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Experience, Education, and Entrepreneurial Success: A View from Bangladesh

Mahfuza Khatun, Sikandar Siddiqui
Jahangirnagar University, Bangladesh
Frankfurt School of Finance & Management, Germany
S.Siddiqui@fs.de

Abstract: This paper examines the impact of education on the age/earnings profiles of self-employed Bangladeshi men, using data from a survey carried out by the first author in 2010. Its results strongly support the perception that educational attainment and on-the-job experience are strongly complementary rather than mutually substitutable in increasing the likelihood of achieving a high income level. Yet the high degree of earnings heterogeneity among well-educated respondents in the sample also indicates that academic excellence is a catalyst but not a guarantor for entrepreneurial success, and that levels of education that are formally equivalent may nevertheless have very different implications for the likelihood of prosperity in business.

Keywords: *Education, experience, entrepreneurship*

1. Introduction

The theory of human capital, established by Becker (1964), maintains that education is an investment of presently disposable time and wealth with a view to later gains through higher earnings. Therefore, assessing the statistical relationship between educational achievement and earnings has long been an important topic in the fields of labour and human resource economics. For the time being, the majority of the related studies have concentrated on employees, as can be inferred, e.g., from the related surveys by Card (1999), Harmon et al. (2003), and Heckman et al. (2006). More recently, efforts to estimate the impact of education on earnings have also been made for entrepreneurs (see, e.g. the survey by van der Sluis et al., 2008). Yet the last-mentioned topic is of particular importance because there are indications that the value added provided by entrepreneurship to society as a whole exceeds the one accruing to the individual entrepreneur. Entrepreneurship tends to bring forward the creation of jobs and the development of new products and processes (see van Praag and Versloot, 2007), and due to these expected favourable side effects, there should be a keen interest among policy makers to stimulate entrepreneurship. If (formal) education positively affects entrepreneurial success, improving the accessibility and quality of the former may be a promising means of stimulating innovation and employment growth.

Until now, most of the research efforts directed at estimating the returns on education in entrepreneurship have related to Western industrialized countries. In contrast, this paper is an attempt to supplement the existing literature on this topic by an empirical investigation based on data from Bangladesh. The specification of the statistical model in use differs from those of many other earnings studies by allowing for multiplicative linkages between the "age" variable serving as a proxy for (potential) professional experience, and the educational attainment score by which the level of academic and/or professional qualification is being captured. With regard to the sample in use, it hence allows for additional insights as to the degree of complementarity, or substitutability, of experience and educational success. In the following section 2, the data used to this end is described in more detail, along with some background information provided to facilitate their interpretation. The empirical approach chosen, the results obtained, and their economic interpretation are provided in section 3. Section 4 concludes the paper and points towards some possible directions for future related research efforts.

2. Data and Background Information

Source of Data in Use: The data in use are based on a survey conducted by the first author in August, 2010. They consist of a cross-section of self-employed men, all of which had in common that their businesses belonged to the class of small and medium-sized enterprises (SMEs) according to the definition by the central bank of Bangladesh; see Bangladesh Bank (2010, pp. 6-7). In geographic terms, the data in use originate from the Savar Export Processing Zone, which located in the District of Dhaka and, at the time of writing, is one out of eight export oriented industrial enclaves providing infrastructures, facilities, administrative and support services for a wide variety of enterprises (see Bangladesh Board of Investment, 2014). The main reason for this choice was the particularly high density of SMEs in that area, which greatly facilitated the collection of data. Information was gathered using the snowball sampling technique, which resembles a chain referral system in which, after addressing group initial respondents, the researcher asked them for help in identifying further ones. A key advantage of this technique is that it is inexpensive, time-saving, and highly effective if, as in this case, only a certain subgroup of the population was targeted. When interpreting the results, however, it has to be noted that the underlying data points are not necessarily representative of the population as a whole.

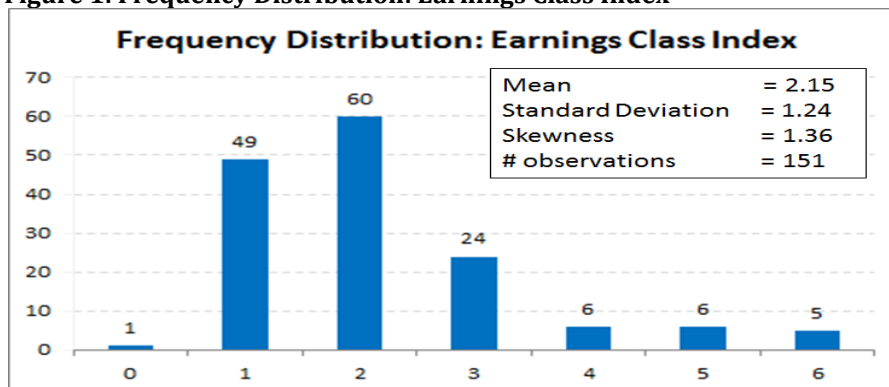
Income Classes: In the questionnaire underlying the survey data, the range of possible earnings levels was sub-divided into five intervals according to the following pattern:

Table 1: Earnings classes

(Figures in BDT = Bangladeshi Taka per month)		
Class #	Range: From above...	... up to...
0	0	10 000
1	10 000	15 000
2	15 000	20 000
3	20 000	25 000
4	25 000	30000
5	35000	

If converted at the USD/BDT exchange rate prevailing on December 31, 2010, an amount of BDT 10 000 would have been roughly equivalent to USD 141.91 (source: exchangerates.org.uk). It may, at least at first sight, appear peculiar that the income data provided by the survey respondents have been grouped in intervals rather provided as exact numbers. However, while conducting the survey, the first author realised that many interviewees did not calculate exact net income figures on a monthly (or even annual basis) and hence felt more comfortable when being asked to provide interval estimates. As Figure 1 indicates, the sample frequency distribution of earnings class indices exhibits considerable positive skewness (which is anything but uncommon for empirical earnings distributions, see Neal and Rosen, 2000), and has its mean at 2.15, which would be roughly equivalent to USD 260 per month:

Figure 1: Frequency Distribution: Earnings Class Index



Educational Attainment Scores: The educational attainment score used in this investigation reflects the different levels of the general educational system prevailing in Bangladesh. In this system, primary education usually begins at the age of 6 and usually takes five years. The following Junior Secondary and Secondary stages comprise three and two years, respectively. At the end of the 10th class, students appear at a public examination called Secondary School Certificate (S.S.C.), which marks the threshold for entrance in the higher secondary stage. The latter usually takes another two years, comprises courses in subject areas as diverse as science, commerce, humanities, home economics, agriculture and Music, and concludes with a public examination called Higher Secondary Certificate (H.S.C.) examination at the end of class 12. After successfully completing the H.S.C., students may pursue, in accordance with their ability and aptitude, higher education in the form of Bachelor's degree courses (taking two or three years) in the colleges or the universities. Moreover, there are Master's degree courses available for holders of a Bachelor's degree, which may take between one (in the case of a Bachelor's degree with honours) and two years. To holders of Master's degrees, universities offer M.Phil and Ph.D. courses in selected subjects, which take another two (M. Phil) or three to seven (Ph.D.) years.

The general education system sketched above is supplemented by a vocational-technical education system, which is organised in three phases, viz. certificate, diploma and degree. The purpose of the certificate courses is to develop skilled workers in different vocations are of 1 – 2 years duration after 8 of schooling (class VIII) imparted in Vocational Training Institutes (V.T.I.). Moreover, there are Polytechnic and Monotechnic Institute offering diploma courses in engineering, commercial and industrial subjects, which take three years for technical and two years for commercial courses entered into after completing the S.S.C. After obtaining a Diploma-in engineering, students can further advance their educational career by enrolling for a Bachelor degree from Engineering & Technology Universities. Related courses normally usually take between two-and-a-half and three years. Degree holders may then cane roll into post-graduate studies. Moreover, holders of Bachelor's degrees, as well as H.S.C. students fulfilling entry criteria of the Institute of Chartered Accountants of Bangladesh (ICAB), can pursue a CA (Chartered Accountant) qualification.

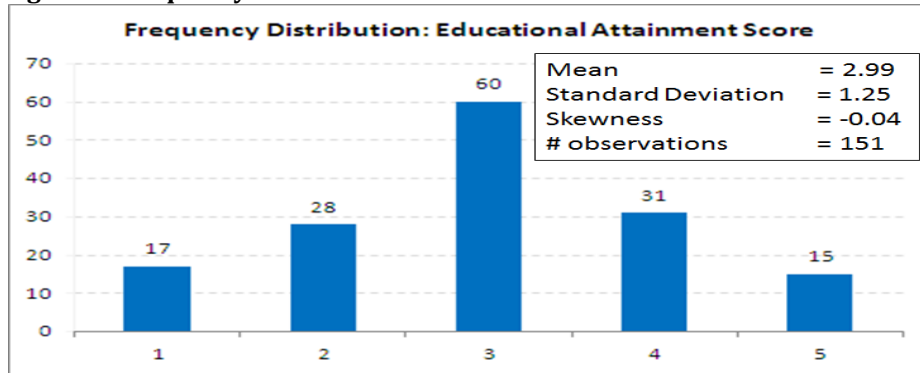
Apart from the two above components of the educational system, there is a parallel sub-system known as Madrasah Education, which teaches all the basics of education in a religious environment. It places particular emphasis offers traditionally Islamic instruction focusing on the study of the Holy Qur'an, its exegesis ("Tafsir"), the Prophetic traditions ("Hadith"), legal theory ("Usul") and jurisprudence ("Fiqh"), as well as Arabic language and literature. Students having passed the "Alim" (12th grade), may go on to pursue the equivalent of a Bachelor's degree ("Fazil") and a "Kamil" (roughly equivalent to a Master's degree) thereafter. In the following Table 2 the way in which different levels of achievement in the educational system sketched above are translated into the numerical educational attainment scores on which the results of the investigation are being based.

Table 2: Educational attainment scores

Score	Description
1	Below S.S.C. or equivalent
2	S.S.C. or equivalent
3	H.S.C. or equivalent
4	Graduate
5	Postgraduate

The frequency distribution of educational attainment scores, which is displayed in Figure 2 is almost perfectly symmetric and indicates that the average respondent had achieved the Higher Secondary Certificate as highest level of education achieved.

Figure 2: Frequency Distribution: Educational Attainment Score



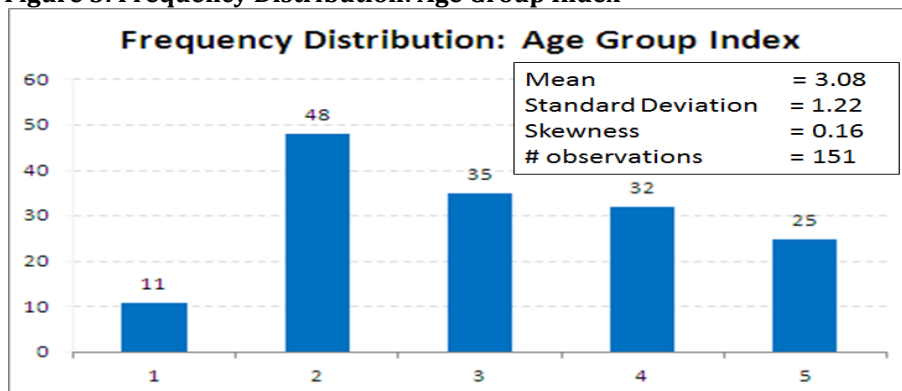
Age Groups: In order to capture, at least in an approximate fashion, the likely relationship prevailing between potential on-the job experience and earnings, it is nowadays common to use a respondent's age as an explanatory variable into an empirical earnings function. Previous experience suggests that, all else being equal, earnings tend to increase with age, albeit at a declining rate, up to a certain high point, beyond which they (slowly) decline again due to the gradual onset of the ageing process (see, e.g., Mazzonna and Peracchi, 2011). This pattern can be represented with some accuracy by follow Wright's (1991) example in using a linear and a squared age term. Our application follows this paragon, while at the same time taking into account an important special feature of the underlying dataset: As has been noticed, e.g., by Kabir and Chowdhuri (1981), age statements by Bangladeshi respondents tend to be heaped around multiples of 5 or 10, the main reason being that the country has introduced the (now mandatory) issuance birth certificate only a few years ago. Against this background, it makes sense to order the respondents' age statements into five-year buckets and use the categorical variable thus created an input to the model. This route was also followed in the sample underlying this paper. The age groups in use have been numbered consecutively according to the following pattern:

Table 3: Age group (all figures in years)

Age group index	Range: From above...	... up to...
1		25
2	25	30
3	30	35
4	35	40
5	40	45

The in-sample frequency distribution of the age group index, shown in Figure 3 exhibits only slight positive skewness and indicates that the average respondent is, roughly, 33 years of age.

Figure 3: Frequency Distribution: Age Group Index



3. Empirical Approach and Results

Empirical Approach: Ordered Probit: In the dataset in use, the dependent variable (=income score) is not continuous but ordinal, which means that its possible realisations consist of numerical scores that establish a ranking order. A frequently used approach to estimating such models is the ordered probit model introduced by Aitchison and Silvey (1957). The main idea behind it is that there is an unobservable continuous variable y^* (here: the actual income level measured in domestic currency units), and that the particular realisation of the observable dependent variable y depends on the particular sub-interval of the real line into which the corresponding realisation of y^* has fallen. The individual, non-overlapping sub-intervals of the real line associated with the different values of y are delimited by thresholds $\tau_0 < \tau_1 < \dots < \tau_M$, where the number of possible realisations of y equals M . The unobservable continuous variable, y^* , is a linear combination of some explanatory variables gathered in the $(k \times 1)$ vector x , and an error term which follows a Standard Normal distribution. Denoting by y_i^* and x_i^* the realisations of y and x pertaining to observation number i , this can be expressed as

$$y_i^* = x_i' \beta + \varepsilon_i \quad (1)$$

The realisation of the observable ordinal variable, y_i , takes on values 0 through M according to the following pattern:

$$y_i = m \text{ if } \tau_{m-1} < y_i^* \leq \tau_m \text{ with } m = 1, \dots, M, \tau_0 = -\infty, \tau_M = \infty \quad (2)$$

Here and in the following, $\Phi(\cdot)$ denotes the cumulative distribution function of the standard normal distribution, evaluated at the term in brackets. The occurrence probability of a given outcome m can then be expressed as

$$\Pr(y_i = m) = \Phi(\tau_m - x_i' \beta) - \Phi(\tau_{m-1} - x_i' \beta) \quad (3)$$

It follows that the unknown parameters of the model, $\tau_1 \dots \tau_{M-1}$ and the elements of β , can be estimated by maximum likelihood, i.e. by numerically maximizing the log-likelihood function

$$\ln \Lambda = \sum_{i=1}^N \sum_{m=1}^M I(y_i = m) \ln [\Phi(\tilde{\tau}_m - x_i' \tilde{\beta}) - \Phi(\tilde{\tau}_{m-1} - x_i' \tilde{\beta})] \quad (4)$$

with respect to the trial parameters $\tilde{\tau}_1, \dots, \tilde{\tau}_{M-1}$ and $\tilde{\beta}$. In the above equation, $I(\cdot)$ denote an indicator function which is set to 1 if the condition in brackets is fulfilled, and to zero otherwise. In order to ensure that

there is a unique combination of parameter values that maximizes (4), the additional constraint $\tau_1 = 0$ is introduced.

Upon interpretation of the results, a caveat, however, seems in place: The standard ordered probit approach considered here does not consider the selectivity issue that arises due to the fact that some individuals choose to become entrepreneurs while others prefer dependent employment. The unobservable factors that positively affect an individual's propensity to entrepreneurship may be positively correlated with those affecting entrepreneurs' earnings prospects. The ordered probit estimates, which do not take this possibility into consideration, may thus be biased and hence mistakenly ascribe to age and educational attainment some effects that are in fact due to other, unobservable, background factors. The standard solution to this problem, i.e. the selectivity adjustment due to Heckman (1979), cannot be applied here because the database in use does not include income information on a control group of dependent employees. The results obtained should hence be understood as quite a rough approximation to, rather than an exact representation of, the statistical relationship examined.

Model Specifications under Test: Even with only two explanatory variables available, several alternative model specifications are at hand. The most basic one, labelled model specification I in the following, would assume a linear and additive relationship between the continuous yet unobservable income indicator y^* and both the age group index and the educational attainment score. Given the considerations from section 2.4., however, allowing for a concave shape of the age/earnings profile by adding the square of the age group index appears reasonable (see specification II below). Based on the supposition that that education and work experience have complementary effects on productivity, Hauser and Daymond (1977) argue that the impact of on-the-job experience on earnings might very well be greater than average for persons with comparatively

high educational achievements than for others. In order to allow for the possibility that education and on-the-job experience do actually interact in their influence on earnings, the set of model specifications tested also includes two cases in which the age group index and the educational attainment score are linked in a multiplicative manner.

Trying to quantify a statistical relationship between a dependent variable and one or more independent variables using a rather flexible functional form, as it is attempted here, involves a tradeoff between two goals: One of them is to obtaining a reasonable goodness of fit; the other is to avoid misinterpreting some of the inevitable random variation “noise” in the data as informationally important, systematic “signals” (see, e.g., Barnett et al., 1991, p.6., and Feger, 2000, pp. 87-88), which would otherwise detrimentally affects the reliability of the resulting estimates. In models like the one used here, a common solution to this dilemma is to compare rivaling specifications in a pairwise manner, using the likelihood ratio statistic, which is based on Neyman and Perarson (1933) and can be, somewhat casually, expressed as

$$D := -2 \times \left[\ln \Lambda_{\max} \left(\begin{array}{c} \text{more restrictive} \\ \text{specification} \end{array} \right) - \ln \Lambda_{\max} \left(\begin{array}{c} \text{less restrictive} \\ \text{specification} \end{array} \right) \right] , \quad (5)$$

with Λ_{\max} representing the maximised value of the likelihood function Λ in (4). According to Wilks (1938), whenever the more restrictive specification is correct, the probability distribution of the test statistic D , given a sufficiently large sample size, can be approximated by a Chi-Square distribution with degrees of freedom equal to $(k_2 - k_1)$, where k_2 represents the number of free parameters in the less restrictive specification and k_1 the one in the more restrictive one.

Estimation Results: The estimation results obtained are gathered in Table 4 below, whereas Table 5 displays the outcomes of the pairwise comparisons between the model specifications under investigation. From these tests, model specification IV, in which the age group indicator and its square are linked with the educational attainment score in a multiplicative manner, and the educational attainment score is also included on a stand-alone basis emerges as most favourable and has therefore been highlighted. As a consequence, the following discussion of the results, along with their graphical representations below, is based on this variant. From the tabulated results it can already be inferred that in our sample, a statistically robust relationship between age and educational achievement on one hand, and the earnings of self-employed men on the other, exists. At first sight, however, the negative coefficient estimate referring to the educational attainment score (if seen in isolation), appears highly counter-intuitive. Yet as the three-dimensional age-education-earnings profile in Figure 4 indicates, this only implies that the correlation between educational achievement and earnings is only negative in the very youngest of the five age groups under investigation, and is so only very slightly.

Figure 4: Average Income Score by Age Group and Education

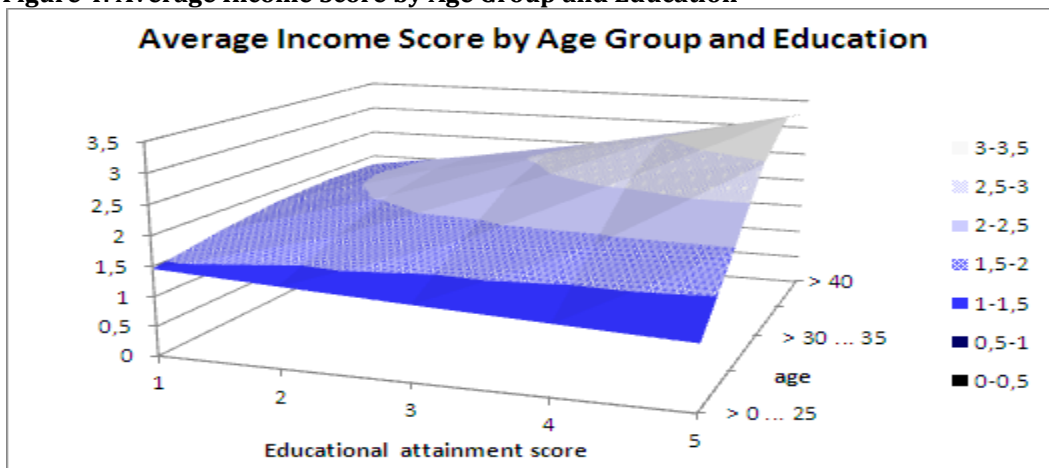


Table 4: Parameter Estimate: Dependent Variable = Income Score (asymptotic t-statistics in parentheses)

Model specification	I	II	III	IV
τ_2	2.0918** (5.007)	2.1743** (4.894)	2.1781** (5.068)	2.1797** (5.099)
$\tau_3 - \tau_2$	1.1571** (9.013)	1.1715** (9.123)	1.2044** (9.174)	1.1845** (9.139)
$\tau_4 - \tau_3$	0.6897** (5.359)	0.6808** (5.337)	0.6910** (5.291)	0.6754** (5.266)
$\tau_5 - \tau_4$	0.2750** (2.570)	0.2690** (2.557)	0.2647** (2.550)	0.2643** (2.556)
$\tau_6 - \tau_5$	0.4302** (2.571)	0.4300** (2.590)	0.4253** (2.576)	0.4289** (2.556)
Intercept	0.7785* (1.937)	-0.0481 (-0.077)	3.6691** (2.008)	2.0858** (4.375)
AGE	0.3192** (3.541)	1.0138** (2.574)	-1.4249 (-1.299)	-
AGE ²	-	-0.1082* (-1.676)	0.2510 (1.511)	-
EDUC	0.2759** (3.270)	0.2605** (3.023)	-1.0517* (-1.707)	-0.5602** (2.519)
AGE × EDUC	-	-	0.8661** (2.274)	0.4297** (3.237)
AGE ² × EDUC	-	-	-0.1278** (-2.208)	-0.0512** (-2.352)
Mean Log Likelihood	-1.34552	-1.33643	-1.32180	-1.33115

Remarks: * = significant on a 90% confidence level; ** = significant on a 95% confidence level.

Table 5: Outcome of Likelihood Ratio Specification Tests

Model	Test statistic	d.f.	p-value
(I) vs. (II)	2.75	1	0.0975*
(II) vs. (III)	4.42	2	0.1097
(IV) vs. (III)	2.82	2	0.2437
(I) vs. (IV)	4.34	1	0.0372**

Against this background, the above outcome finding has a very plausible interpretation: People can rarely, if ever, pursue high-flying academic ambitions while at the same time, take on the extraordinary efforts usually required for full-time entrepreneurship. Hence, very young people who have already progressed much further than average on the scale of academic achievement will often have not gathered the amount of on-the-job experience that is indispensable for outstanding entrepreneurial success. In age group 1, the vocational experience advantage of less educated individuals slightly overcompensates the earnings impact of higher educational attainment.

However, this lead quickly turns into its opposite as people grow older: In age groups 2 to 5, the estimated impact of educational attainment on expected earnings is high and positive. As indicated by the high degree of statistical significance observed for the related coefficients, the multiplicative linkage between age and education established in the underlying model specification strongly supports the supposition that education and on-the-job experience are complimentary factors of entrepreneurial success that mutually reinforce each other. The estimated occurrence probabilities of different earnings brackets, which are shown in Figures 5 to 9 for different values of the educational attainment score, makes this point obvious, particularly when looking at the opposite ends of the related scale. For respondents at or below the age of 25, the estimated likelihood of being in the highest income bracket is negligible (less than 0.25%) for educational attainment

scores of both 1 and 5. In the age group ranging from above 35 to 40 years, the estimated probability of having ended up in the highest income bracket is a remarkable 17.2% for postgraduates but only amounts to around 1.1% for people without a S.S.C. or equivalent qualification.

Figure 5: Occurrence Probabilities for Different Income Scores

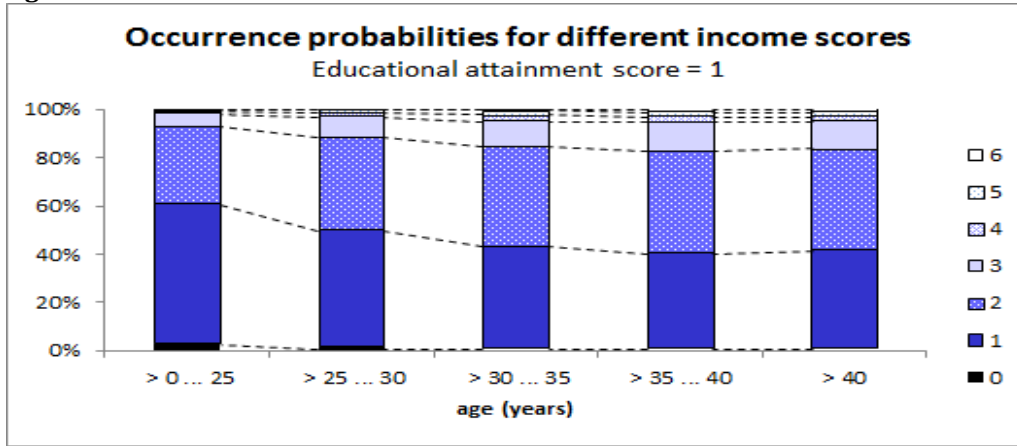


Figure 6: Occurrence Probabilities for Different Income Scores

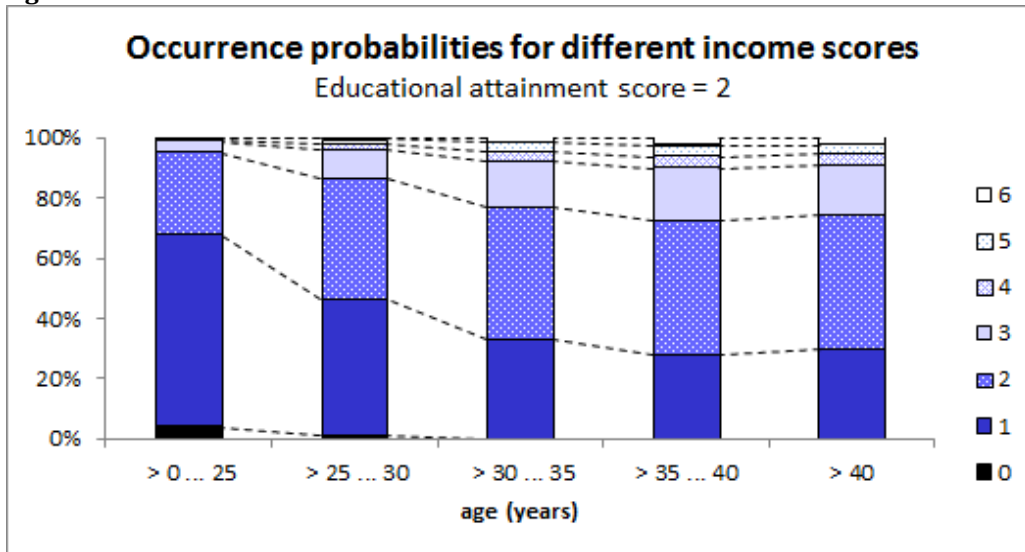


Figure 7: Occurrence Probabilities for Different Income Scores

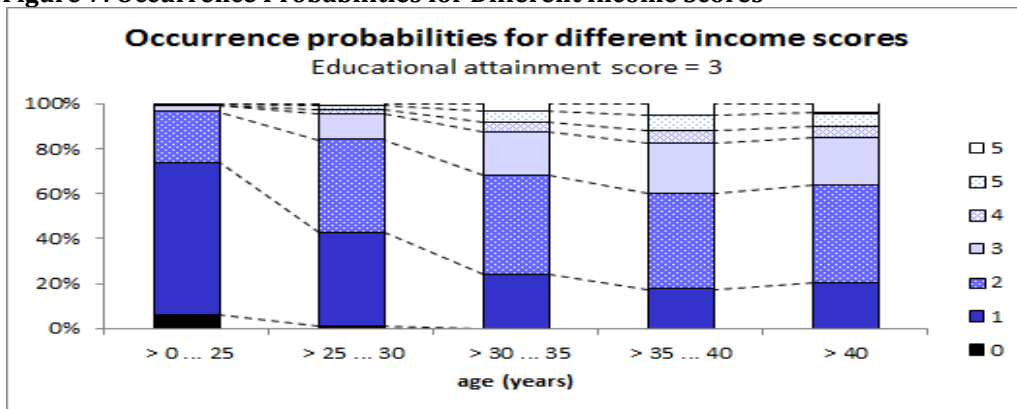


Figure 8: Occurrence Probabilities for Different Income Scores

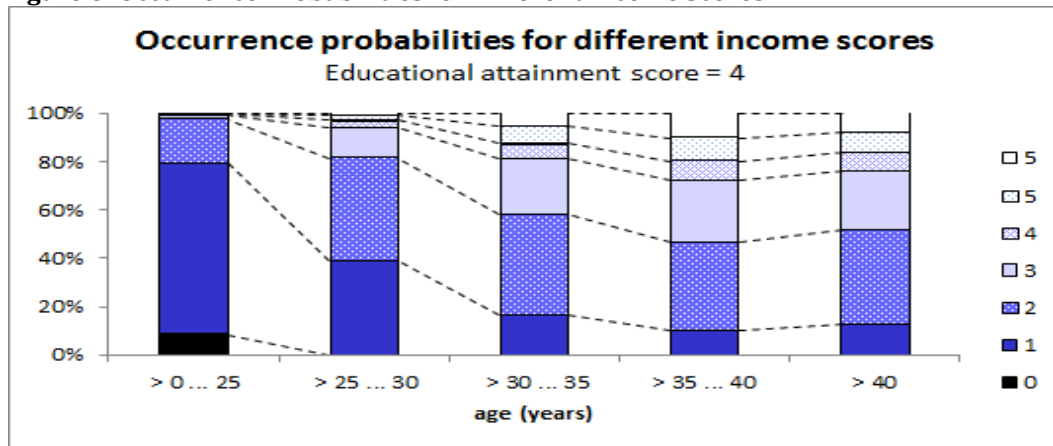
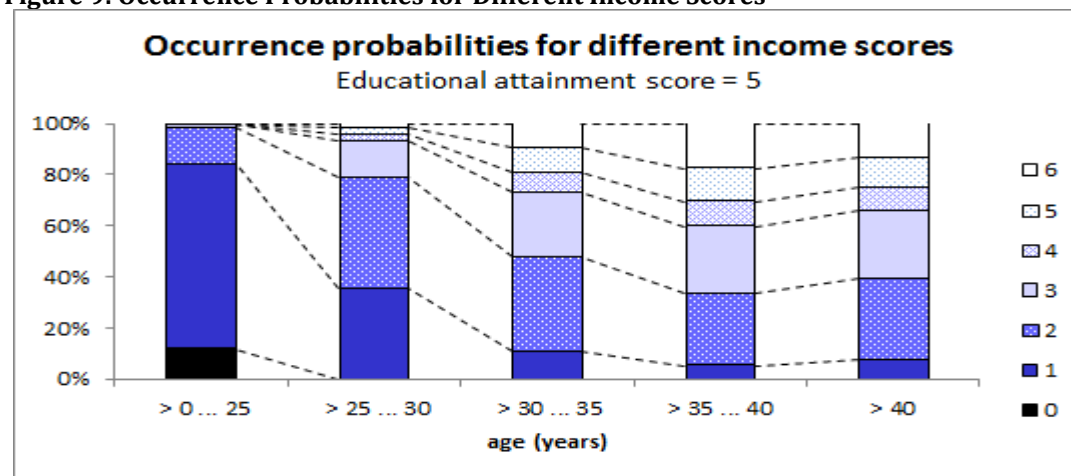


Figure 9: Occurrence Probabilities for Different Income Scores



Across all educational subgroups, people appear to reach the peak of their income generation potential at around 40 years. Although the imprecision of the age statements prevailing in this sample call for a cautious interpretation of the above finding, this seems to be rather early compared to corresponding estimates for Western Europe and the U.S., which often locate the peak of an average male's age/earning profile near the age of 50 (see, e.g., Casanova, 2013). However, given the overall lower average life expectancy prevailing in Bangladesh, this result does not come as a huge surprise. Finally, our estimates show that the degree of earnings inequality, too, tends to increase with educational achievement. More than an estimated 70% of the respondents having educational attainment scores of 1 (below S.S.C.) or 2 (S.S.C.) have an earnings score of 2 or below. In contrast, the earnings of self-employed men with a graduate or even postgraduate degree, especially at ages beyond 30, tend to be a lot more evenly distributed among the different categories used here. This observation suggests two complementary interpretations: On one hand, individual educational achievements significantly increases the odds of entrepreneurial success, but is by no means a guarantee for it. On the other hand, given the considerable diversity of subject areas in which an individual may specialise while at school or during tertiary education, it is quite plausible to assume that two educational qualifications that are formally equivalent may not be equally suited to foster success in business.

In the introduction, it was postulated that successful entrepreneurs create positive externalities for the societies they live in, and that promoting entrepreneurship should hence be an important objective of educational policy. Against this background, the above findings, which point to a high degree of complementarity between experience and educational attainment, suggest an important normative implication: Educational programmes aimed at providing society with entrepreneurs should aim for an early

and, as possible, seamless integration of theoretical skills acquisition and hands-on practical experience to gathered, e.g., through mandatory internships for students or by integrating first-hand experience reports by practitioners into the related curricula.

4. Conclusion

This paper has examined the impact of education on the age/earnings profiles of self-employed Bangladeshi men, using data from a survey carried out by the first author in 2010. Its results strongly support the perception that educational attainment and on-the-job experience are strongly complementary rather than mutually substitutable in increasing the likelihood of achieving a high income level. Yet the high degree of earnings heterogeneity among well-educated respondents in the sample also indicates that academic excellence is a catalyst but not a guarantor for entrepreneurial success, and that levels of education that are formally equivalent may nevertheless have very different implications for the likelihood of prosperity in business.

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