also find that entrepreneurs score higher on "openness" and "extraversion" on the Big Five Personality Traits when compared to wage workers. The panel data also allows me to focus on the transition into entrepreneurship. Those who enter entrepreneurship are more likely to be open, and interestingly, less likely to be conscientious than wage workers. For each percentile of the earning distribution, entrepreneurs always earn more than wage workers and the self-employed, and the self-employed earn the least beyond the first quintile. My research shows that individual traits are important factors in explaining entrepreneurship even in developing economies where liquidity and institutional barriers are presumed to play a large role.

Keywords: Self-employment, Entrepreneurship, Development, Big Five Personality

JEL classification: O1, L2

1   Introduction

Entrepreneurship is usually viewed as crucial to economic growth, and governments often tailor policies to encourage self-employment and to support businesses (Acs and Szerb, 2007; Acs et al., 2008). It is difficult, however, to define and measure entrepreneurship. If one uses the most often-used definition — self-employment — one is left with a puzzle. Self-employment rates in high-income countries stand at about 10-15%, while it stands at more than 30% in middle and low income countries.[1] The literature has pointed out that self-employment in developing countries is heterogeneous (Schoar, 2010). For example, de Mel et al. (2010) look into differences between employers and own-account self-employed workers in Sri Lanka, and show that employers have better cognitive abilities, come from better family backgrounds, and possess higher entrepreneurial attitudes. Banerjee et al. (2017) distinguish between "gung-ho entrepreneurs" who had already owned businesses prior to the microfinance intervention and other "reluctant entrepreneurs" who have no such experience. They find that the former perform significantly better. It is clear that self-employment is a heterogeneous pool where some have better abilities and higher potential to succeed.

In this study, I investigate the characteristics associated with selection into different types of self-employment. Using panel data from Indonesia Family Life Survey (IFLS), I distinguish between "entrepreneurs" (the self-employed with permanent workers) and "self-employed" (the self-employed who are own-account or with temporary/unpaid workers). I look at not only how cognitive abilities, measured by years of schooling, are associated with selection into entrepreneurship but also the role of non-cognitive abilities measured by Big Five Personality traits. The results show that without disaggregating self-employment, selection into self-employment is associated with less education and higher openness compared to wage workers. However, when I disaggregate self-employment, I find that entrepreneurs have similar cognitive skills but higher scores on openness and extraversion relative to wage workers. The other types of self-employed also have higher scores on openness but

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[1]World Bank ILO database: https://data.worldbank.org/indicator/SL.EMP.SELF.ZS

have less education and cognitive skills compared to wage workers. The results indicate that failure to distinguish across the different types of the self-employed can be misleading.

In addition to examining traits associated with different employment types, it is of interest to look at entrants — those who switch from wage work to entrepreneurship or self-employment. Policies are often set up to encourage individuals to start a business. What are the characteristics of those who start a business? With the longitudinal dataset, I am able to look at the characteristics associated with entry from wage work into entrepreneurship. I find that entrants have similar levels of education as wage workers so cognitive skills are not the distinguishing characteristic of entrants into entrepreneurship, but openness and extraversion are. While somewhat imprecisely estimated, I find the magnitude of the coefficients on openness and extraversion are similar in the entry equations. Interestingly, entrants score somewhat below wage workers in terms of "conscientiousness." These results echo the findings in developed economies such as Levine and Rubinstein (2017) which show that entrepreneurs are not only smart but also risk takers and rule-breakers. On the other hand, as expected, individuals who transition from wage work to other types of self-employment are negatively selected in terms of education.

One question is whether entrepreneurship has a return. Give that it is a risky enterprise and requires equal amounts of cognitive ability, it would be puzzling if there was no return. I show that it is crucial to distinguish between the two types of self-employment to answer this question. When pooling all self-employment together, the mean earning is about $200 less than wage workers annually. However when I distinguish between the entrepreneurs and the other self-employed, I find that median earnings of entrepreneurs is $1424 more than wage workers, while median earning of other self-employed workers is $64 less than wage workers. Furthermore, for all earning percentiles, entrepreneurs earn more than wage workers and other self-employment types. Focusing on those who transition into entrepreneurship from wage work, I find that mean earnings increase by $1598 while those who transition from wage work to other self-employed categories lose about $570.

This paper adds to the literature in several ways. First, I show as others have found that it is important to distinguish between different types of self-employment—those who are entrepreneurs

and those who for the most employ just themselves. The entrepreneurs are more educated and have higher cognitive scores relative to the other categories of the self-employed. Second, to the best of my knowledge, this is the first paper to show that individual personality traits, in addition to cognitive ability, play an important role in the selection into entrepreneurship in developing countries. I show that entrepreneurs score higher on "openness" and "extraversion" than wage workers and those who transition from wage work to entrepreneurship are less "conscientious" than those who stay in wage work—a finding similar to what others have found in the U.S. Finally, I am able to exploit a large panel dataset to show that returns to entrepreneurship is substantial in developing economies. Those who enter entrepreneurship from wage work experience almost \$1600 gain in mean earnings. If we pool all self-employed, there is essentially zero gain in earnings. These results again point to the importance of distinguishing between the types of self-employment in developing country context.

The rest of paper is organized as follows. Section 2 reviews the literature on selection into entrepreneurship and the importance of personality traits. Section 3 describes the data used and the summary statistics. Section 4 presents the results of characteristics related to entry into entrepreneurship. Section 5 analyzes the earning distribution by employment types. Section 6 provides additional information regarding the life cycle path of employment types. Section 7 presents robustness checks. Section 8 concludes.

2 Literature Review

2.1 Selection into Entrepreneurship

The literature suggests two types of constraints on entrepreneurship: liquidity constraints and human capital constraints. Liquidity constraints prevent individuals with high entrepreneurial ability from starting their own businesses (Evans and Jovanovic, 1989; Holtz-Eakin et al., 1994; Lindh and Ohlsson, 1996). Governments and activists over the past three decades have tried to relax the liquidity constraints and to increase credit access to the poor. For example, the foundation of

microfinance institution (MFI) is based on the belief that poor households do not have access to traditional commercial banks, and thus cannot start or expand their businesses. On the other hand, other empirical work emphasize the importance of human capital for the formation and performance of firms (Dunn and Holtz-Eakin, 2000; Acs and Armington, 2004; Colombo and Grilli, 2005). In the context of microfinance experiments, recent studies also show that interventions which include business consulting and mentors improve the performance of businesses (Lafortune et al., 2018; Brooks et al., 2018). In addition to credit access and human capital, Hamilton (2000) has discussed the importance of non-pecuniary utility contributing to the sorting into self-employment.

2.2   Entrepreneurship and Big Five Personality Traits

The literature has studied how personality traits affect economic decisions and occupational choice (Heckman et al., 2006; Almlund et al., 2011) In particular, Big Five Personality traits, openness (to new experience), conscientiousness, extraversion, agreeableness, neuroticism, have been shown predictive on the labor market outcomes in Germany and UK, but have heterogeneous effects on men and women. For example, (Heineck, 2011) find that openness is positively related to hourly wage for women, but negatively related for men. Extraversion and aggreableness are negatively related to wage for women, positively and insignificantly related for men. (Rustichini et al., 2016) show that U.S. truck drivers who score higher on extraversion and conscientiousness have lower credit score, and those who score higher on openness and agreeableness are less likely to smoke. Using IFLS, Adhitya et al. (2019) shows that extraversion is a strong predictor of higher wage for both men and women in Indonesia.

Entry into entrepreneurship has been shown to be related to soft skills and social emotions, such as illicit behaviors and optimism (Fairlie, 2002; Levine and Rubinstein, 2017; Puri and Robinson, 2007, 2013). Big Five Personality traits are also shown to be relevant to the entry, exit, and performance of self-employment. Using German Socio-Economic Panel (GSEOP), Caliendo et al. (2014) find that out of the five traits, openness and extraversion are predictive of entry into self-employment, but only agreeableness is predictive of exit. Similarly, using the National Survey

of Midlife Development in the United States (MIDUS), Hamilton et al. (2018) show that while both openness and extraversion are predictive of entry into self-employment, only extraversion is predictive of being profitable. Among the five traits, openness and extraversion are related to higher risk tolerance, while neuroticism is related to lower risk tolerance (Dohmen et al., 2010; Oehler and Wedlich, 2018).

Most of the studies regarding entrepreneurship and personality traits, however, are in high-income countries, little is known regarding the relevance of personality traits on entrepreneurship in developing countries. One of the reasons is the difficulty in measuring Big Five Personality. Laajaj and Macours (2018) and Laajaj et al. (2019) point out that the existing questions measuring Big Five Personality are designed and developed in developed countries, and may not be applicable to low-income agricultural population and different cultural contexts. However, the common attenuation problem resulting from measurement errors, does not nullify the effects of Big Five Personality Traits in this study. Given the under-developed institutions in low-income countries, personality traits may not play a significant role: Financial development, capital and credit access are usually considered the main constraints of entrepreneurship (King and Levine, 1993; Evans and Jovanovic, 1989; de Mel et al., 2008). Nevertheless, using the data from Indonesia, this study show that personality traits do play a role in selection into entrepreneurship. Moreover, the patterns are similar to the developed countries.

3   Data and Summary Statistics

Indonesia is the fourth populous country in the world, and has been steadily growing since Asian Financial Crisis in 1997-1998.[2] The GDP per capita has grown from $780 in 2000 to more than $3000 in 2010.[3] In 2003, World Bank changed Indonesia's classification from low income country (GNI per capita less than $765) to lower-middle income country (GNI per capita $766-$3,050). The poverty rate has reduced from 40% of the population in 2000 to 7% in 2015.[4] However, around

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[2]World Bank Overview: https://www.worldbank.org/en/country/indonesia/overview
[3]World Bank national accounts data: https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=ID
[4]World Bank Data: https://data.worldbank.org/indicator/SI.POV.DDAY?locations=ID

20% of the population are still vulnerable of economic condition, and more than 10% of the GDP is contributed by agriculture sector.[5]

3.1   Indonesia Family Life Survey

This paper uses Indonesia Family Life Survey (IFLS) to understand the choice of employment types in developing countries. IFLS is a longitudinal survey initiated and conducted by RAND in 1993, the sample is representative of 83% of Indonesian population and is designed to study socioeconomic and health characteristics of households.[6] The original sample included 7,224 households, more than 22,000 individuals.[7] The subsequent waves in 1997, 2000, 2007, and 2014 track the original 1993 households, and follow their split-off households. Due to the conformity of questionnaire, I use only the data from the last three waves (2000, 2007, and 2014). The workers analyzed in this study are aged 20-60 males who work in non-agricultural sector. As pointed out by Parker (2018) and Blanchflower (2000), agricultural sector usually is excluded in many studies of entrepreneurship, given the difficulty to distinguish self-reported self-employed workers in agriculture from unpaid family workers.

IFLS defines different employment types in detail similar to the categories in the Indonesian Census. Specifically, individuals aged 15 or more are asked about the primary job which consumes the most of their time, what sector is the job in, and the employment types: "Which category best describes the work that you do?" The respondents then answered one of the following: (i) Self-employed (without help), (ii) self-employed with unpaid family worker/temporary worker, (iii) self-employed with permanent worker, (iv) government worker, (v) private worker, (vi) casual worker in agriculture, (vii) casual worker not in agriculture, (viii) unpaid family worker. I group self-employed workers into two types: "Entrepreneurs", who are self-employed with permanent workers, and "Self-employed", who are self-employed without help or with temporary workers/unpaid family

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[5]World Bank national accounts data: https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS?locations=ID

[6]The original sample only covered 13 of 27 provinces in Indonesia due to the higher cost of more remote provinces, and Aceh province was also excluded due to the political unrest.

[7]The sampling scheme was based on the enumeration areas (EAs) from the National Socioeconomic Survey (SUSE-NAS), where each EA usually consists of 200 to 300 households. IFLS randomly selected 321 EAs from the 13 provinces; 20 households were randomly chosen from urban EAs, and 30 households from rural EAs.

workers.

I categorize the the self-employed with temporary workers/unpaid family workers as "Self-employed" based on two reasons: First, temporary workers are those work for wages "based on the length of time working or on a work output volume basis." On the other hand, permanent workers "receive salary/wages in cash and in goods permanently, regardless of the availability of economic output/activity."[8] Having permanent workers is distinct from having temporary workers in terms of liability: employers of permanent workers are committed to the payroll regardless of the business risks. Second, about 37% of self-employed with temporary/unpaid family workers have a secondary job, while 32% of self-employed without help and 23% of self-employed with permanent workers have a secondary job.

Following the employment type question, wage workers are asked about their last year's salary/wage including the value of all benefits. Wages of unpaid family workers are assumed to be zero since they are not asked about their salary/wage. Additionally, I also include the amount of year-end-bonuses and other bonuses in calculating earnings. Individuals who are self-employed are asked about approximate net profits gained from the business last year, taking out all business expenses.

Because household wealth is relevant to the choice of employment types, I use questions regarding the ownership of assets owned by the household, shown in A2, to measure household wealth. Some asset ownership, however, can be noisy to understand the meaningful wealth owned by the household. For example, home ownership in rural areas can be qualitatively inferior and have little monetary value comparing with home ownership in urban areas. Therefore, I weigh the binary asset ownership variables using the first component generated by principal-component analysis, and standardize the asset index into a continuous variable.

Table 1 summarizes the characteristics by each employment type. When all self-employed workers are pooled together, they constitute around 32% of all workers. However, when breaking down to entrepreneurs and the self-employed, entrepreneurs only make up to 3.2% out of all workers, while

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[8]Translated survey manual from IPUMS-International: https://international.ipums.org/international-action/source_documents/enum_instruct_id2000a_tag.xml

the self-employed are 90% of self-employment. When looking at the characteristics of wage workers and pooled self-employment, self-employment seems to be inferior: they are about two years less educated, own less household asset, work about similar hours as wage workers but earn less median income, and are more likely to have a secondary job. Nevertheless, when the self-employment is disintegrate into entrepreneurs and the self-employed, entrepreneurs have similar education as wage workers, work longer hours and earn more than the wage workers in both mean and median income; while self-employment workers are less educated, earn less median income and are more likely to have a secondary job. Table A3 summarizes the proportion of sector by each employment type. The largest sectors are social services, such as educational and health services, followed by wholesale, retail and hospitality sector, and manufacturing sector. The plurality of entrepreneurs and the self-employed are both in wholesale, retail and hospitality sector, the second largest sector for entrepreneurs is manufacturing, while for the self-employed is social services. In addition, about 13% of the self-employed are in transportation, storage and communication sector, such as transport equipment operators and freight operators, while only 2% of entrepreneurs in this sector.

To address concerns that IFLS only sampled 83% of the Indonesia population in the initial wave, I also use the 2000 Indonesia Census which is a representative sample of the entire population. Fortunately, the categories of employment types are the same in the Census so that I again define entrepreneurs as those who are self-employed with permanent workers, and categorize all other self-employed into one group. As shown in Table A4, wage workers make up to 62.62% of all workers, entrepreneurs 2.09%, and the self-employed 35.29%. In the Census the fraction who are wage workers and entrepreneurs are somewhat lower than in the IFLS. However, the demographic characteristics across employment types are similar: the average age of workers is around 36, about 80% workers are married, and 67% live in urban areas while the other types of the self-employed are the least likely to live in urban areas. Wage workers are more educated than the pooled self-employed: around 50% of the wage workers are high school graduates, while about 60% of the pooled self-employed are elementary and junior high school graduates. Nevertheless, when we disaggregate self-employment into entrepreneurs and other self-employed, the educational profile of entrepreneurs

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are similar to wage workers: 46% of the entrepreneurs are high school graduates, while 26% of the other self-employed are high school graduates.

3.2 Big Five Personality Traits

To explore the importance of personality traits on entrepreneurship, I use a new module included by IFLS in 2014 where Big Five Personality traits were measured. By the definition of American Psychological Association (APA) dictionary, Big Five Personality is "a model of the primary dimensions of individual differences in personality." The dimensions are usually labeled as: Openness to new experiences, conscientiousness, extraversion, agreeableness, and neuroticism. The contents of five personality traits are summarized in Table A1. IFLS adopted a short version of the questionnaire to measured the big five personality traits, where each trait consists of three relevant questions. The effective assessment of a short version is proven by Lang et al. (2011) using the German Socio-Economic Panel (SOEP). Because IFLS only incorporates the module since 2014, a caveat to use the measure in this study is to assume that the personality traits do not change over time. As shown by Cobb-Clark and Schurer (2012), Big Five Personality traits tend to stay stable for the working-age adults, and adverse events are in general unrelated to within-person changes. Hence, the restriction to workers aged 20-60 may mitigate the concerns of changes in Big Five Personality over time.

Figure 1 shows the standardized Big Five Personality traits by employment types. When pooling all self-employment, only extraversion is significantly different between pooled self-employment and wage workers. However, when we disaggregate into entrepreneurs and other self-employed, entrepreneurs have significantly higher openness and extraversion, while the other self-employed have similar levels of openness and extraversion as wage workers. Concerns may arise if Big Five Personality traits, schooling and household wealth are strongly dependent. Table A6 describes the correlation of Big Five Personality traits, years of schooling and asset index. As shown in the table, neuroticism is negatively correlated with conscientiousness and extraversion, and all other Big Five Personality traits are positively correlated. Other than neuroticism, all Big Five Personality traits

are positively correlated with years of schooling and asset index. To further explore the possibility of collinearity among Big Five Personality traits, Table A7 test the variance inflation factors (VIF) of the five dimensions of personality.[9] Since all VIFs of Big Five Personality traits are much less than 10, no high collinearity presents among the traits.

4 Who Becomes Entrepreneurs? Selection Into Different Employment Types

To understand the selection into employment types, I estimate a multinomial logit probability model as follows:

$$ln\frac{P_{ijt}}{P_{iwt}} = \beta_{0,j} + \beta_{1,j}\text{Education}_{i,t} + \beta_{2,j}\text{Asset Index}_{i,t}$$

(1)
$$+ \sum_{k=1}^{5} \beta_{3,k,j}\text{Personality}_{k,i} + \beta_{4,j}f(age)_{i,t} + X'_{i,t}\Gamma_{X,j}$$

where P_{ijt} is the probability of person i being $j \in \{\text{Entrepreneur}, \text{Self-employed}\}$ at wave t; P_{iwt} is the probability of person i being a wage worker at wave t; Education is measured in years of schooling; Asset Index is the asset index imputed by a series of question about household asset ownership; Personality is Big 5 personality indexes; $f(age)_{i,t}$ is a quadratic age function; $X_{i,t}$ is a vector of controls: dummies for married and Muslim, aggregate sector, region-urban fixed effect, survey year fixed effects, and standard errors are clustered at sub-district level.

For the estimation results, both log odds ratios and marginal effects are presented. The former shows how the probabilities selecting into entrepreneurs and the self-employed relative to the prob-

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[9]Variance inflation factors (VIF) are used to detect the likely multicollinearity among the explanatory variables. Suppose there are k explanatory variables, $X_1, \ldots X_k$. VIF is defined as

$$VIF_i = \frac{1}{1 - R_i^2}$$

where R_i^2 is derived from the regression of X_i on $\mathbf{X_{-i}}$

$$X_i = \alpha_0 + \alpha_1 X_1 + \cdots + \alpha_{i-1}X_{i-1} + \alpha_{i+1}X_{i+1} + \cdots + \alpha_k X_k + e$$

Therefore, a greater VIF indicates a severer multicollinearity. The rule of thumb suggests that VIF greater than 10 indicates high multicollinearity (O'brien, 2007).

ability selecting into wage workers, and the latter shows the magnitude of characteristics related to selection probabilities.

4.1 Entry into Different Self-employment Types: Pooled All Panel Individuals

Table 2 shows the log odds ratios relative to wage workers from equation 1. In column (1) and (3), self-employment is pooled, where the estimation is logit probability model. From column (1), selection into pooled self-employment is associated with less education and higher household asset relative to wage workers. However, when distinguishing self-employment between entrepreneurs and the self-employed in column (2), lower education related to the sorting into self-employment is driven by the type of the self-employed relative to wage workers, and higher household asset is driven by the type of entrepreneurs, although it is also significantly associated with the sorting into the self-employed relative to wage workers. In column (3), when Big Five Personality traits are included, selection into pooled self-employment is associated with even less education and household asset become less important comparing with selection into wage workers. Among Big Five Personality traits, openness is positively associated with selection into pooled self-employment, extraversion and neuroticism are marginally associated with the selection, while conscientiousness and agreeableness are insignificantly negatively related to the selection relative to selection into wage workers. When disaggregating self-employment in column (4), both openness and extraversion are significantly positively related to sorting into entrepreneurs relative to wage workers, while only openness is significantly positively associated with selection into the self-employed.

Table 3 presents the marginal effects of these characteristics. The marginal effects of years of schooling and asset index do not vary much when Big Five Personality traits are included in column (3) and (4). In column (4), years of schooling is insignificantly related to sorting into entrepreneurs, and asset index is significantly positively related. Specifically, an increase of one standard deviation in asset index is associated with 56% increase in selecting into entrepreneurs ($0.018/0.032 \approx 56\%$). In contrast, years of schooling is significantly related to sorting into the self-employed, and insignificantly related. Considering an increase of half of the standard deviation in years of schooling, which

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is about the difference of average years of schooling between entrepreneurs and the self-employed, it is associated with 10% decrease in selecting into the self-employed. Table 4 further disintegrates education into five highest levels: less than elementary school, elementary graduate, junior high school graduate, high school graduate, and some college education. As shown in the last column, the negative association of education and selection into the self-employed is driven non-linearly by higher educational level: Higher the education level is related to lower probability selecting into the self-employed, while no significant difference has found between less than elementary education and completion of elementary education.

Among Big Five personality traits, openness and extraversion are strong predictors related to selection into entrepreneurs. One standard deviation increase in openness is associated with 25% increase in selecting into entrepreneurs; one standard deviation increase in extraversion is associated with 18.8% increase in selecting into entrepreneurs. On the other hand, one standard deviation increase of openness has a similar magnitude as one year decrease of schooling in association of sorting into the self-employed. A standard deviation increase of openness is related to about 5% increase sorting into the self-employed.

To sum up, when pooling all self-employment together, self-employment appears to be associated with lower education, higher openness, and more household asset relative to wage workers. Nevertheless, when disintegrating into entrepreneurs and the self-employed, selection of entrepreneurs are related to more household asset, higher openness *and* extraversion, while selection of the self-employed are related to lower education and higher openness. The significant marginal effects of asset index for entrepreneurs but not for the self-employed could be indicative of the differences of entrepreneurship and subsistence self-employment: Entrepreneurs demand more capital to build a business, while subsistence self-employment requires little capital to start a business. On the other hand, the importance of Big Five Personality traits in selection into different employment types in Indonesia appears to be similar to the results in the U.S. Hamilton et al. (2018) find openness is significantly related to selection into self-employment, while extraversion is the factor that related to being profitable.

4.2 Entry into Different Self-employment Types: Transition From Wage Work

It is common to assume that employment types are determined ex ante and do not change over time in economic models (Evans and Jovanovic, 1989). However, transitions among different employment types could be prevalent in reality, especially when poor households in low-income countries usually have a "portfolio of work" (Blattman and Ralston, 2015). Therefore, we would wonder if the previous results are driven by the "always stayers", those who enter a particular type of employment and do not switch at all could have the most persistent wealth and also score the highest in personality traits. Thus, it is not obvious the "switchers" would have the same pattern of characteristics related to the selection into entrepreneurs and the self-employed. Using the panel data of IFLS, I am able to trace the transitions among different employment types.

Table 5 shows the transition proportion between waves, i.e. the 7-year transitions. The column labels the employment type from the last wave, and the row labels the employment type of the current wave. Each column sums up to one. The diagonal represents the proportion of workers staying for the same type: 92% of wage workers stay as wage workers, about 46% entrepreneurs stay as entrepreneurs and the same for the self-employed. It is not surprising that wage workers are the most stable type, while transitions from entrepreneurs to wage workers and to the self-employed are similar in proportion, and transitions from the self-employed to wage workers are two times of transitions to entrepreneurs. I focus on the transition from wage workers for two reasons. First, although wage work is persistent, transitions from wage workers are the largest: the total number of transitions from entrepreneurs and the self-employed are 194, while the total number of transitions from wage workers are 205. Second, policies encouraging the entry into entrepreneurship nudges at the extensive margins, that is, encouraging wage workers to enter self-employment. Therefore, looking at the transition from wage workers is useful to understand the type of wage workers switching to entrepreneurs and the self-employed.

Table 6 shows the log odds ratio of transition from wage workers. Transition into pooled self-employment, again, is related to lower education which is driven by the self-employed, and higher

asset index from last wave which is driven by entrepreneurs, although imprecisely estimated. While higher openness remains positively related to the selection into both entrepreneurs and the self-employed, extraversion is positively related to selection into entrepreneurs and is negatively related to selection into the self-employed, despite being insignificant. The imprecise estimates may be due to the small sample size: Transition from wage workers to entrepreneurs only makes up to 43 observations.

Interestingly, higher conscientiousness is significantly associated with *lower* probability of sorting into entrepreneurs. As pointed out in Costa et al. (1991); De Hoogh et al. (2005), conscientiousness is the tendency to be responsible and hardworking, but "conscientiousness also reflects the tendency to be cautious, thoughtful and a strict adherence to standards of conduct", which could be a constraint under a highly-challenging, fast-paced working environment. Moreover, Moutafi et al. (2004) find that conscientiousness is negatively correlated with fluid intelligence, which measures the cognitive ability of abstract reasoning and applying logic to solve problem. Thus, higher conscientiousness may not always be an appealing trait for an entrepreneur.

5 Is There a Return to Entrepreneurship? Employment Type and Earnings

The results of characteristics related to the selection into employment types have shown that pre-determined factors such as education and personality traits are distinct between entrepreneurs and the self-employed. I first look into the earning distribution and percentile by employment type. As shown in Table 1, entrepreneurs have the highest median earning, followed by wage workers and then the self-employed. However, the self-employed have higher average earning than wage workers, which are driven by some outliers. Therefore, I exclude the earning observations of top and bottom one percentile for each employment type. Figure 2 plots the earning density function by employment type. While earning distribution of all employment types are right-skewed, entrepreneurs' earning distribution has the longest right tail. Figure 3 graphs the earning percentile by employment type.

For all percentile, entrepreneurs always earn the most, while the self-employed earn similarly as wage workers in the first quintile but earn less than wage workers beyond the first quintile.

Table 10 estimates OLS regression of earnings on employment types, education, asset index, Big Five Personality, and controls stated in equation 1. First four columns show the results from pooling all panel individuals. When pooling all self-employment together, the mean earning difference between wage workers and self-employed workers is insignificant. When distinguishing self-employment between entrepreneurs and the self-employed, entrepreneurs earn $1438 more than wage workers, and the self-employed earn $199 less than wage worekers. When Big Five Personality traits are included, we see that extraversion is positively related to earnings, and neuroticism is negatively related to earnings (i.e. being more neurotic is related to lower earnings).

Column (5) and (6) are the first-difference OLS estimation for those who transition from wage workers. Again, when we pool all self-employment transitioning from wage workers, no earing premium has found. However, when distinguishing between entrepreneurs and the self-employed, entrepreneurs gain $1266 in mean earnings comparing with the earnings when they were wage workers, while the self-employed bear $560 loss in mean earnings comparing with their previous wage earnings.

Despite excluding the top and bottom one percentile earning observations, the OLS results can still be driven by extreme values of top percentiles. Thus, Table 11 estimates median regression of earnings. The median earning of entrepreneurs is $236-$241 higher than wage workers, the median earning of the self-employed is $64-$66 less than wage workers. While conscientiousness is negatively related to earnings and extraversion is positively related to earnings when pooling self-employment, these two traits lose significance when decomposing self-employment into entrepreneurs and the self-employed. Neuroticism, however, is still significantly negatively correlated with earnings. When focusing on the earning gains for those who transitioned from wage workers, entrepreneurs gain $364 more than those who remained as wage workers, although imprecisely estimated. The self-employed, on the other hand, earn $533 less comparing with their wage earnings.

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6 Employment Types over the Life Cycle

To further understand the transition among employment types, I utilize the retrospective employment information in IFLS, where information regarding labor force participation and employment types are elicited for years in between the waves for individuals who are 15 and older. For example, if the survey was conducted in 2014, the individuals would be asked if they worked in year of 2013; if they did, what was their employment type. Next, in year 2012, if they worked and what was their employment type, and traced all years back to 2007, the previous survey wave. By using these questions, I am able to construct work histories and construct a profile of life-cycle employment type.

Table 12 shows the proportion of transitions conditional on last year's employment type. Columns show the employment type in the previous year while rows show the proportions in each employment type in the current year. For example, the first cell, 0.910, means that for individuals who were a wage worker last year, 91% stay as wage workers in the current year. The cell below, 0.003, means that for individuals who were a wage worker last year, 0.3% transition to entrepreneurs in the current year. Therefore, the diagonal reports the proportion staying in the same employment type. As shown in the table, except for non-workers, employment types are quite stable: approximately 85% or more stay in the same employment type.

Figure 4 graphs the person-age by cohort and employment type. The younger cohorts enter the labor market when they are around 20 to 24 years old, and the older cohorts exit the labor market whey they are approximately 56 and above. There are clear cohort effects in agricultural work: the proportion in the agriculture sector decreases from older cohorts to younger cohorts. However, it still makes up more than 20% of all workers. While around 35-45% of workers enter the labor market as wage workers, entrepreneurs and other self-employed at young ages seem less common: Only 6-12% of workers enter the labor market as the self-employed before age 25, and less than 1% of workers are entrepreneurs. The proportion of other self-employed increases to more than 15% before age 30, and remains relatively stable between age 40 to 50. On the other hand, the

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proportion of entrepreneurs increases to 2-3% only at ages 30-40 years old, and it is fairly volatile.

7 Robustness Checks

7.1 Cognitive Capacity

Table 13

7.2 Big Five Personality Traits: Using Ordinal Measure

Table 14

7.3 Transition From Wage Work and Risk Tolerance

Table 15

8 Conclusion

In this paper, I use data from Indonesia to study heterogeneity in self-employment. Separating out different types of self-employment, I find that employers of permanent employers are distinct from other self-employed and are more likely to be true entrepreneurs. They are more educated than the other self-employed and have higher household assets, and also experience earnings gains rather than losses when they transition from being wage workers. Moreover, entrepreneurs score higher on both openness and extraversion compared to wage workers. These results point to the importance of individual traits—both cognitive ability and personality traits in selection into entrepreneurship. Microfinance is founded on the notion that access to credit will encourage business ownership and a path out of poverty. My research shows that these interventions are more likely to be impactful when we understand the individual traits associated with entrepreneurship. One question is whether these traits are acquired or stable—an important question which I cannot address in my study due to lack of data availability. I leave these important questions for future work.

References

Acs, Zoltan J. and Catherine Armington, "The impact of geographic differences in human capital on service firm formation rates," *Journal of Urban Economics*, 2004, *56* (2), 244 – 278.

_ **and Laszlo Szerb**, "Entrepreneurship, Economic Growth and Public Policy," *Small Business Economics*, Mar 2007, *28* (2), 109–122.

_ **, Sameeksha Desai, and Jolanda Hessels**, "Entrepreneurship, economic development and institutions," *Small Business Economics*, Oct 2008, *31* (3), 219–234.

Adhitya, Dhian, Tri Mulyaningsih, and Bhimo Rizky Samudro, "The Role of Cognitive and Non-Cognitive Skills on Labour Market Outcomes in Indonesia," *Malaysian Journal of Economics*, 2019, *53* (1), 3–16.

Almlund, Mathilde, Angela Lee Duckworth, James Heckman, and Tim Kautz, "Personality Psychology and Economics," in Eric A. Hanushek, Stephen Machin, and Ludger Woessmann, eds., *Handbook of The Economics of Education*, Vol. 4 of *Handbook of the Economics of Education*, Elsevier, 2011, pp. 1 – 181.

Banerjee, Abhijit V., Emily Breza, Esther Duflo, and Cynthia Kinnan, "Do Credit Constraints Limit Entrepreneurship? Heterogeneity in the Returns to Microfinance," *Buffett Institute Global Poverty Research Lab Working Paper*, 2017, (No. 17-104).

Blanchflower, David G., "Self-employment in OECD countries," *Labour Economics*, 2000, *7* (5), 471 – 505.

Blattman, Christopher and Laura Ralston, "Generating Employment in Poor and Fragile States: Evidence from Labor Market and Entrepreneurship Programs," *SSRN*, July 2015.

Brooks, Wyatt, Kevin Donovan, and Terence R. Johnson, "Mentors or Teachers? Microenterprise Training in Kenya," *American Economic Journal: Applied Economics*, October 2018, *10* (4), 196–221.

Caliendo, Marco, Frank Fossen, and Alexander S. Kritikos, "Personality characteristics and the decisions to become and stay self-employed," *Small Business Economics*, Apr 2014, *42* (4), 787–814.

Cobb-Clark, Deborah A. and Stefanie Schurer, "The stability of big-five personality traits," *Economics Letters*, 2012, *115* (1), 11 – 15.

Colombo, Massimo G. and Luca Grilli, "Founders' human capital and the growth of new technology-based firms: A competence-based view," *Research Policy*, 2005, *34* (6), 795 – 816.

Costa, Paul T., Robert R. McCrae, and David A. Dye, "Facet Scales for Agreeableness and Conscientiousness: A Revision of the NEO Personality Inventory," *Personality and Individual Differences*, 1991, *12* (9), 887 – 898.

de Mel, Suresh, David McKenzie, and Christopher Woodruff, "Returns to Capital in Microenterprises: Evidence from a Field Experiment," *The Quarterly Journal of Economics*, 11 2008, *123* (4), 1329–1372.

_ , _ , and _ , "Who are the Microenterprise Owners? Evidence from Sri Lanka on Tokman versus De Soto," *National Bureau of Economic Research*, May 2010, pp. 63–87.

Dohmen, Thomas, Armin Falk, David Huffman, and Uwe Sunde, "Are Risk Aversion and Impatience Related to Cognitive Ability?," *American Economic Review*, June 2010, *100* (3), 1238–60.

Dunn, Thomas and Douglas Holtz-Eakin, "Financial Capital, Human Capital, and the Transition to Self-Employment: Evidence from Intergenerational Links," *Journal of Labor Economics*, 2000, *18* (2), 282–305.

Evans, David S. and Boyan Jovanovic, "An Estimated Model of Entrepreneurial Choice under Liquidity Constraints," *Journal of Political Economy*, 1989, *97* (4), 808–827.

Fairlie, Robert W., "Drug Dealing and Legitimate Self-Employment," *Journal of Labor Economics*, 2002, *20* (3), 538–537.

Hamilton, Barton H., "Does Entrepreneurship Pay? An Empirical Analysis of the Returns to Self-Employment," *Journal of Political Economy*, 2000, *108* (3), 604–631.

Hamilton, Barton H, Nicholas W Papageorge, and Nidhi Pande, "The Right Stuff? Personality and Entrepreneurship," *National Bureau of Economic Research*, September 2018, (25006).

Heckman, James J., Jora Stixrud, and Sergio Urzua, "The Effects of Cognitive and Noncognitive Abilities on Labor Market Outcomes and Social Behavior," *Journal of Labor Economics*, 2006, *24* (3), 411–482.

Heineck, Guido, "Does It Pay To Be Nice? Personality And Earnings In The United Kingdom," *Industrial and Labor Relations Review*, 2011, *64* (5), 1020–1038.

Holtz-Eakin, Douglas, David Joulfaian, and Harvey S. Rosen, "Sticking it Out: Entrepreneurial Survival and Liquidity Constraints," *Journal of Political Economy*, 1994, *102* (1), 53–75.

Hoogh, Annebel H. B. De, Deanne N. Den Hartog, and Paul L. Koopman, "Linking the Big Five-Factors of personality to charismatic and transactional leadership; perceived dynamic work environment as a moderator," *Journal of Organizational Behavior*, 2005, *26* (7), 839–865.

King, Robert G. and Ross Levine, "Finance and Growth: Schumpeter Might Be Right," *The Quarterly Journal of Economics*, 08 1993, *108* (3), 717–737.

Laajaj, Rachid and Karen Macours, "Measuring Skills in Developing Countries," *C.E.P.R. Discussion Papers*, October 2018, (13271).

_ , _ , **Daniel Alejandro Pinzon Hernandez, Omar Arias, Samuel D. Gosling, Jeff Potter, Marta Rubio-Codina, and Renos Vakis**, "Challenges to capture the big five personality traits in non-WEIRD populations," *Science Advances*, 2019, *5* (7).

Lafortune, Jeanne, Julio Riutort, and José Tessada, "Role Models or Individual Consulting: The Impact of Personalizing Micro-entrepreneurship Training," *American Economic Journal: Applied Economics*, October 2018, *10* (4), 222–45.

Lang, Frieder R., Dennis John, Oliver Lüdtke, Jürgen Schupp, and Gert G. Wagner, "Short Assessment of the Big Five: Robust Across Survey Methods Except Telephone Interviewing," *Behavior Research Methods*, June 2011, *43* (2), 548–567. Additional information: This article is published with open access at Springerlink.com: doi:10.3758/s13428-011-0066-z.

Levine, Ross and Yona Rubinstein, "Smart and Illicit: Who Becomes an Entrepreneur and Do They Earn More?," *The Quarterly Journal of Economics*, 2017, *132* (2), 963–1018.

Lindh, Thomas and Henry Ohlsson, "Self-Employment and Windfall Gains: Evidence from the Swedish Lottery," *The Economic Journal*, 1996, *106* (439), 1515–1526.

Moutafi, Joanna, Adrian Furnham, and Laurence Paltiel, "Why is Conscientiousness negatively correlated with intelligence?," *Personality and Individual Differences*, 2004, *37* (5), 1013 – 1022.

O'brien, Robert, "A Caution Regarding Rules of Thumb for Variance Inflation Factors," *Quality & Quantity*, 2007, *41* (5), 673,690.

Oehler, Andreas and Florian Wedlich, "The relationship of extraversion and neuroticism with risk attitude, risk perception, and return expectations.," *Journal of Neuroscience, Psychology, and Economics*, 2018, *11* (2), 63 – 92.

Parker, Simon C, "Entrepreneurship and economic theory," *Oxford Review of Economic Policy*, 09 2018, *34* (4), 540–564.

Puri, Manju and David T. Robinson, "Optimism and economic choice," *Journal of Financial Economics*, 2007, *86* (1), 71 – 99.

— **and** — , "The Economic Psychology of Entrepreneurship and Family Business," *Journal of Economics & Management Strategy*, 2013, *22* (2), 423–444.

Rustichini, Aldo, Colin G DeYoung, Jon E. Anderson, and Stephen V. Burks, "Toward the integration of personality theory and decision theory in explaining economic behavior: An experimental investigation," *Journal of Behavioral and Experimental Economics*, 10 2016, *64*, 122–137.

Schoar, Antoinette, "The Divide between Subsistence and Transformational Entrepreneurship," in Josh Lerner and Scott Stern, eds., *Innovation Policy and the Economy*, Vol. 10, University of Chicago Press, February 2010, chapter 3, pp. 57–81.

Figures

Figure 1: Big Five Personality Traits (Standardized)

Earning Distribution by Employment Type

Note: For each employment type, top 1% and bottom 1% are excluded.
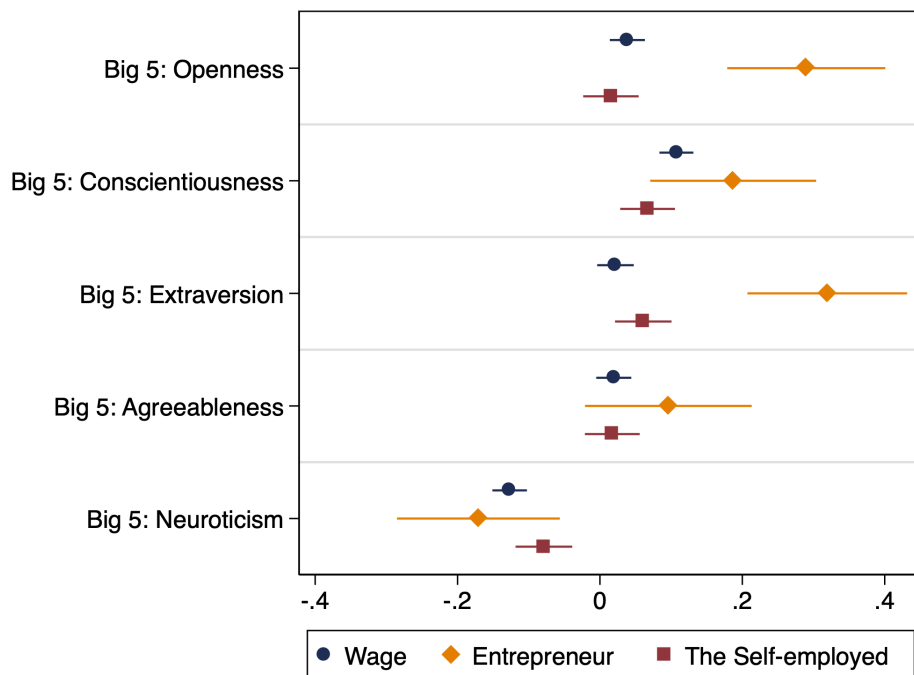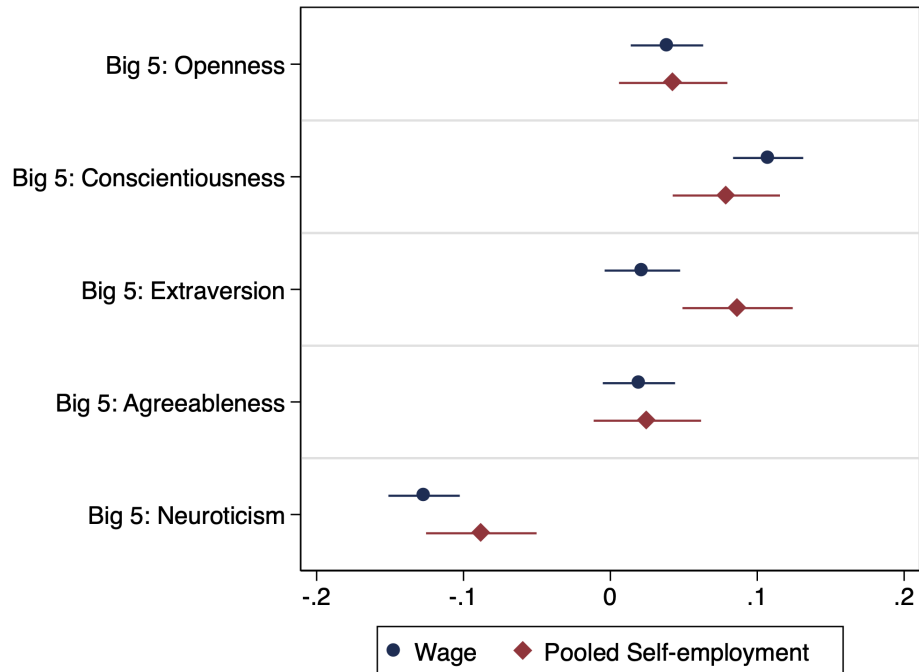
Figure 3: Earning Distribution By Types: All Percentile

Earning Distribution by Employment Type

Earning Distribution by Employment Type: Below Median
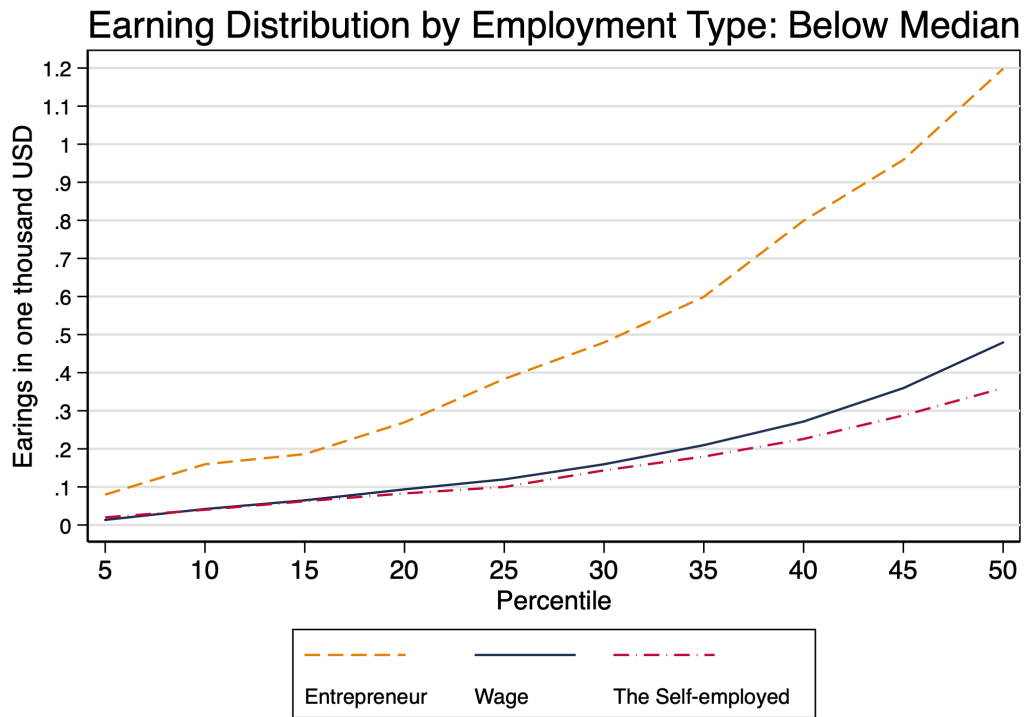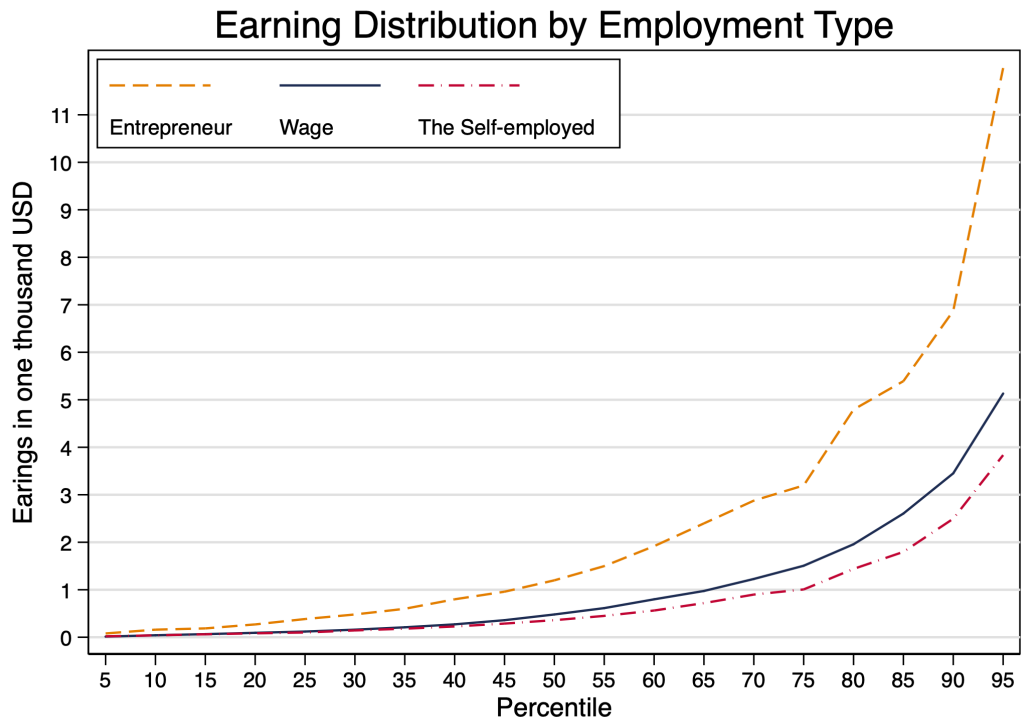
Figure 4: Proportion of Employment Types By Birth Cohort
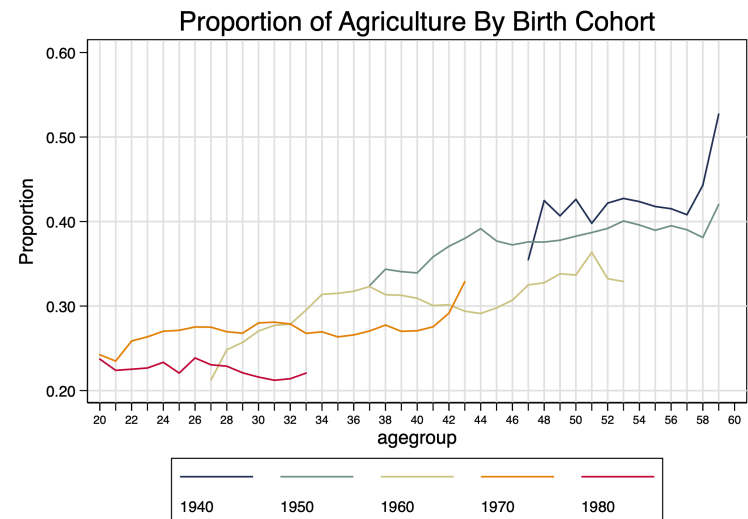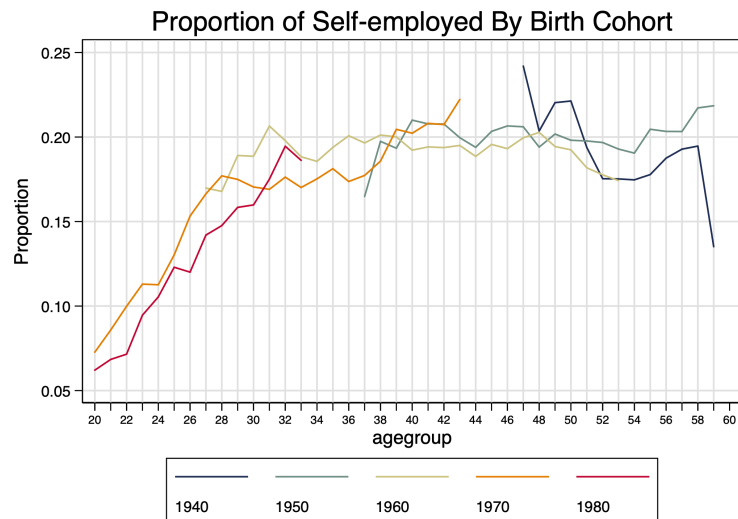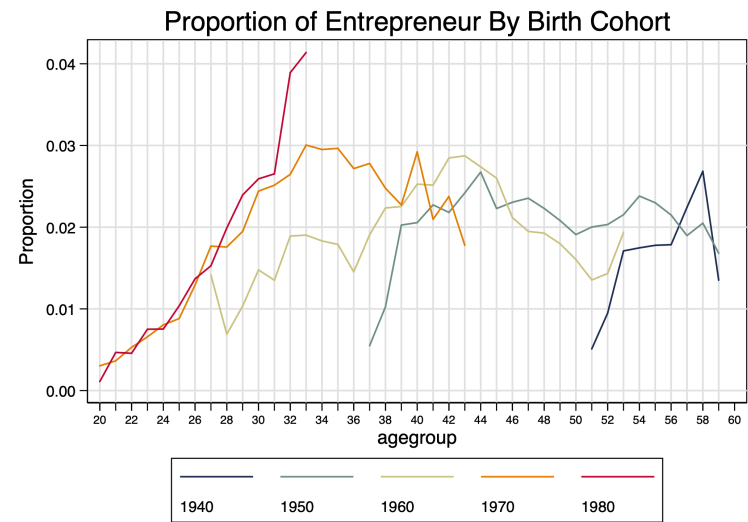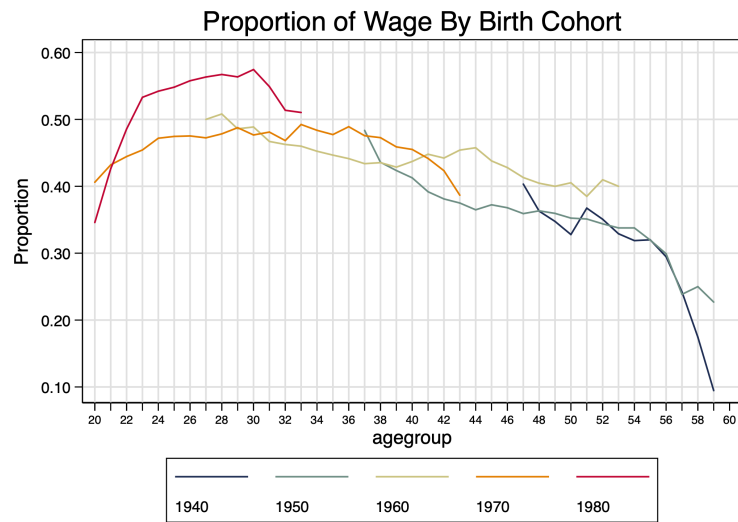
Tables

Table 1: Employment Types Summary Statistics

	All Workers	Wage Workers	Pooled Self-employment	All Self-employment Entrepreneur	All Self-employment Self-employed
	(1)	(2)	(3)	(4)	(5)
Age	37.47	36.76	38.93	39.94	38.82
	(9.40)	(9.33)	(9.36)	(8.81)	(9.41)
Years of schooling	9.61	10.15	8.49	10.42	8.29
	(4.36)	(4.31)	(4.26)	(4.37)	(4.20)
Asset Index	0.14	0.14	0.16	0.73	0.10
	(0.97)	(0.96)	(0.98)	(0.98)	(0.96)
Married	0.87	0.84	0.91	0.94	0.91
	(0.34)	(0.37)	(0.28)	(0.24)	(0.28)
Muslim	0.92	0.92	0.94	0.90	0.95
	(0.26)	(0.28)	(0.23)	(0.30)	(0.22)
Urban	0.63	0.66	0.57	0.70	0.55
	(0.48)	(0.47)	(0.50)	(0.46)	(0.50)
Total working hours last week	44.75	44.57	45.11	46.59	44.96
	(21.93)	(18.81)	(27.25)	(25.26)	(27.45)
	[8621]	[5886]	[2735]	[272]	[2463]
Mean Earnings Last Year (USD)	1684	1291	2506	3828	2371
Median Earnings Last Year (USD)	452	479	400	1198	359
	[8530]	[5848]	[2682]	[263]	[2419]
Having secondary job	0.28	0.25	0.33	0.23	0.34
	(0.45)	(0.43)	(0.47)	(0.42)	(0.47)
Unique persons	4500	3455	1828	232	1721
Observations	8632	5889	2743	273	2470
	100%	68.2%	31.8%	3.2%	28.6%

Note: 1) The sample is restrict to aged 20 to 60 male workers, excluding agricultural sector. 2) Standard deviations are shown in parentheses. Observations are shown in brackets if they are different from others.

Table 2: Estimation Results of Pooling All Panel Individuals:
Log Odds Ratio Relative to Wage Workers

| | (1) | (2) | | (3) | (4) | |
	Pooled Self-employment	Entrepreneur	Self-employed	Pooled Self-employment	Entrepreneur	Self-employed
Years of schooling	-0.079***	-0.025	-0.086***	-0.084***	-0.038*	-0.090***
	(0.009)	(0.021)	(0.009)	(0.009)	(0.022)	(0.009)
Asset Index	0.136***	0.674***	0.071**	0.129***	0.652***	0.067**
	(0.034)	(0.093)	(0.034)	(0.034)	(0.095)	(0.034)
Big 5: Openness				0.126***	0.313***	0.107***
				(0.038)	(0.105)	(0.038)
Big 5: Conscientiousness				-0.016	-0.050	-0.013
				(0.038)	(0.100)	(0.040)
Big 5: Extraversion				0.057*	0.218***	0.037
				(0.033)	(0.072)	(0.034)
Big 5: Agreeableness				-0.008	-0.055	-0.003
				(0.038)	(0.085)	(0.039)
Big 5: Neuroticism				0.026	0.015	0.028
				(0.037)	(0.081)	(0.038)
Observations	8632	8632		8632	8632	

Notes: 1) The sample is restrict to aged 20 to 60 male workers, excluding agricultural sector. 2) All columns include controls for quadratic age function, married, Muslim, survey year, sector, and region-urban dummies. Standard errors are clustered at sub-district level. 3) Significant level: *0.10**0.05***0.01.

Table 3: Estimation Results of Pooling All Panel Individuals: Marginal Effects

| | (1) | (2) | | (3) | (4) | |
	Pooled Self-employment	Entrepreneur	Self-employed	Pooled Self-employment	Entrepreneur	Self-employed
Years of schooling	-0.013***	0.000	-0.014***	-0.014***	-0.000	-0.014***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Asset Index	0.023***	0.019***	0.004	0.022***	0.018***	0.004
	(0.006)	(0.003)	(0.005)	(0.006)	(0.003)	(0.005)
Big 5: Openness				0.021***	0.008***	0.014**
				(0.006)	(0.003)	(0.006)
Big 5: Conscientiousness				-0.003	-0.001	-0.002
				(0.006)	(0.003)	(0.006)
Big 5: Extraversion				0.010*	0.006***	0.004
				(0.006)	(0.002)	(0.005)
Big 5: Agreeableness				-0.001	-0.002	0.000
				(0.006)	(0.002)	(0.006)
Big 5: Neuroticism				0.004	0.000	0.004
				(0.006)	(0.002)	(0.006)
Observations	8632	8632		8632	8632	

Notes: 1) The sample is restrict to aged 20 to 60 male workers, excluding agricultural sector. 2) All columns include controls for quadratic age function, married, Muslim, survey year, sector, and region-urban dummies. Standard errors are clustered at sub-district level. 3) Significant level: *0.10**0.05***0.01.

Table 4: Estimation Results of Pooling All Panel Individuals: Marginal Effects

| | (1) | (2) | | (3) | (4) | |
	Pooled Self-employment	Entrepreneur	Self-employed	Pooled Self-employment	Entrepreneur	Self-employed
elementary graduate	-0.028	0.002	-0.028	-0.033*	-0.000	-0.031
	(0.019)	(0.008)	(0.019)	(0.019)	(0.008)	(0.019)
junior high school graduate	-0.059***	0.003	-0.060***	-0.065***	0.001	-0.064***
	(0.022)	(0.009)	(0.022)	(0.022)	(0.010)	(0.022)
high school graduate	-0.131***	-0.000	-0.128***	-0.141***	-0.004	-0.134***
	(0.021)	(0.007)	(0.020)	(0.022)	(0.008)	(0.021)
some college	-0.181***	0.005	-0.189***	-0.194***	-0.000	-0.196***
	(0.023)	(0.009)	(0.022)	(0.023)	(0.010)	(0.022)
Asset Index	0.024***	0.019***	0.006	0.023***	0.018***	0.005
	(0.006)	(0.003)	(0.005)	(0.006)	(0.003)	(0.005)
Big 5: Openness				0.022***	0.008***	0.014**
				(0.006)	(0.003)	(0.006)
Big 5: Conscientiousness				-0.003	-0.001	-0.002
				(0.006)	(0.003)	(0.006)
Big 5: Extraversion				0.010*	0.006***	0.004
				(0.006)	(0.002)	(0.005)
Big 5: Agreeableness				-0.002	-0.002	-0.000
				(0.007)	(0.002)	(0.006)
Big 5: Neuroticism				0.004	0.000	0.004
				(0.006)	(0.002)	(0.006)
Observations	8632	8632		8632	8632	

Notes: 1) The sample is restrict to aged 20 to 60 male workers, excluding agricultural sector. 2) All columns include controls for quadratic age function, married, Muslim, survey year, sector, and region-urban dummies. Standard errors are clustered at sub-district level. 3) Significant level: *0.10**0.05***0.01.

Table 5: Employment Transitions

	Transition Proportions Conditional On Wave $t-1$ Employment Type		
Wave t Employment Type	Wage worker	Self-employed	Entrepreneur
Wage worker	0.919 [2333]	0.381 [106]	0.250 [20]
Self-employed	0.064 [162]	0.457 [127]	0.288 [23]
Entrepreneur	0.017 [43]	0.162 [45]	0.463 [37]
Observations	2538	278	80

Notes: 1) This table presents the 7-year transition proportions among wage workers, self-employed and entrepreneurs. Each column sums up to one, where the column labels are the employment types from last wave, and the row labels are the employment types of current wave. 2) Number of observations in brackets.

Table 6: Estimation Results Restricting to Wage Workers at $(t-1)$:
Log Odds Ratio Relative to Wage Workers

	(1)	(2)		(3)	(4)	
	Pooled Self-employment	Entrepreneur	Self-employed	Pooled Self-employment	Entrepreneur	Self-employed
Years of schooling	-0.043*	-0.035	-0.044*	-0.052**	-0.051	-0.052**
	(0.024)	(0.047)	(0.025)	(0.024)	(0.048)	(0.026)
Asset index last wave	0.194**	0.305	0.164	0.176*	0.298	0.141
	(0.098)	(0.217)	(0.105)	(0.100)	(0.216)	(0.106)
Big 5: Openness				0.383***	0.556**	0.349***
				(0.107)	(0.248)	(0.112)
Big 5: Conscientiousness				-0.169	-0.470**	-0.083
				(0.111)	(0.234)	(0.116)
Big 5: Extraversion				-0.043	0.273	-0.132
				(0.092)	(0.235)	(0.099)
Big 5: Agreeableness				-0.115	-0.156	-0.113
				(0.099)	(0.167)	(0.113)
Big 5: Neuroticism				-0.088	-0.150	-0.072
				(0.096)	(0.207)	(0.105)
Observations	2538	2538		2538	2538	

Notes: 1) The sample is restrict to aged 20 to 60 male workers who were non-agricultural wage workers from last wave. 2) All columns include controls for quadratic age function, married, Muslim, survey year, current job's sector, last wave job's and last wave's region-urban dummies. Standard errors are clustered at sub-district level. 3) Significant level: *0.10**0.05***0.01.

Table 7: Estimation Results Restricting to Wage Workers at $(t-1)$: Marginal Effects

	(1)	(2)		(3)	(4)	
	Pooled Self-employment	Entrepreneur	Self-employed	Pooled Self-employment	Entrepreneur	Self-employed
Years of schooling	-0.003* (0.002)	-0.001 (0.001)	-0.002* (0.001)	-0.004** (0.002)	-0.001 (0.001)	-0.003* (0.001)
Asset index last wave	0.014* (0.007)	0.005 (0.004)	0.009 (0.006)	0.012* (0.007)	0.005 (0.004)	0.007 (0.006)
Big 5: Openness				0.027*** (0.008)	0.009* (0.005)	0.019*** (0.006)
Big 5: Conscientiousness				-0.012 (0.008)	-0.008* (0.004)	-0.004 (0.006)
Big 5: Extraversion				-0.003 (0.006)	0.005 (0.004)	-0.008 (0.006)
Big 5: Agreeableness				-0.008 (0.007)	-0.002 (0.003)	-0.006 (0.006)
Big 5: Neuroticism				-0.006 (0.007)	-0.002 (0.004)	-0.004 (0.006)
Observations	2538	2538		2538	2538	

Notes: 1) The sample is restrict to aged 20 to 60 male workers who were non-agricultural wage workers from last wave. 2) All columns include controls for quadratic age function, married, Muslim, survey year, current job's sector, last wave job's and last wave's region-urban dummies. Standard errors are clustered at sub-district level. 3) Significant level: *0.10**0.05***0.01.

Table 8: Transition from Self-employed at (t-1): Log odds ratio relative to the Self-employed

| | (1) | |
	Wage worker	Entrepreneur
Years of schooling	0.049	0.171***
	(0.053)	(0.058)
Big 5: Openness	-0.128	-0.295
	(0.202)	(0.256)
Big 5: Conscientiousness	0.032	0.396
	(0.236)	(0.329)
Big 5: Extraversion	-0.214	0.301
	(0.181)	(0.251)
Big 5: Agreeableness	0.253	-0.238
	(0.219)	(0.233)
Big 5: Neuroticism	0.314	0.197
	(0.205)	(0.254)
Asset index last wave	-0.160	0.121
	(0.277)	(0.211)
Observations	278	
Pseudo R^2	0.284	

Table 9: Transition from Self-employed at (t-1): Marginal Effects

| | (1) | (2) | (3) |
	Wage workers	Entrepreneur	Self-employed
Years of schooling	-0.000	0.016***	-0.016**
	(0.007)	(0.006)	(0.008)
Big 5: Openness	-0.006	-0.027	0.033
	(0.028)	(0.027)	(0.030)
Big 5: Conscientiousness	-0.012	0.042	-0.030
	(0.033)	(0.034)	(0.036)
Big 5: Extraversion	-0.044*	0.042	0.002
	(0.026)	(0.025)	(0.028)
Big 5: Agreeableness	0.047	-0.036	-0.010
	(0.031)	(0.024)	(0.032)
Big 5: Neuroticism	0.037	0.008	-0.046
	(0.028)	(0.026)	(0.030)
Asset index last wave	-0.028	0.020	0.009
	(0.038)	(0.022)	(0.036)
Observations	278	278	278
Pseudo R^2	0.284	0.284	0.284

Table 10: OLS Regression of Earnings (in USD)

	(1) Earnings	(2) Earnings	(3) Earnings	(4) Earnings	(5) ΔEarnings	(6) ΔEarnings
Pooled Self-employed	-22.72 (45.51)		-26.26 (45.11)			
Entrepreneur		1437.57*** (337.34)		1424.41*** (336.87)		
Self-employed		-198.61*** (36.37)		-199.58*** (36.41)		
ΔPooled Self-employed					-114.91 (183.38)	
ΔEntrepreneur						1598.65** (629.77)
ΔSelf-employed						-569.62*** (137.62)
Years of schooling	86.30*** (5.40)	83.14*** (5.29)	84.08*** (5.32)	81.42*** (5.23)		
Asset Index	251.38*** (24.62)	226.02*** (21.26)	246.93*** (24.73)	222.55*** (21.46)		
ΔAsset index					44.48 (36.58)	38.69 (36.73)
Big 5: Openness			15.94 (19.09)	8.59 (18.54)		
Big 5: Conscientiousness			-6.99 (18.06)	-5.36 (18.09)		
Big 5: Extraversion			47.42*** (16.54)	38.43** (16.03)		
Big 5: Agreeableness			0.66 (17.50)	0.99 (17.40)		
Big 5: Neuroticism			-36.60** (15.59)	-34.56** (15.53)		
Observations	8243	8243	8243	8243	2409	2409
First Difference	No	No	No	No	Yes	Yes

Notes: 1) For column (1) to (4), the sample is restrict to aged 20 to 60 non-agriculture male workers. OLS regressions on earnings exclude the top and bottom one percent for each employment type. 2) All regressions include controls for quadratic age function, married, Muslim, survey year, sector, region-urban dummies. 3) For column (5) and (6), change in earnings is regressed on change in transition from wage workers to entrepreneurs (ΔEntrepreneur) or to the self-employed (ΔThe self-employed), and change of asset index is also included. The base group is those who stayed as wage workers. 4) Significant level: *0.10**0.05***0.01.

Table 11: Median Regression of Earnings (in USD)

	(1) Earnings	(2) Earnings	(3) Earnings	(4) Earnings	(5) ΔEarnings	(6) ΔEarnings
Pooled Self-employed	-50.29*** (5.34)		-47.86*** (5.21)			
Entrepreneur		235.58** (116.66)		241.38** (105.07)		
Self-employed		-66.49*** (6.20)		-64.34*** (7.58)		
ΔPooled Self-employed					-388.05*** (114.69)	
ΔEntrepreneur						644.17 (549.38)
ΔSelf-employed						-572.56*** (87.45)
Years of schooling	21.15*** (0.95)	21.54*** (1.11)	21.14*** (1.02)	21.52*** (1.17)		
Asset Index	55.97*** (2.80)	54.63*** (3.63)	55.53*** (2.78)	53.70*** (3.94)		
ΔAsset index					40.02 (32.23)	40.02 (31.12)
Big 5: Openness			1.83 (2.66)	3.10 (3.33)		
Big 5: Conscientiousness			-4.02** (1.88)	-5.97 (3.78)		
Big 5: Extraversion			7.11*** (2.64)	5.28 (3.52)		
Big 5: Agreeableness			1.47 (2.36)	1.33 (3.78)		
Big 5: Neuroticism			-6.87** (2.82)	-7.05** (3.28)		
Observations	8243	8243	8243	8243	2409	2409
First Difference	No	No	No	No	Yes	Yes

Notes: 1) For column (1) to (4), the sample is restrict to aged 20 to 60 non-agriculture male workers. Median regressions include controls for quadratic age function, married, Muslim, survey year, sector, region-urban dummies. 2) For column (5) and (6), change in earnings is regressed on change in transition from wage workers to entrepreneurs (ΔEntrepreneur) or to the self-employed (ΔThe self-employed), and change of asset index is also included. The base group is those who stayed as wage workers. 3) Significant level: *0.10**0.05***0.01.

Table 12: Retrospective Employment Type Transitions

Employment Type in Current Year	Transition Proportion Conditional On Last Year's Employment Type				
	Wage worker	Entrepreneur	Self-employed	Agriculture	Non-worker
Wage worker	0.910	0.040	0.051	0.036	0.236
	[43091]	[84]	[990]	[1312]	[2336]
Entrepreneur	0.003	0.868	0.008	0.001	0.004
	[154]	[1802]	[163]	[37]	[39]
Self-employed	0.030	0.055	0.887	0.017	0.064
	[1418]	[115]	[17189]	[599]	[629]
Agriculture	0.026	0.017	0.033	0.935	0.076
	[1208]	[35]	[636]	[33830]	[751]
Non-worker	0.032	0.020	0.021	0.011	0.620
	[1498]	[42]	[404]	[387]	[6127]

Notes: 1) This table presents year-to-year transition proportions among wage workers, entrepreneurs, the self-employed, agriculture workers and non-workers. Each column sums up to one, where the column labels are the employment types from last year, and the row labels are the employment types of current year. 2) Number of observations in brackets.

Table 13: Using Cognitive Capacity measured in 2014 (Log Odds Ratio relative to wage worker)

	(1) Entrepreneur	(1) Self-employed	(2) Entrepreneur	(2) Self-employed	(3) Entrepreneur	(3) Self-employed
Years of schooling	-0.009	-0.084***			-0.014	-0.082***
	(0.029)	(0.012)			(0.033)	(0.013)
Cognitive capacity			0.045	-0.132***	0.064	-0.019
			(0.111)	(0.047)	(0.124)	(0.050)
Asset Index	0.514***	0.053	0.497***	-0.023	0.512***	0.054
	(0.115)	(0.048)	(0.114)	(0.047)	(0.115)	(0.048)
Big 5: Openness	0.309**	0.111**	0.302**	0.068	0.310**	0.111**
	(0.139)	(0.051)	(0.133)	(0.051)	(0.139)	(0.051)
Big 5: Conscientiousness	0.031	-0.108**	0.040	-0.110**	0.035	-0.108**
	(0.149)	(0.050)	(0.149)	(0.050)	(0.149)	(0.050)
Big 5: Extraversion	0.325***	0.008	0.317***	0.010	0.323***	0.008
	(0.105)	(0.045)	(0.105)	(0.044)	(0.106)	(0.045)
Big 5: Agreeableness	-0.117	0.079	-0.117	0.077	-0.116	0.079
	(0.110)	(0.050)	(0.111)	(0.050)	(0.111)	(0.050)
Big 5: Neuroticism	0.078	-0.002	0.088	0.020	0.083	-0.004
	(0.105)	(0.050)	(0.100)	(0.050)	(0.103)	(0.050)
Observations	3717		3717		3717	

Notes: 1) In 2014, a new module measuring cognitive ability is included for all respondents aged 15 or above. A series of numbers with a blank cell are shown, and respondents should use the logic based on the pattern of numbers displayed to fill in the blank cell. Three starting questions are answered, and based on the number of correct answers, different sets of another three questions are shown and answered. 2) The sample is restrict to aged 20 to 60 male workers in 2014, excluding agricultural sector. 3) All columns include controls for quadratic age function, married, Muslim, survey year, sector, and region-urban dummies. Standard errors are clustered at sub-district level. 4) Significant level: *0.10**0.05***0.01.

Table 14: Estimation Results: Log Odds Ratio Relative to Wage Workers

	Pooling Panel Individuals			Transition of Wage Workers Restrict to Wage Workers at $(t-1)$		
	(1)	(2)		(3)	(4)	
	Pooled Self-employment	Entrepreneur	Self-employed	Pooled Self-employment	Entrepreneur	Self-employed
Years of schooling	-0.083***	-0.038*	-0.088***	-0.055**	-0.056	-0.054**
	(0.009)	(0.022)	(0.009)	(0.025)	(0.049)	(0.026)
Asset Index	0.130***	0.651***	0.068**			
	(0.034)	(0.095)	(0.034)			
Asset index last wave				0.179*	0.275	0.152
				(0.098)	(0.211)	(0.105)
Openness above average	0.136*	0.375**	0.107	0.553***	0.930**	0.472**
	(0.072)	(0.178)	(0.075)	(0.174)	(0.408)	(0.189)
Conscientiouseness above average	0.042	0.129	0.031	-0.123	-0.219	-0.099
	(0.071)	(0.201)	(0.072)	(0.190)	(0.377)	(0.208)
Extraversion above average	0.165**	0.598***	0.109	0.002	0.352	-0.105
	(0.071)	(0.177)	(0.072)	(0.178)	(0.429)	(0.190)
Agreeableness above average	-0.010	0.028	-0.016	0.015	0.058	0.001
	(0.068)	(0.161)	(0.069)	(0.182)	(0.407)	(0.191)
Neuroticism above average	0.022	-0.004	0.025	-0.231	-0.344	-0.192
	(0.067)	(0.152)	(0.068)	(0.173)	(0.349)	(0.191)
Observations	8632	8632		2538	2538	

Notes: 1) Each Big Five Personality is a dummy with value 1 if above the average, 0 below the average. 2) The sample is restrict to aged 20 to 60 male workers, excluding agricultural sector. 3) Column (1) and (2) include controls for quadratic age function, married, Muslim, survey year, sector, and region-urban dummies. Standard errors are clustered at sub-district level. 4) Column (3) and (4) include controls for quadratic age function, married, Muslim, survey year, sector of current job and last wave's job, and last wave's region-urban FE. Standard errors are clustered at sub-district level. 5) Significant level: *0.10**0.05***0.01.

Table 15: Transition from Wage Workers and Risk Tolerance

	(1) Entrepreneur	(1) Self-employed	(2) Entrepreneur	(2) Self-employed	(3) Entrepreneur	(3) Self-employed	(4) Entrepreneur	(4) Self-employed
Years of schooling	0.002 (0.055)	-0.019 (0.051)	0.014 (0.047)	-0.032 (0.042)	-0.026 (0.055)	-0.020 (0.051)	-0.008 (0.047)	-0.034 (0.043)
Asset index last wave	0.138 (0.242)	0.280 (0.229)	0.229 (0.248)	0.200 (0.171)	0.222 (0.239)	0.296 (0.236)	0.295 (0.245)	0.206 (0.174)
Risk Aversion last wave	-0.450** (0.215)	-0.066 (0.164)			-0.437** (0.216)	-0.065 (0.169)		
Risk Aversion last wave (loss)			-0.169 (0.206)	0.150 (0.189)			-0.155 (0.216)	0.166 (0.179)
Big 5: Openness					0.319 (0.238)	0.244 (0.203)	0.314 (0.286)	0.328* (0.173)
Big 5: Conscientiousness					-0.637* (0.372)	-0.227 (0.240)	-0.536 (0.360)	-0.270 (0.176)
Big 5: Extraversion					0.136 (0.320)	-0.159 (0.212)	0.308 (0.311)	-0.291* (0.153)
Big 5: Agreeableness					0.211 (0.389)	-0.044 (0.264)	0.283 (0.391)	-0.028 (0.191)
Big 5: Neuroticism					-0.165 (0.221)	-0.008 (0.238)	-0.116 (0.223)	-0.001 (0.158)
Observations	833		1124		833		1124	

Notes: 1) In the fourth and fifth waves (2007 and 2014), a new module measuring risk aversion is included for all respondents aged 15 or above. Respondents are asked a series of questions regarding their preferences between two lotteries. Risk aversion variables are standardized, the larger the more risk averse. 2) The sample is restrict to aged 20 to 60 male wage workers in 2007, excluding agricultural sector. 3) All columns include controls for quadratic age function, married, Muslim, survey year, sector of current job and last wave's job, and last wave's region-urban FE. Standard errors are clustered at sub-district level. 4) Significant level: *0.10**0.05***0.01.

A   Appendices

Table A1: Big 5 Personality Traits

Dimensions	The tendency to be
Openness	Open to new aesthetic, cultural, or intellectual experiences; curious, imaginative
Conscientiousness	Organized, responsible, thorough, not careless
Extraversion	Outgoing, talkative, sociable, adventurous, not reserved
Agreeableness	Cooperative, unselfish, forgiving, not rude
Neuroticism	Worried, moody, nervous, not relaxed

Source: APA Dictionary of Psychology and John, O. P., & Srivastava, S. (1999)

Table A2: Employment Types Summary Statistics: Ownership of Household Assets

	Wage Workers	Pooled Self-employment	All Self-employment	
			Entrepreneur	Self-employed
	(1)	(2)	(3)	(4)
Home ownership	0.66	0.73	0.74	0.73
	(0.47)	(0.44)	(0.44)	(0.44)
Other house/building ownership	0.12	0.12	0.23	0.11
	(0.32)	(0.32)	(0.42)	(0.31)
Land ownership (not for business)	0.13	0.14	0.21	0.13
	(0.34)	(0.34)	(0.41)	(0.34)
Vehicles (cars, boats, bicycles, motorbikes)	0.74	0.63	0.78	0.61
	(0.44)	(0.48)	(0.42)	(0.49)
Household appliances	0.93	0.93	0.99	0.93
	(0.26)	(0.25)	(0.10)	(0.26)
Savings/certificate of deposit/stocks	0.34	0.34	0.54	0.32
	(0.47)	(0.47)	(0.50)	(0.47)
Receivables	0.12	0.19	0.32	0.18
	(0.32)	(0.39)	(0.47)	(0.38)
Jewelry	0.56	0.57	0.69	0.56
	(0.50)	(0.50)	(0.46)	(0.50)
Household furniture and utensils	0.96	0.98	0.99	0.98
	(0.19)	(0.14)	(0.11)	(0.14)
Observations	5889	2743	273	2470

Table A3: Employment Types Summary Statistics: Sectors

	Wage	Pooled	All Self-employment	
	Workers	Self-employment	Entrepreneur	Self-employed
	(1)	(2)	(3)	(4)
2 Mining and quarrying	1.80	1.23	0.68	1.28
3 Manufacturing	22.36	12.95	24.53	11.75
4 Electricity, gas, water	1.00	0.19	0.00	0.21
5 Construction	15.07	3.23	6.33	2.90
6 Wholesale, retail, restaurants and hotels	13.03	49.03	42.99	49.66
7 Transportation, storage and communications	5.82	11.81	2.33	12.80
8 Finance, insurance, real estate and business service	3.66	0.75	1.84	0.63
9 Social services	36.64	19.49	20.52	19.38
10 Activities that cannot be classified	0.62	1.32	0.78	1.37
Total	100.00	100.00	100.00	100.00
Observations	5889	2743	273	2470

Table A4: Employment Types Summary Statistics From Indonesia 2000 Census

	All Workers	Wage Workers	Pooled Self-employment	All Self-employment	
				Entrepreneur	Self-employed
Highest Education (%)					
less than elementary	8.61	6.22	12.62	6.63	12.98
elementary graduate	32.01	26.50	41.24	28.62	41.99
junior high graduate	17.60	17.32	18.07	17.99	18.07
high school graduate	32.52	37.86	23.59	33.76	22.98
some college	9.25	12.10	4.48	13.00	3.98
Age	35.71	34.77	37.30	38.42	37.23
	(10.06)	(9.89)	(10.16)	(9.92)	(10.17)
Married	0.80	0.76	0.87	0.88	0.87
	(0.40)	(0.42)	(0.34)	(0.32)	(0.34)
Muslim	0.90	0.89	0.91	0.83	0.91
	(0.31)	(0.32)	(0.29)	(0.38)	(0.28)
Urban	0.67	0.71	0.60	0.69	0.59
	(0.47)	(0.45)	(0.49)	(0.46)	(0.49)
Observations	2559374	1602914	956460	53505	902955
	100%	62.62%	37.38%	2.09%	35.29%

Table A5: Indonesia 2000 Census Cross-sectional Selection:
Log Odds Ratio Relative To Wage Workers

	(1)	
	Entrepreneur	Self-employed
elementary graduate	0.138***	-0.202***
	(0.031)	(0.023)
junior high graduate	0.214***	-0.533***
	(0.043)	(0.034)
high school graduate	0.069	-1.083***
	(0.057)	(0.047)
some college	0.101	-1.865***
	(0.068)	(0.046)
married	0.443***	0.435***
	(0.027)	(0.013)
muslim	-0.636***	0.030
	(0.067)	(0.038)
Observations	2559374	

Table A6: Big Five Personality Pairwise Correlation

	Big 5: O	Big 5: C	Big 5: E	Big 5: A	Big 5: N	Years of schooling	Asset Index
Big 5: Openness	1						
Big 5: Conscientiousness	0.383***	1					
Big 5: Extraversion	0.198***	0.164***	1				
Big 5: Agreeableness	0.380***	0.407***	0.218***	1			
Big 5: Neuroticism	0.0616***	-0.0738***	-0.0823***	0.0263*	1		
Years of schooling	0.236***	0.112***	0.0908***	0.0771***	-0.0942***	1	
Asset Index	0.141***	0.0868***	0.0729***	0.0458***	-0.0648***	0.336***	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A7: Big Five Personality Variance Inflation Factors

Variable	VIF	1/VIF
Big 5: Agreeableness	1.32	0.757637
Big 5: Conscientiousness	1.32	0.758802
Big 5: Openness	1.29	0.776242
Big 5: Extraversion	1.09	0.915071
Big 5: Neuroticism	1.04	0.958888
intercept	1.02	0.977405
Mean VIF	1.18	