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A Job Worth Waiting for: Parental Wealth and Youth Unemployment in Ghana

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Abstract

Youth unemployment in Ghana increases in parental wealth. This occurs because, without unemployment insurance, only workers with sufficiently high parental wealth can afford to remain unemployed, and do so to search for scarce, high-productivity jobs. I estimate a structural model of endogenous education, employment and occupational choice to quantify this effect; I demonstrate that it leads to low educational attainment, high income inequality, and low match efficiency among workers of heterogeneous ability. I decompose the effect of wealth on average lifetime earnings into education and unemployment channels, and show that the latter accounts for 37% of the total effect. Further, I compare the effectiveness of two alternative policy interventions: an education subsidy and unemployment insurance. I find that the former is most effective at increasing aggregate productivity, but comes at the cost of increasing income inequality, while the later has a smaller effect on aggregate productivity, but also decreases inequality.

Keywords: Youth Unemployment, Occupational Choice, Human Capital Investment, Credit Constraints, Unemployment Insurance

JEL codes: J24, I24, J64

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1 Introduction

The first-time transition from school to the labour force often involves a period of searching for a "good" job offer, regardless of where in the world it takes place. In many developing countries, however, institutional failures such as search and information frictions, and a shortage of desirable employment options can severely protract the required waiting time, while a lack of credit or unemployment insurance renders long periods of unemployment more costly. The outcome of these tensions is high dispersion and low average productivity among accepted jobs. In Sub-Saharan Africa, such a state of affairs bears a particularly high economic cost, as the region has the youngest population of any in the world: approximately 70% of its citizens are under 30 years of age, and the ILO estimates that 11 million young people will enter the labour market each year over the next decade. Consequently, the question of how best to channel youth into stable and productive employment is an important consideration for researchers and policy-makers alike.

The primary focus of existing research and policy dialogue concerning youth in this region has been unemployment (see, for instance, Baah-Boateng (2013) and Baah-Boateng (2016)). This is epitomised by the president of Ghana who, in his 2018 State of the Nation address, declared that "the number of young people who cannot find work is staggering and a threat to our national security".[1] Nevertheless, there is an informal consensus among academics and policy-makers that, in Sub-Saharan Africa, unemployment is often a luxury that few can afford (Hart (1973), Udall and Sinclair (n.d.) and Fox et al. (n.d.)).[2] In this paper, I use data from Ghana to present a set of stylised facts that formalise this view. I show that youth unemployment in this region is relatively low; consequently, the low productivity of youth employment represents a much graver and more salient concern than unemployment.[3] Further, I demonstrate that the probability of youth unemployment is increasing in parental wealth: a 1% rise in parental assets is associated with a 0.08 percentage point increase in the probability of unemployment among 15-29 year-old Ghanaian males. This relationship arises precisely because the scarcity of high-productivity employment requires workers to wait (often several years) for a "good" job. Youth whose families do not have a large stock of assets to draw down will then accept worse jobs in order to avoid a prolonged period of unemployment. In the absence of unemployment insurance these effects are likely to be particularly pronounced. Finally, I show that educational attainment is low, a fact that may also be explained by an inability to reap the returns of education when they must be preceded by a costly stint in unemployment.

I build and structurally estimate a model that quantifies these effects and demonstrates that the positive link between parental assets and unemployment has negative implications for education choices, income inequality and aggregate productivity. Individuals in the model are heterogeneous in initial family assets and ability. They make decisions

[1] https://www.dw.com/en/ghana-president-vows-to-step-up-fight-against-youth-unemployment/a-42519951, last accessed 26 August 2018

[2] See also Serneels (2007) for a treatment of this subject in the context of workers queueing for public-sector employment in urban Ethiopia. He argues, however, that unemployment is concentrated among the middle-classes, rather than the wealthiest strata of society.

[3] This is in line with Falco and Teal (2012), who argue that, for young job-seekers in urban Ghana, the binding constraint is not a shortage of jobs, but the low wages offered by many of them.

over whether or not to invest in education, which sector of employment to accept work in, and how long to remain unemployed after the end of education. A tension between the desire for higher consumption while unemployed and the desire to save in order to fund a continued search for a better job underlies, and motivates, these decisions. The consequence of this is a positive relationship between parental wealth and unemployment, which results in youth from wealthier families obtaining higher-productivity jobs, on average, than their poorer counterparts. For the latter, this often implies a career in low-productivity agriculture or small-scale, low-capital entrepreneurship. In particular, when the expected return to education is low and earnings in high-education jobs are relatively dispersed, there is a high degree of income inequality, low educational participation and an inefficient allocation of workers to jobs, as low-wealth, high-ability workers end up in low-productivity employment.

I use the estimated model to decompose the effect of parental wealth on a worker's average lifetime earnings into two channels: higher education and greater willingness to wait in unemployment for a good job. I show that, for Ghana, the former accounts for 63% of the total effect, while the latter contributes the remaining 37%. The model also provides a framework within which to consider counter-factual policy experiments. Accordingly, I use it to compare the effectiveness of two alternative policy interventions: an education subsidy and unemployment insurance. I find that the education subsidy is most effective at improving aggregate productivity – a subsidy of 20% increases productivity by 25%, but also increases income inequality by 6%. Unemployment insurance of the same total value increases aggregate productivity by only 1%, but also reduces income inequality by 1%. The relatively small effects generated by unemployment insurance are due to the fact that the take-up rate of this policy is higher than that of the education subsidy. With a fixed budget, this results in a relatively small per-person payment compared to that of the latter policy. Differences in the size of the productivity effect across the two policies are also due to gains from raising the aggregate level of education outweighing the gains from extending unemployment (while holding education constant) in order to access higher-productivity employment. The opposing effects on equity are due to workers in the bottom 20% of the initial wealth distribution being unresponsive to the education subsidy, such that the former policy disproportionately benefits wealthier individuals, while the latter disproportionately benefits the bottom of the wealth distribution. Thus, the optimal policy prescription depends on a government's relative preferences over efficiency and equity.

This paper draws on, and brings together, three related strands of existing literature: research on the role of assets in determining labour market outcomes, research on education choice and its implications for labour market search, and research on unemployment in developing-country contexts.

In the first of these strands, Danforth (1979) is one of the earliest papers to analyse job search with risk-averse workers, and shows that reservation wages are increasing in wealth.[4] Eeckhout and Sepahsalari (2015) come closest to the spirit of this paper: they set up a search-and-matching framework with wage-posting, in which workers choose whether

[4]See Mortensen (1986) for a review of related research, and Bloemen and Stancanelli (2001), Algan et al. (2002) and Rendon (2006) for similar findings. Lentz and Tranaes (2005) show that search effort decreases in wealth for risk-averse workers when utility is additively separable. Wolpin (1987) estimates an asset-dependent model of the transition from high-school to employment for US workers.

to direct their search towards low- or high-productivity jobs. There is a trade-off between job productivity and the probability of receiving an offer in each sub-market, such that initial assets determine workers' sorting behaviour across job types. They demonstrate the conditions under which workers with low levels of initial assets sort into low-risk, low-productivity jobs, while high-asset workers prefer jobs with high levels of both risk and productivity, and unemployment duration increases in initial asset-holdings. Relatedly, Herkenhoff et al. (2017) use an empirical approach and US data to show that, when credit access tightens during an economic downturn, employment levels recover relatively quickly, while output and productivity remain low; this is due to low-asset workers exiting unemployment relatively quickly, and taking jobs at low-productivity firms. A separate strand of the literature, based on Baily (1978), shows that the receipt of unemployment insurance extends job search duration: for instance, Chetty (2008) shows that UI disproportionately extends the search of low-asset households, while Crossley and Low (2011) demonstrate the effects of UI on inter-temporal consumption smoothing and job search duration in the presence of credit constraints.

The other two papers in this grouping focus on aggregate-level structural change: Banerjee and Newman (1993) use a dynamic model of occupational choice to explain how the initial distribution of wealth among individuals determines the long-run development path of the economy, which, under certain conditions, leads to prosperity, and, under others, results in stagnation. The mechanism driving these outcomes is the occupational choices made by individuals in the presence of imperfect credit markets. Similarly, Ghatak and Jiang (2002) set up an inter-generational model of poverty traps based on Banerjee and Newman (1993), in which credit-constrained workers must choose among three sectors of employment: agricultural subsistence, entrepreneurship and wage work. The entrepreneurial sector utilises a more efficient, but also more costly, technology than the subsistence sector. Consequently, the question of whether or not the economy converges to a prosperous equilibrium depends on the initial wealth distribution: a threshold amount of investment in entrepreneurship is required in order to push the economy onto the high-growth path. Finally, Galor and Zeira (1993) demonstrate the way in which the initial wealth distribution drives long-run aggregate output in the presence of imperfect credit markets and indivisibility in human capital investment.

The second strand of literature I build on deals with endogenous education choice. Keane and Wolpin (1997) set up and estimate a dynamic, discrete-choice model of schooling, employment and occupational choice.[5] They use this to explain observed patterns in the labour-market outcomes of young men in the US, and to forecast patterns of employment and wages. The primary focus of the paper is its augmentation of the standard human capital investment model, however, rather than a consideration of inequality. As such, there is no treatment of wealth. Flinn and Mullins (2015) augment a standard search-and-matching framework with an endogenous education choice that enables access to different labour sub-markets. As in the model of this paper, workers are heterogeneous in ability, and earnings are complementary in ability and match productivity with the firm. Workers sort across sub-markets, taking into account the relative costs, wages, and unemployment rates. The authors then estimate the model using US data to consider the impact of minimum wage policies and education subsidies on welfare. Again, however, differences in wealth are

[5] **?**, Lee and Wolpin (n.d.) and Sullivan (2010) represent related models of school, employment and occupational choice.

not considered. A closely related paper is Lee (2005), who estimates a dynamic model of schooling, employment and occupational choice for US data, in order to consider the effect of changes in cohort size on these decisions.[6]. Lastly, a number of papers such as Carneiro and Heckman (2002) and Yang (2017) also analyse the effect of parental wealth on post-secondary schooling choice and, consequently, lifetime earnings, but without consideration of unemployment behaviour.

The third, and final, body of research focuses on unemployment in developing countries. *, author=Feng, Ying and Lagakos, David and Rauch, James E., year=2018, note=Unpublished Working Paper, organization=mimeo* (n.d.) use cross-country household survey data to investigate the relationship between unemployment and GDP per capita. They find a positive relationship, and show further that this is driven primarily by unemployment among low-educated workers. They build a two-sector model (traditional and modern), in which workers differ in terms of ability (proxying education), while countries vary in terms of their modern-sector productivity. As productivity rises, production shifts to the modern sector and, under the assumption of stronger labour market frictions here than in the traditional sector, unemployment rates rise, both overall, and disproportionately for low-ability workers. Girsberger and Meango (2017) seek to explain the "puzzle of educated unemployment in West Africa".[7] Accordingly, they present a search-and-matching framework with three labour market sectors and heterogeneity in workers' education levels. The model is estimated using data on two West African countries: Senegal and Burkina Faso. They conclude that the relatively high unemployment rates among highly-educated workers are driven by a combination of low job arrival rates, poor search efficiency in self-employment, and differential job destruction. Lastly, Falco and Teal (2012) investigate the nature of youth unemployment in urban Ghana, showing that, while measured unemployment for this group is low, so are earnings and the quality of employment.[8]

The contribution of this paper is, firstly, to provide a framework within which to consider the issue of youth unemployment in sub-Saharan Africa. This is achieved by presenting a set of stylised facts that motivate an understanding of youth unemployment as a luxury that increases in parental wealth, and by formalising these facts into a model that allows for endogenous education, savings and occupational decisions based on parental wealth. This framework draws together the three disparate strands of the labour-market literature I have just described in order to facilitate a richer understanding of the school-to-work transition in a developing-country setting. Secondly, the paper provides estimates of the model for Ghana, which allows quantification of both the "waiting effect" on earnings and the aggregate efficiency and equity consequences of the link between parental wealth and unemployment. Finally, it offers a comparison of two policy interventions, and quantifies their relative effects. The remainder of this paper is organised as follows: Section 2 presents a trio of stylised facts about labour markets in Ghana (and sub-Saharan Africa more generally) that motivates this research, Section 3 outlines the theoretical framework, Section 4 introduces the data and presents the

[6] Other relevant papers include Charlot and Decreuse (2010), who build a model with heterogeneous agents that demonstrates how the presence of search frictions in the labour market leads to over-investment in education by the rich, and under-investment by the poor

[7] Fan and Stark (2012) offer a discussion of this phenomenon for developing countries more generally.

[8] Falco and Teal (2012) also argue that waiting in unemployment increases neither one's chance of getting a job, nor one's earnings later in life, which appears to contradict the findings of this paper. Yet Falco and Teal (2012) include workers out of the labour force in their definition of unemployment, while this paper is concerned solely with active job-seekers.

results from a structural estimation of the model, Section 5 evaluates a number of labour market policy alternatives, and Section 6 concludes.

2 Data and Facts

The paper is motivated by a trio of stylised facts concerning young labour-force participants in Ghana.[9] The data I use comes from the 2012 round of the Ghana Living Standards Survey (hereafter, GLSS 2012). This nationally representative, cross-sectional dataset covers approximately 17,000 Ghanaian households, and includes a rich labour market module. The selected sample is working-age males (aged 15-60). I drop those with missing information on education, current employment and the variables used to compute parental wealth. I also drop those currently in education, as well as casual workers, apprentices and individuals not in the labour force. This yields a sample size of approximately 10,500 individuals.

Workers' education is measured as the last completed level of schooling. For the structural model, this is converted into a binary variable that defines individuals as "highly-educated" if they have completed (as a minimum) senior high school, and as "low-educated" otherwise. Employment status is defined as follows: an individual is classified as "unemployed" if he has not worked during the last week, does not have a job on hold, and is available to work.[10] Parental wealth for all individuals is obtained as follows: first, I regress a measure of household assets on education, occupation and geographic region for males aged 35 to 60. I then predict parental wealth using the same explanatory variables for sampled individuals' fathers, collected in the household module of the GLSS 2012. Details are given in Appendix A.

2.1 Fact 1: Low Youth Unemployment

The first fact of interest is that youth unemployment, in Sub-Saharan Africa on average, and in Ghana in particular, is moderately low. In 2012, unemployment among men aged 15-24 years was 12.1% in the SSA region and only 9% in Ghana (Kühn et al. (2016)). By comparison, the relevant figures for the European Union and the United States were 25.2% and 17.5%, respectively. Nevertheless, relatively low levels of unemployment in the context of low-income, developing countries are not surprising but, rather, to be expected: in the absence of unemployment insurance, remaining unemployed is simply an unaffordable luxury for the majority of the labour-force. Instead, the more important and relevant statistic is the productivity of employment, and it is here that the region truly lags behind others: it has the highest working poverty rate among youth of any region in the world, with approximately 70 per cent of youth living on a daily income of less than US$ 3.10 (Kühn et al. (2016)).

[9] While Ghana constitutes the principal focus of this research, however, these findings are not unique to it but rather, are also applicable more broadly to other countries in the Sub-Saharan African region. To illustrate this, I replicate the stylised facts detailed in this section for Uganda in Appendix B.

[10] This is a slightly more relaxed version of the standard ILO definition of unemployment, which additionally requires individuals to have actively searched for work in the last 7 days. I adopt this version because it includes discouraged workers and those who may not have searched in the last 7 days due to slow job arrival rates, but who are still "unemployed" in the sense that they want a job but do not have one. This is, further, the definition used by the Ghana Statistical Service in their 2014 Labour Force Report based on this data.

2.2 Fact 2: Low Educational Attainment

The second fact is that educational attainment in Ghana is very low, despite numerous policy attempts to raise it, including making education up to the age of 15 compulsory, and providing education up to the end of senior high school available free of charge. As Figure 1 shows, approximately 76% of Ghanaian men between the ages of 20 and 60 have not completed senior high school, and 36% have no formal education at all. Regionally, it is estimated that, in 2014, 58% of secondary school-aged children were not in school; this is the highest proportion of any region in the world (UNESCO Institute for Statistics (2016)).

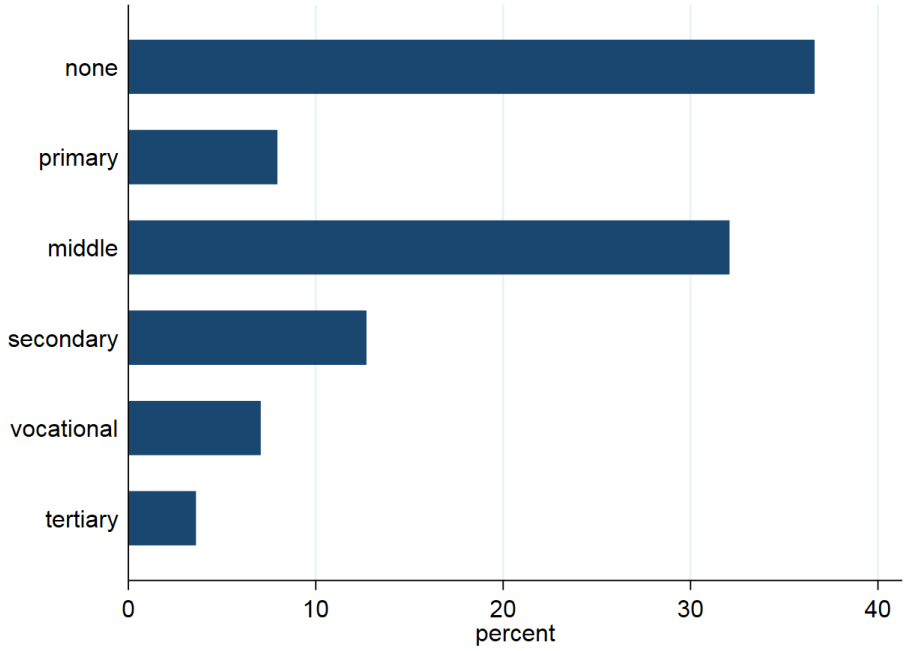

Figure 1: Male Educational Attainment in Ghana: Age 20-60
Data Source: GLSS 2012

2.3 Fact 3: Youth Unemployment Increases with Wealth

The third stylised fact is that Ghanaian youth from wealthy families are more likely to be unemployed early in life than are their counterparts from poorer backgrounds. Table 1 shows the results from a linear probability regression of parental wealth on the probability of men across different age groups being unemployed.[11] In both cases, the dependant variable is equal to 1 if the individual is currently unemployed and reports being available to work, and zero if currently employed. I control for potentially confounding variables, including age, region, and whether the individual lives in an urban or rural environment. Columns 3 and 4 add controls for education. While education decisions are endogenous, adding these controls is still useful in terms of showing that differences in unemployment are not accounted for by education alone; rather, as the model presented in the next section will show, it is one of the channels through which parental wealth affects unemployment.

[11] The construction of the parental wealth measure is described in detail in Appendix A

In Column 1, there is a positive and highly significant correlation between parental wealth and unemployment among men aged 15-29: a 1% increase in parental wealth raises the probability of unemployment by 0.08 percentage points. Comparing this to the results in Column 2, however, reveals that this relationship completely disappears after the age of 30. Columns (3) and (4) show that the same pattern persists even after controlling for education. The results are also robust to using a probit specification, as shown in Appendix B, Table 16.

	(1) Age 15-29 Unemployment = 1	(2) Age 30-60 Unemployment = 1	(3) Age 15-29 Unemployment = 1	(4) Age 30-60 Unemployment = 1
log parental wealth	0.077***	0.009	0.059**	0.009
	(0.019)	(0.006)	(0.020)	(0.006)
age	-0.007***	0.000	-0.008***	0.000
	(0.001)	(0.000)	(0.001)	(0.000)
urban	0.070***	0.004	0.062***	0.003
	(0.012)	(0.003)	(0.012)	(0.003)
region dummies	Yes	Yes	Yes	Yes
education dummies	No	No	Yes	Yes
mean unemployment	0.072	0.020	0.072	0.020
N	3328	7172	3328	7172

Standard errors in parentheses

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

Data Source: GLSS 2012

Table 1: Parental Wealth and Male Unemployment

In the next sections, therefore, I build and estimate a model that formalises the mechanisms underlying this trio of stylised facts. As previously stated, the primary focus of this model is the way in which parental wealth affects youth unemployment in a developing-country setting, and the consequences of such a relationship for the equity and efficiency of labour market outcomes.

3 Model

In this section, I present a discrete-choice, life-cycle model that considers the effect of parental wealth on youth unemployment. In this model, workers rely on family wealth in order to fund consumption while transitioning from education into employment. The primary mechanism underlying the unemployment motive is a desire to trade-off higher present consumption (by accepting a job) against a better wage offer (by waiting in unemployment). Consequently, wealthy workers remain unemployed longer, on average, in order to access high-paying jobs, while workers from poor families are willing to accept less desirable jobs in order to transition out of unemployment, which has consequences for education choices. As previously discussed, the combination of credit market failure and an absence of unemployment benefits amplifies the role of family wealth in this developing-country setting.

3.1 Model Set-Up

The model economy consists of a finitely-lived, working-age population. There are no credit markets.

Endowments:

Workers are heterogeneous in their initial endowments of family wealth and ability, each of which is an independent, random draw. Ability, denoted h_i, may be low or high, such that $h_i \in \{H^L, H^H\}$, and is observable. The proportion of low-ability types in the population is q_L. The initial family wealth of worker i, denoted $a_{i,0}$, is drawn from a log-normal distribution with cumulative distribution function F_{a0}, mean μ_{a0} and variance σ^2_{a0}.

Preferences:

Workers are risk-averse, and have logarithmic preferences over consumption in every period. The period discount factor is denoted β.

$$\sum_{t=1}^{T} \beta^{t-1} \ln c_t \tag{1}$$

Education:

Workers make a binary education decision at time $t = 0$. Let $k = \{0, 1\}$ indicate a choice of low and high education, respectively. For the purposes of this paper, I define a worker of "high education" to be one who invests in schooling beyond the compulsory level in Ghana of junior high school. A worker of "low education" is equivalently defined as one who has the compulsory level of schooling or lower. Workers incur a fixed cost of education, denoted E^E_k, where $E^E_0 = 0$ and $E^E_1 > 0$. Those who choose to invest in high education spend T_E periods at the start of life in school, with one period in this model set equal to a single year of working life; simultaneous employment is not permitted. A worker's choice of education determines the set of occupations in which she later searches for employment (this is described in more detail in the following subsection on jobs). Finally, I assume no depreciation of skills during the transition from school into employment.

Jobs:

The labour market in this model consists of three sectors: wage employment, agricultural production and entrepreneurship, where the latter is defined as self-employment in a non-agricultural business.[12] Entrepreneurship incurs a fixed start-up cost, denoted E_S. Let $m = \{u, w, a, e\}$ denote the set of possible employment statuses, corresponding to unemployment, wage employment, agriculture and entrepreneurship, respectively. Note that, while workers may remain unemployed indefinitely, employment is considered an absorbing state, such that there is no mobility across occupational alternatives once the worker has moved from unemployment to some form of employment. This is a reasonable assumption because job-to-job mobility in this context is low: for instance, among individuals sampled in

[12] Gindling and Newhouse (2014) and Nguimkeu (2014) highlight the important role played by the heterogeneous informal sector in a broad range of developing countries, and in West Africa, respectively. For an analysis of the role of self-employment in the Ghanaian labour market, with particular treatment of the question of whether it represents a sector of "opportunity" or of "last resort", see Falco and Haywood (2016). Finally, Kerr (2012) argues the importance of distinguishing between self-employment and wage-employment in small firms, which are traditionally treated collectively as the "informal sector".

the 2004 round of the Ghana Urban Household Panel Survey, which includes a detailed job history module, 30-40 year-olds had had an average of 1.9 jobs in their lifetime (see Table 20 in Appendix C). This figure would be even lower in rural regions (which is where 66% of the estimation sample lives), given the relative scarcity of job opportunities there.

Workers in this model economy may be employed in one of six distinct occupations. An occupation is defined as a sector-education level pairing, each with its own distribution of firm productivities. The productivity distribution for each alternative – from which each unemployed worker receives a random draw each period – is stationary, and is assumed to follow a log-normal distribution with mean $\mu_{m,k}$, variance $\sigma^2_{m,k}$ and cdf $F_{m,k}$ where, as before, m denotes an employment sector and k denotes workers' education level. Thus, as previously described, while workers may choose to be employed in any sector, their education choice restricts access to one or other subset of three (of the possible six) occupations.

The return to workers in each of the wage and entrepreneurial occupations is complementary in firm productivity and worker ability, while the equivalent return for the agricultural occupations depends solely on the firm productivity draw.[13] Furthermore, I allow for growth in earnings over time (and within a given job) by including an occupation-specific growth term, $G_{m,k}$. Thus, an employed worker i's total period earnings in a given job, $W_{i,m,k,t}$, may be written as:

$$W_{i,m,k,t} = \begin{cases} G_{m,k}^{t-d} w_{i,m,k,d} h_i & \text{if } m \in \{w, e\} \\ G_{m,k}^{t-d} w_{i,m,k,d} & \text{if } m \in \{a\} \end{cases} \tag{2}$$

where t indicates the current period, and d the period in which worker i transitioned into employment.

Choices and Timing:

During their lifetime, workers face three decisions. The first is a choice of education level. The second is a two-part decision while in unemployment: whether or not to accept a given job offer, and which sector to accept an offer from. Search is random, and every unemployed worker receives an offer simultaneously from each of the three sectors in each period prior to accepting one. They receive no unemployment benefits, and so, must rely solely on their initial wealth draw to finance consumption until entering employment. The third, and final, decision is a trade-off between consumption and savings in each period. When unemployed, consumption will be an increasing function of $a_{i,0}$, h_i, and expected future earnings in employment. Once employed, the optimal consumption path is deterministic, and is increasing in $a_{i,0}$, h_i and accepted earnings.

The timing of the model is as follows: at $t = 0$, workers receive their endowments of wealth and ability ($a_{i,0}$ and h_i).

[13] Such an assumption is common in the literature for developing countries. For instance, , *author=Feng, Ying and Lagakos, David and Rauch, James E., year=2018, note=Unpublished Working Paper, organization=mimeo* (n.d.) equally assume that agricultural returns do not depend on ability while returns to other sectors do, and Banerjee and Newman (1993) make an equivalent assumption, albeit using effort rather than ability.

They must choose whether or not to invest in high education at a cost of E_1^E. At $t = 1$, workers enter the labour market. They receive an independent, random firm productivity draw from each sector: wage employment, agriculture and entrepreneurship. Workers then decide whether to accept one of these offers, or to remain unemployed for the period. In all subsequent periods up to and including $t = T$, employed workers remain in their chosen job. Unemployed workers continue to receive employment offers each period until they accept one. At the end of $t = T$, all workers die.

3.2 Solving the Model: Optimal Education Choice

Workers seek the optimal strategy k to maximise the discounted sum of future pay-offs. I define the value of strategy k at time $t = 0$ as:

$$VS_{i,k} = E\left[\sum_{t=1}^{T} \beta^{t-1} \ln(c_{i,k,t}]\right] - E_k^E \tag{3}$$

The optimal strategy is then:

$$VS_i^* = max\{VS_{i,0}, VS_{i,1}\} \tag{4}$$

3.3 Solving the Model: Optimal Savings Choice

Unemployed Workers

Let $c_{i,m,k,t}$ denote consumption at time t of an individual i with education k and employment status m. While unemployed, workers then solve the following maximisation problem, based on their expectations of future earnings:

$$\begin{aligned} \max_{c_{i,0,k,t}} \quad & E\left[\sum_{t=1}^{T} \beta^{t-1} \ln(c_{i,0,k,t})\right] \\ \text{subject to} \quad & a_{i,t} = (1+r)a_{i,t-1} + W_{i,m,k,t} - c_{i,0,k,t} \\ & a_T = 0 \quad \forall \quad i = 1, ..., N \\ & a_t \geq 0 \quad \forall \ t = 1, ..., T \ \ and \ \ \forall i = 1, ..., N \end{aligned} \tag{5}$$

This gives rise to an Euler equation:

$$E_t[c_{t+1}] = \beta R c_t \tag{6}$$

This problem has no explicit solution for $c_{i,0,k,t}^*$, and is solved computationally, by backward induction.

Employed Workers

Once employed, the savings choice is deterministic, and may be solved explicitly. Workers solve the following maximisation problem, in which z denotes the current period of employed life and $Z \leq T$ denotes the total number of periods spent in employment:

$$\begin{aligned} \max_{c_{i,m,k,z}} \quad & \sum_{z=1}^{Z} \beta^{z-1} \ln(c_{i,m,k,z}) \\ \text{subject to} \quad & a_{i,z} = (1+r)a_{i,z-1} + W_{i,m,k,z} - c_{i,m,k,z} \\ & a_{i,Z} = 0 \quad \forall \quad i = 1, ..., N \\ & a_{i,z} \geq 0 \quad \forall \ z = 1, ..., Z \ \ and \ \ \forall i = 1, ..., N \end{aligned} \tag{7}$$

This yields the following interior and corner solutions for the optimal consumption path, where $R = (1 + r)$ and r is the real interest rate on savings:

$$c^{I}_{i,m,k,z} = \frac{\beta^{z-1} R^{z-1}}{R^{Z-1} \sum_{z=0}^{Z-1} \beta} [R^{Z} a_{i,0} + \sum_{z=1}^{Z} R^{Z-z} W_{i,m,k,z}] \tag{8}$$

$$c^{C}_{i,m,k,z} = \begin{cases} Ra_{i,0} + W_{i,m,k,z} & \text{if } z = 1 \\ W_{i,m,k,z} & \text{if } z = 2, ..., Z \end{cases} \tag{9}$$

Thus, the employed worker's optimal consumption in any period z is given by:

$$c^{*}_{i,m,k,z} = min\{c^{I}_{i,m,k,z}, c^{C}_{i,m,k,z}\} \tag{10}$$

3.4 Solving the Model: Optimal Employment and Sectoral Choice

Finally, I consider jointly the decision by workers between employment and unemployment, as well as between sectors. Workers seek the optimal strategy m to maximise the discounted sum of future pay-offs. I define the value of strategy m at time z as:

$$VM_{i,m,k,z} = E\left[\sum_{t=z}^{T} \beta^{t-1} \ln(c_{i,m,k,z})\right] \tag{11}$$

The optimal strategy is then:

$$VM^{*}_{i,k,t} = max\{VM_{i,u,k,t}, VM_{i,w,k,t}, VM_{i,a,k,t}, VM_{i,3,e,t}\} \tag{12}$$

The model is solved computationally, by backward induction, and the results are discussed in the next section.

3.5 Model Predictions

In this section, I consider the ways in which the two dimensions of worker heterogeneity (wealth and ability) affect choices over education and unemployment duration. This is important for understanding the mechanisms that underlie

observed individual choices, for determining the sign and magnitude of the effects on equity and efficiency, and, later, for making sense of the differential effects of alternative policy interventions.

3.5.1 Wealth and Education Choice

The sign of the relationship between wealth and education choice is ambiguous; it depends on the cost of education and the relative parameters of the offered earnings distributions in high- and low-education occupations. There are thus two channels of effect; I term these the "fixed cost" channel and the "cost of waiting" channel, respectively. The first of these depends on E_1^E and T_E, the monetary and time costs of education. The existence of these fixed costs implies a threshold value of wealth above which workers can afford to enter high education, and below which they cannot. The "cost of waiting" channel is, however, governed by the relative means and variances of offered earnings in high- and low-education occupations. In particular, when returns to education are highly uncertain (i.e. they have a low mean and a high variance), less-wealthy workers will prefer not to obtain high education, due to the high waiting cost of a good draw.

To show the effect on education choice of each of these channels in turn, I begin by considering a case in which the fixed cost of education is zero and the distribution of offered earnings in high education has the same mean but a high variance compared to the equivalent distribution in low education. This shuts down the "fixed cost" channel, isolating the "cost of waiting" effect. As Figure 2 illustrates, this generates the standard result of a threshold value of wealth, a_0^*, above which individuals always choose high education, and below which, equivalently, they always choose low education. Increasing the fixed cost of education then shifts the education-wealth threshold to the right: the minimum level of wealth which induces workers to invest in high education is now higher.

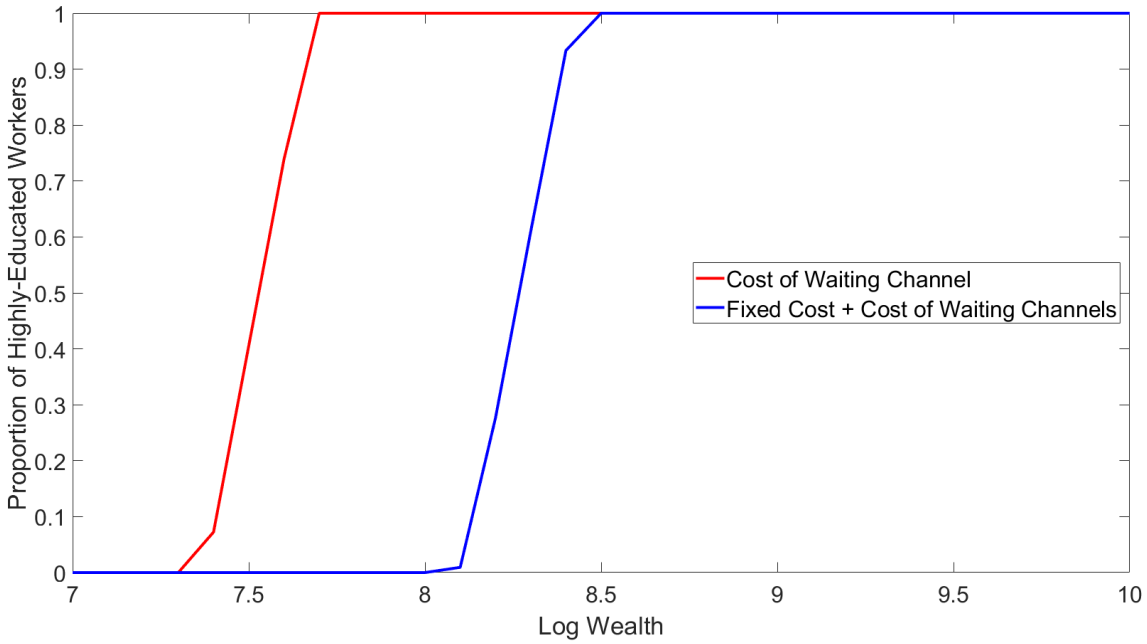

Figure 2: Wealth and Education Choice

It should be noted, however, that, while Figure 2 shows a case in which the "cost of waiting" channel induces a positive relationship between wealth and education choice, it is also possible for this effect to be negative. In particular, if low-education occupations have a sufficiently higher "cost of waiting" than high-education occupations (that is, the low-education earnings distribution is relatively more dispersed than the equivalent high-education one) and the "fixed cost" effect is small or zero, there is a negative relationship between education and wealth, in which poorer workers choose high education, while the wealthiest workers, who can afford to wait a longer time in unemployment for a high-paying job, find it optimal to remain at a low level of education, where there is now a chance of getting a very high draw.

3.5.2 Wealth and Unemployment Choice

In considering the effect of wealth on workers' choice of employment status, it is important to distinguish between the effects *within* and *across* education categories. Conditional on education status, average unemployment duration is always increasing in initial wealth. Across education groups, however, the sign of the relationship depends on relative parameter values of the earnings distributions, as these determine how long an individual must wait in unemployment at each education level for a job he is willing to accept.

In particular, when offered earnings in high- and low-education have the same mean, but the former has a higher variance, the cross-education wealth effect is positive: wealthy workers are now more likely to get educated, given the fixed costs of high-education, and also remain unemployed longer than their poorer counterparts, incentivised by the relatively high earnings variance in their sub-market. This case is illustrated in Panel (i) of Figure 3.

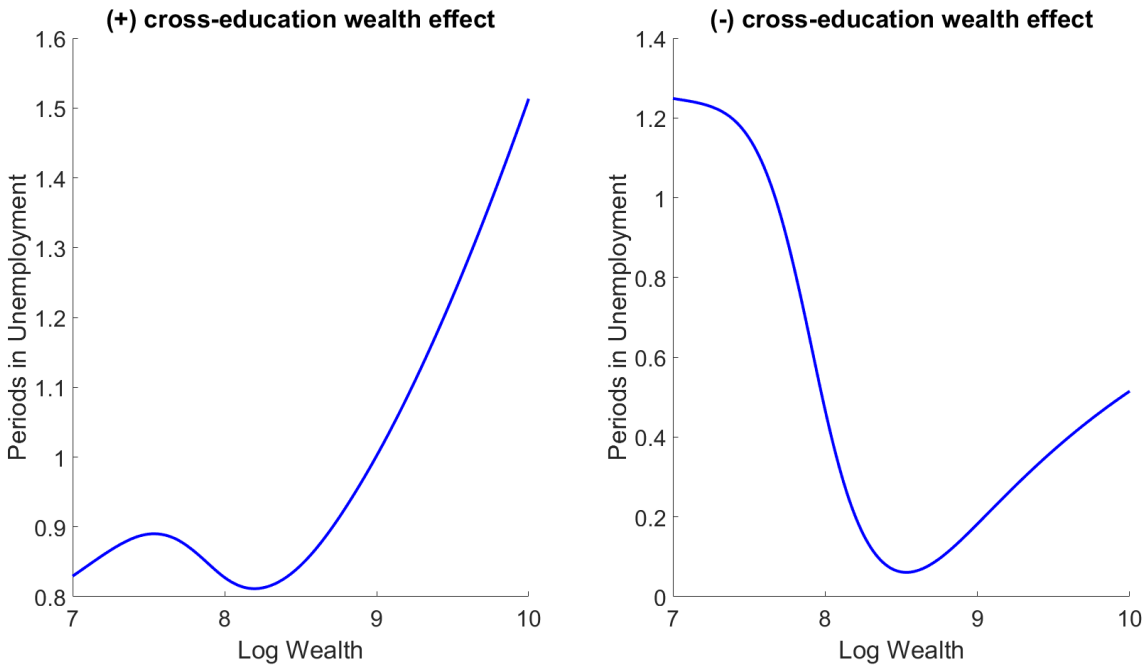

Figure 3: Wealth and Unemployment Duration

Conversely, consider a case in which high-education offered earnings have a high mean and a low variance relative to low-education earnings.[14] Wealthy workers remain more likely to get educated, but now receive good job offers relatively quickly, so do not remain long in unemployment. Poorer workers, by contrast, do not invest in high education, and then find it optimal to wait relatively longer in order to secure a job. Here, the cross-education wealth effect is negative. Panel (ii) of Figure 3 illustrates this case; with the negative cross-education wealth effect dominating the positive within-education wealth effect, except at the top of the wealth distribution (where everyone is highly-educated, such that the cross-group effect is zero and the positive within-group effect dominates).

3.5.3 Ability and Education Choice

In terms of ability, the model predicts two opposing effects on education choice, rendering the net effect ambiguous. I term these the "fixed cost" channel and the "asset de-accumulation" channel, respectively. The "fixed cost" channel summarises the way in which, conditional on wealth, the existence of an education fixed cost, E_1^E makes high-ability workers more likely than their low-ability counterparts to undertake high education. This is shown in Figure 4: increasing the monetary or time cost of high education reduces the proportion of highly-educated workers, but high-ability workers are less sensitive to these higher costs than are their low-ability counterparts.

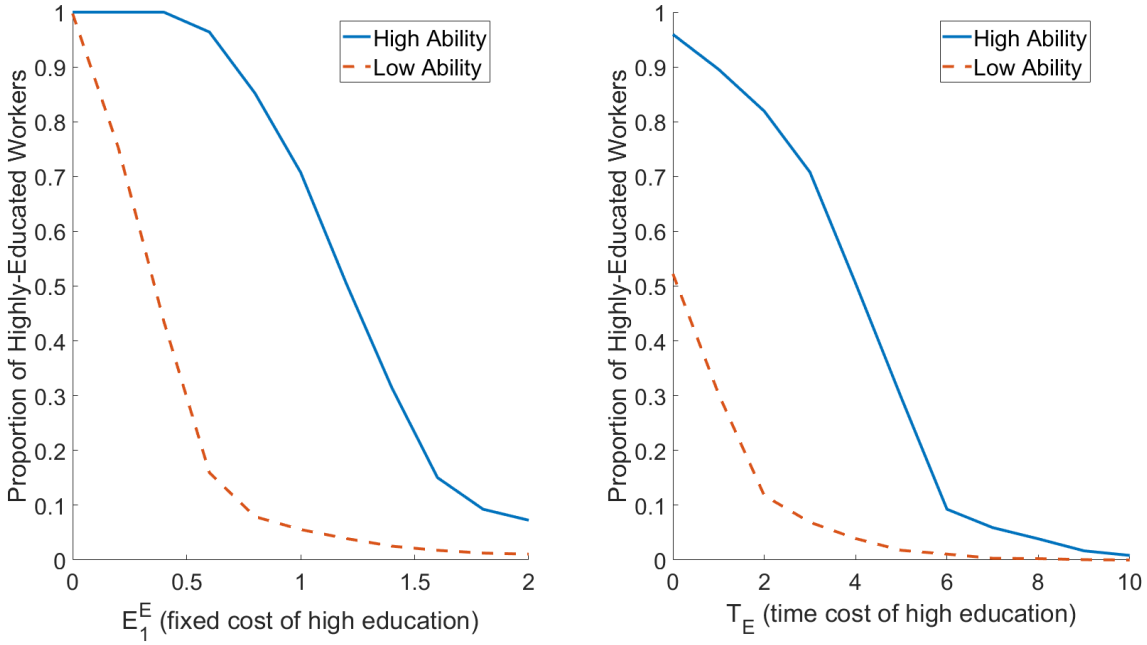

Figure 4: Cost of Education and Education Choice by Ability

The "asset de-accumulation" channel, on the other hand, captures the fact that, all else equal, a high-ability worker draws down his assets faster in unemployment than does a low-ability worker, in anticipation of relatively higher future wages. This means that a high-ability worker behaves, for the purposes of education choice, as though he were

[14] A more natural comparison to the former case would be to assume constant means across the two education levels, but a higher variance for low-education earnings. In such a case, however, the fraction of educated workers is zero, so it is not possible to consider cross-group variation.

effectively poorer than a low-ability worker with the same level of assets. Therefore, as in the relationship between wealth and education choice described above, when offered high-education earnings are sufficiently uncertain (low $\mu_{m,1}$ and high $\sigma^2_{m,1}$) relative to low-education earnings, a high-ability worker prefers to remain uneducated, as it allows him to transition more quickly into employment, while a low-ability worker with the same wealth chooses high education. Figure 5 presents this channel; beginning with a case in which high-education returns have a lower mean but a higher variance than low-education returns, an increase in the variance of high-education returns induces workers of both high- and low-ability to get educated, but the latter group is more sensitive to this change than is the former.[15]

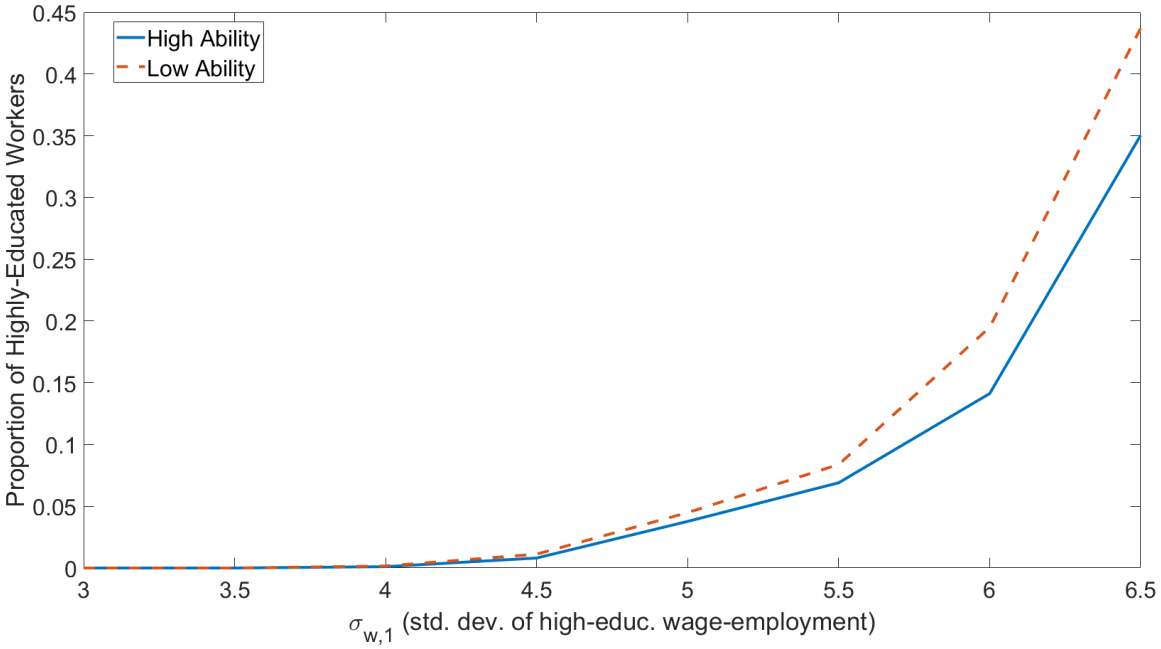

Figure 5: Uncertainty in Returns to Education and Education Choice by Ability

Thus, the question of which effect dominates depends on the relative parameters of education costs and the earnings distributions; consequently, the probability of obtaining high education may be increasing or decreasing in workers' ability.

3.5.4 Ability and Unemployment Choice

As with wealth, it is important to distinguish between the effects of ability on unemployment *within* and *across* education categories. First, the relationship with unemployment conditional on education is ambiguous. There are two channels that drive this relationship, which I term the "asset de-accumulation" channel and the "sectoral shift" channel, respectively. The first of these has already been explained: a high-ability worker consumes more in unemployment than does a low-ability worker with the same wealth, due to having a higher expected future income stream. Thus, he draws down his assets more quickly, which lowers his reservation wage and pushes him into employment. This means that a high-ability worker behaves, for the purposes of employment choice, as though he were effectively poorer than

[15] For simplicity, I set offered returns equal to zero in all sectors except wage-employment.

a low-ability worker with the same level of assets.

The "sectoral shift" channel arises due to the assumption that ability does not affect earnings in the agricultural production sector. Consequently, a low-ability worker facing an employment offer from this sector is now *more* likely to accept it than an equivalent high-ability worker, because he receives exactly the same value of employment, but the former has a lower outside value of unemployment, due to lower expected earnings in the other two sectors. This shifts low-ability workers towards employment in the agricultural sector, particularly when offered returns in this sector have a relatively high mean.

Figure 6 shows the relationship between ability and unemployment duration, conditional on workers' education choice. In the first panel, I retain the assumption that ability does not affect earnings in agricultural production, such that the results in this panel derive from a combination of the "asset de-accumulation" and "sectoral shift" channels. In the second panel, however, I relax this assumption (thereby removing the "sectoral shift" effect). The removal of this channel leads to higher unemployment durations among low-ability workers in the second panel compared to the first, but there is no change in the outcomes of high-ability workers.

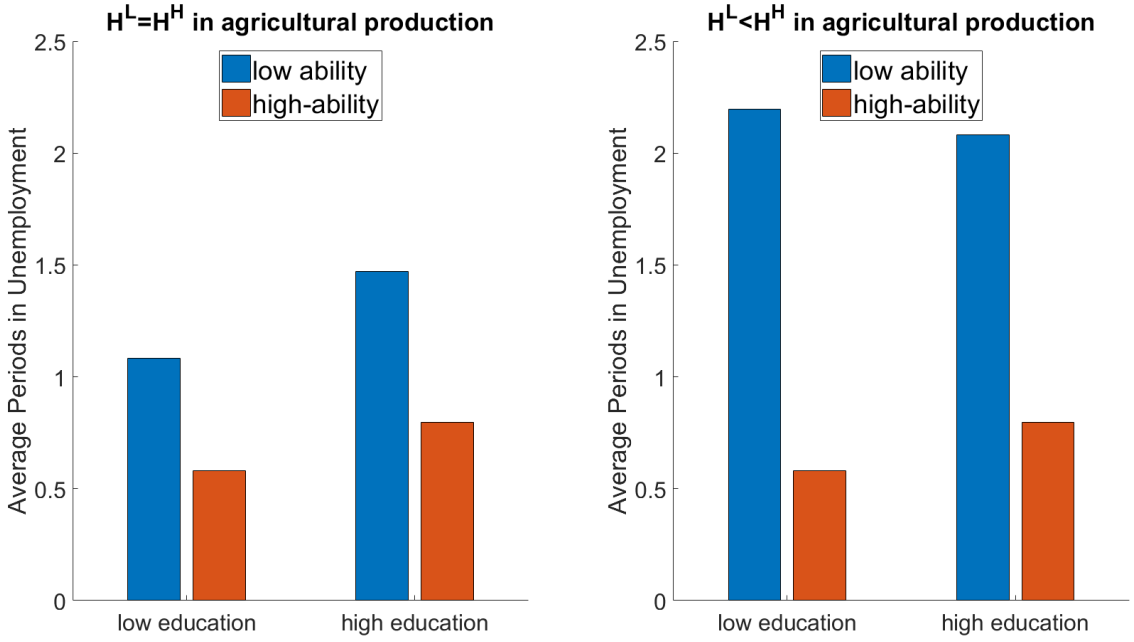

Figure 6: Ability and Unemployment Duration

Second, if we now consider the relationship *across* education groups, an additional, compositional effect arises. The average unemployment duration across education sub-markets is driven by the average asset-holdings of individuals in each sub-market, as well as by the offered earnings parameters of its occupations. Thus, if high-ability workers are disproportionately likely to invest in high education (as detailed in the previous section), and offered earnings in this sub-market have relatively low means and high variances compared to offered earnings in the low-education sub-market, the cross-education effect of ability on unemployment duration is positive.

4 Data Description and Estimation

As previously described, the data comes from the sub-sample of working-age males (aged 15-60) in the GLSS 2012. For employed workers, information about annual earnings and sector of employment comes from survey questions relating to work during the last week and the total number of hours worked in the last year. Workers who report having multiple occupations (representing about 10% of the sample) are classified as belonging to their main sector of employment, but total earnings across both sectors are used. For workers in agriculture, earnings information is supplemented by data from a survey module on household agricultural income. Lastly, for individuals recorded as "unpaid workers" in household agriculture or non-agricultural businesses, earnings are computed as the total household earnings for that activity, divided by the number of household members engaged in it.

4.1 Summary Statistics

In this section, I present some summary statistics for the GLSS 2012 data. First, Ghana has - as does the Sub-Saharan African region more broadly - a particularly youthful population. As Figure 7 shows, 68% of individuals in the full sample are 30 years old or younger, a feature that lends additional significance to the consideration of youth labour-market outcomes.

The remainder of these summary statistics focuses on the sub-sample of male labour-force participants aged 16-30, which is the estimation sub-sample (equivalent statistics for the full sample are presented in Appendix D). As previously discussed, average education is low, with 70.73% of sampled workers having attained a maximum of middle-school education (see Table 2). 34.33% are urban-dwellers, while the rest live in rural areas.

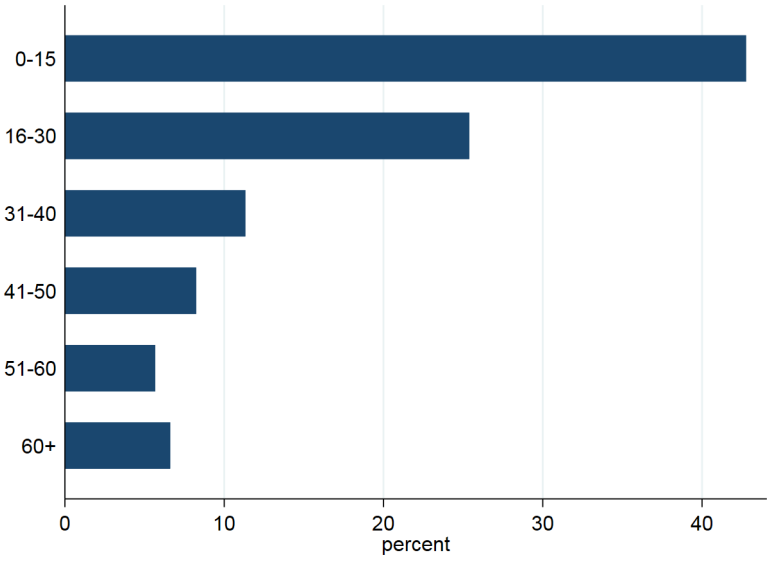

Figure 7: GLSS 2012 by Age Group

Figure 8 presents the sectoral composition of this labour market; the most striking feature is that 45% of all individuals

observations	3728	
urban (%)	34.33	
highly-educated (%)	29.27	
	mean	s.d.
age (years)	24.26	4.07
education (years)	8.47	5.90
median parental assets (US$)	620.59	553.76

Table 2: Summary Statistics: Male Labour-Force Participants Aged 16-30

work in agricultural production (which accords with the high proportion of rural-dwellers). The proportion of agricultural workers falls significantly with education, however: 64% of low-educated workers are in this sector compared to 28% of their highly-educated counterparts. Education shifts the sectoral composition away from agricultural production and towards wage-employment, with 47% of highly-educated workers employed in the wage sector, compared to only 18% of the low educated. The share of entrepreneurs, by contrast, is approximately constant across education groups.[16]

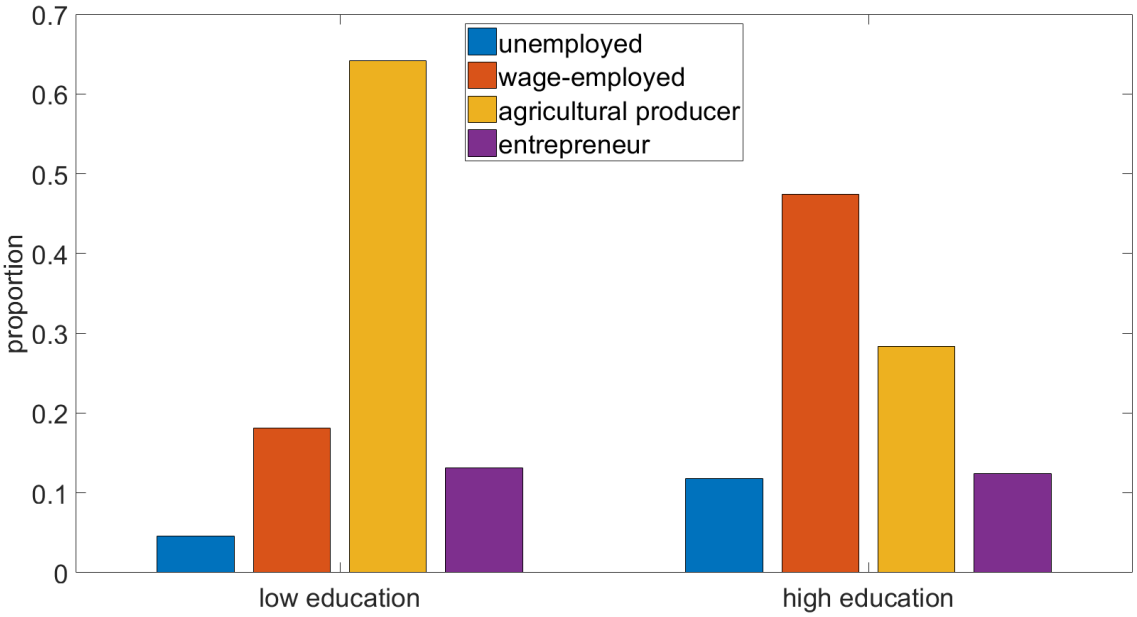

Figure 8: Employment Status by Education

4.2 Model Predictions and Empirical Patterns of Parental Wealth

The model predicts that parental wealth drives workers' choices over unemployment, education and sector of employment and, consequently, leads to higher lifetime earnings for the wealthy. In this section, I show that the empirical patterns of workers' outcomes are consistent with these predictions.

[16] Poschke (2013), for instance, argues, using US data, that entrepreneurship rates are U-shaped with respect to education, due to the co-existence of necessity-based and talent-based entrepreneurs.

First, parental wealth drives higher unemployment rates through two channels: first, by making wealthy workers more likely to invest in education, when earnings in high-education occupations have relatively high variances, and second, conditional on educational status, by making wealthy workers wait longer in unemployment for a better job. I have already demonstrated the positive correlation between parental wealth and unemployment in Section 2. In fact, unemployment rates in the data also differ significantly across education groups, with 12% of highly-educated workers unemployed compared to only 5% of low-educated workers, as Figure 8 has shown.

Second, Table 3 presents a linear probability regression of education choice on the log of parental wealth and geographic controls. There is, as expected, a positive and significant correlation between parental wealth and the probability of choosing to be highly-educated.

Third, the model predicts that differences in wealth drive sorting behaviour across sectors of employment, with wealthier workers more likely to enter sectors in which returns are relatively dispersed and, therefore, require a longer wait in unemployment in order to secure a high-productivity draw. Table 4 presents the results from a multinomial logit regression of employment sector on the log of parental wealth and geographic controls. Among low-educated workers (the first column), higher parental wealth is associated with a shift out of agriculture and into wage employment and (to a lesser extent) entrepreneurship. Among highly-educated workers, higher parental wealth remains correlated with a shift out of agriculture and into wage employment, but there is no significant change in the probability of being an entrepreneur. This is consistent with the model prediction, as the estimation results in the next section show that offered earnings are, in fact, more dispersed in the wage and entrepreneurial sectors than in agriculture.

Finally, I consider the relationship between parental wealth and lifetime earnings. Table 5 displays the results from a regression of the log of annual earnings on the log of parental wealth and geographic controls. As parental wealth has a positive relationship with both education choice and unemployment, the model predicts that workers from wealthier families earn more than their counterparts from poorer backgrounds on average, and this wage gap is increasing over the life-cycle. The latter result is due primarily to higher unemployment among the wealthy (such that they are more likely to record zero earnings early in life), but may also be affected by wealthy workers being relatively more willing to accept employment in sectors with low initial earnings but high earnings growth. Table 5 presents just such a pattern: in the first column (workers aged 16-30), parental wealth is negatively correlated with earnings; in the second column (workers aged 31-50), however, wealthy workers not only catch up with, but significantly outstrip, their poorer counterparts.

4.3 Identification and Structural Estimation Procedure

The model is estimated by the Method of Simulated Moments (MSM). It has a total of 28 parameters; 14 of these are identified structurally, by targeting a set of 25 data moments, while the remaining 14 are external parameters fixed ex-ante in accordance with the data or the literature.

	(1)
	Age 16-30
	Educated=1
log parental wealth	0.331***
	(0.019)
urban	0.179***
	(0.018)
region dummies	Yes
mean(educated)	0.293
N	3728

Standard errors in parentheses

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

Table 3: Education Choice and Parental Wealth

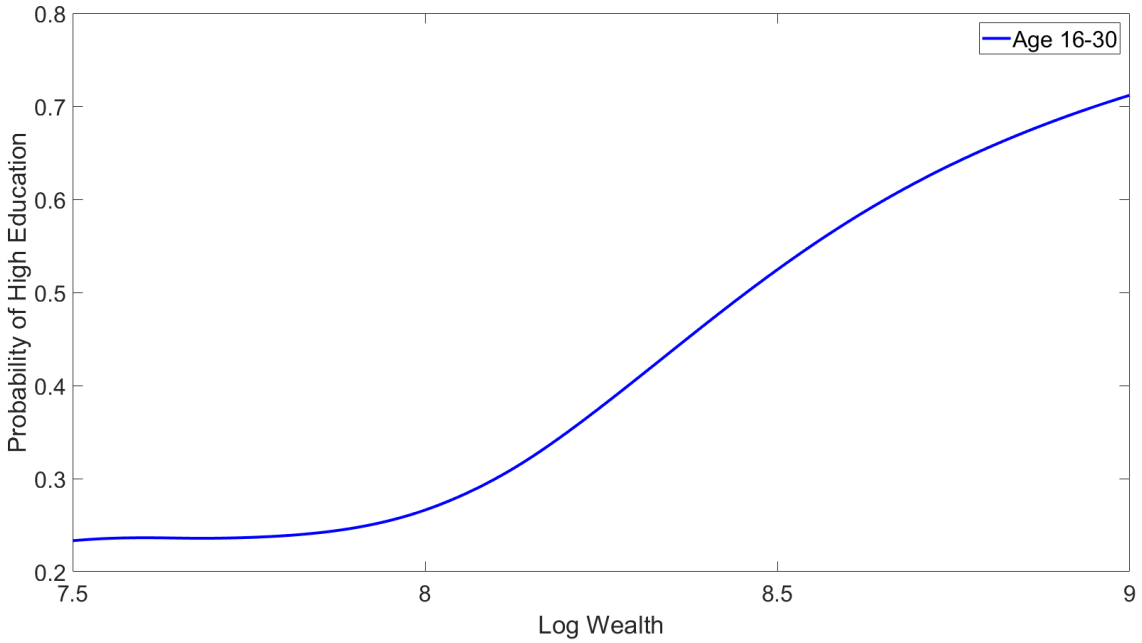

Figure 9: Education Choice and Parental Wealth

	(1) education=0 Employment Sector	(2) education=1 Employment Sector
log parental wealth		
1.wage employment	0.093***	0.170***
	(0.023)	(0.036)
2. agriculture	-0.136***	-0.140***
	(0.028)	(0.038)
3. entrepreneurship	0.044*	-0.030
	(0.022)	(0.021)
urban		
1.wage employment	0.130***	0.169***
	(0.013)	(0.030)
2. agriculture	-0.299***	-0.269***
	(0.014)	(0.024)
3. entrepreneurship	0.169***	0.101***
	(0.013)	(0.024)
region dummies	Yes	Yes
N	2516	962

Marginal effects; Standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

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

data: employed males aged 16-30 (GLSS 2012)

Table 4: Employment Sector Choice and Parental Wealth

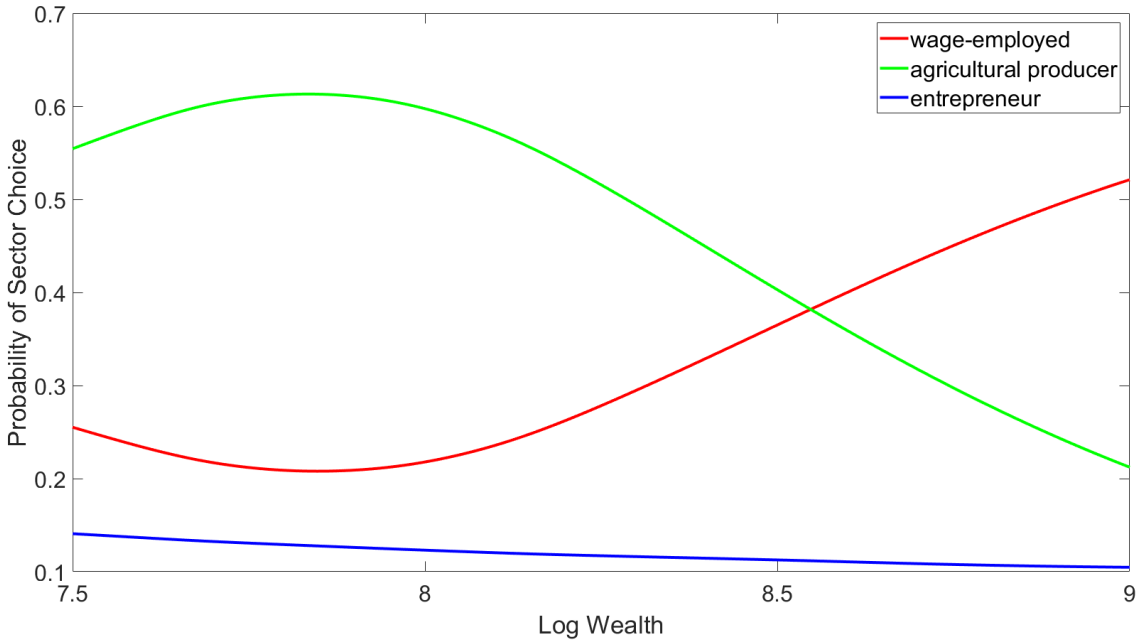

Figure 10: Sectoral Choice and Parental Wealth

	(1) Age 16-30 Log Annual Earnings	(2) Age 31-50 Log Annual Earnings
log parental wealth	-0.479*	0.260**
	(0.196)	(0.088)
age	0.324***	-0.002
	(0.022)	(0.006)
urban	-0.194	0.671***
	(0.187)	(0.076)
region dummies	Yes	Yes
mean(log earnings)	6.050	7.388
N	2237	4329

Standard errors in parentheses

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

data: all males aged 16-50 (GLSS2012)

Table 5: Log Earnings and Parental Wealth

Figure 11: Log Annual Earnings and Parental Wealth

Table 6 summarises the external parameters of the model. The real interest rate is obtained from national statistics. The wealth distribution is described by my measure of parental wealth. The cost of education is the median amount spent on tuition, textbooks, transport, boarding and other schooling costs for male family members currently in public schooling at the level of senior high school or above (the variable captures expenditure within the last 12 months, and this figure is multiplied by the time cost of education to obtain the parameter estimate for E_1^E). The GLSS 2012 does not collect information about the fixed cost of entrepreneurship. Thus, the estimate of E_S is the average start-up cost reported by entrepreneurs in the Ghana Urban Household Panel Survey (2004-2006). The model is simulated over 35 periods, covering the age range 16-50. The time cost of education is the average number of additional years spent in education by high-educated individuals (those with a minimum of a senior high school certificate).

Finally, the growth rate of earnings in each occupation is computed by regressing the log of earnings on age for men between the ages of 31 and 50 (see Appendix E for further details). The challenge here is to separately identify the wage growth due to selection - that is, remaining unemployed longer to get a good earnings draw - and that governed by the underlying growth parameter. As transition into the labour market has been completed by age 30, I use the age range 31-50 to compute the growth parameters. Estimation of the structural earnings parameters thus relies on the assumption that the growth rate of earnings is constant over the life-cycle.

Parameter	Description	Value	
β	discount factor	0.95	
r	real interest rate	5%	
F_{a0}	initial wealth endowment	from GLSS 2012	
E_1^E	cost of high education	1200 GHc ($\approx$ 250 USD)	
E_S	cost of entrepreneurship	210 GHc ($\approx$ 44 USD)	
T	number of periods	35	
T_E	time (period) cost of high education	4	
H^H	level of high ability	1	
		educated=0	educated=1
$G_{w,k}$	earnings growth	1%	3%
$G_{a,k}$	earnings growth	0%	5%
$G_{e,k}$	earnings growth	1%	2%

Table 6: External Parameters 1

Estimation of the model's structural parameters is conducted as follows: first, I select the sub-sample of all male labour-force participants aged 16-30. As the model focuses on the initial transition from education to the labour-force, this is the age category whose characteristics I aim to match in the estimation. This yields a sample size of $N = 3728$. I proceed to solve the model by backward induction for an initial parameter set. This yields a full set of simulated outcomes for each sampled individual over his life-cycle. As the GLSS 2012 is a cross-sectional dataset, however, I then convert the simulated data into a comparable cross-sectional form based on the age at which each individual is observed in the empirical data. The next step is to construct the moments required for estimating the structural parameters, for both the simulated and empirical data. Simulated moments are computed for labour-force participants

aged 16-30, excluding those currently in education, in order to match the data. Table 7 lists these parameters, while Tables 8 and 9 display the moments used to estimate their values.

The estimated parameters minimise a quadratic loss function that measures the weighted distance between the set of moments from the simulated dataset and their empirical counterparts. I use the Nelder-Mead algorithm to simulate the model (and obtain the set of simulated moments) repeatedly, varying the set of structural parameters until the loss function is minimised, such that the simulated moments are as close as possible to the empirical ones. Formally, the simulated moments estimator $\hat{\theta}_{S,N}(W)$ solves:

$$\hat{\theta}_{S,N}(W) = argmin_{\theta}[\hat{\psi}_N^d - \hat{\psi}_N^s(\theta)]' W_N [\hat{\psi}_N^d - \hat{\psi}_N^s(\theta)] \tag{13}$$

in which S is the number of simulations for a given parameter set (I choose $S = 10$), N is the sample size, $\hat{\psi}_N^d$ is the set of empirical moments, $\hat{\psi}_N^s(\theta)$ is the set of simulated moments, and W is the weighting matrix. For the last of these, I use the inverse of the variance-covariance matrix of the empirical moments. This puts more weight on moments that are precisely estimated, while also adjusting the weighting for correlation between moments.

The moments employed in estimation are as follows: the means and standard deviations of log earnings in each of the six occupations, the proportion of workers in each occupation, the proportion of highly-educated workers in the sample, the proportion of unemployed workers aged 16-24 by education level, the proportion of low-education workers in the top wealth decile, and the mean log earnings ratio of workers in the top wealth decile by sector. The last two sets of moments are particularly useful in estimating the parameters of the ability distribution; identification of these parameters thus relies on the assumption that ability is uncorrelated with the initial distribution of parental wealth. While the model simulates the schooling process of those who choose high education, simulated moments are computed using only the sub-sample of out-of-school workers, in order to ensure comparability with the data moments, which are computed for exactly this group of workers.

4.4 Estimation Results and Model Fit

The estimation results are presented below. Table 7 shows the estimated parameter values, and Tables 8 and 9 list the values of the matched model moments alongside their empirical counterparts and a 95% confidence interval around them. Standard errors (in parentheses) are bootstrapped using 200 replications.

One of the most striking features of this set of results is the degree of labour-market selection that underlies it. The wage offer distributions for all occupations have high estimated standard deviations; in fact, with the exception of high-education wage-employment and the two agricultural occupations, the standard deviation of each occupation exceeds its corresponding mean. By contrast, the accepted wage distributions (see Table 8) have low standard deviations and high means relative to their offered counterparts. This demonstrates the degree to which individuals, conditional on wealth, are willing to wait in unemployment in order to secure a higher-paying job.

Parameter	Description	Estimate	
q_L	proportion of low types	0.42	
		(0.01)	
H^L	low ability level	0.54	
		(0.03)	
		educated=0	educated=1
$\mu_{w,k}$	mean log earnings (wage-emp.)	0.86	4.87
		(0.06)	(0.08)
$\mu_{a,k}$	mean log earnings (agric.)	4.56	3.03
		(0.03)	(0.27)
$\mu_{e,k}$	mean log earnings (entrep.)	0.11	0.73
		(0.01)	(0.05)
$\sigma_{w,k}$	sd log earnings (wage-emp.)	3.79	2.97
		(0.11)	(0.12)
$\sigma_{a,k}$	sd log earnings (agric.)	2.02	2.55
		(0.03)	(0.14)
$\sigma_{e,k}$	sd log earnings (entrep.)	4.10	3.69
		(0.06)	(0.11)

Table 7: Structural Parameters 1

	educated=0			educated=1		
Moment	Fitted	Data	{LB,UB}	Fitted	Data	{LB,UB}
prop. (wage-emp.)	0.13	0.13	$\{0.12, 0.14\}$	0.17	0.14	$\{0.13, 0.15\}$
prop. (agric.)	0.46	0.45	$\{0.44, 0.47\}$	0.06	0.08	$\{0.07, 0.09\}$
prop. (entrep.)	0.11	0.09	$\{0.08, 0.10\}$	0.03	0.04	$\{0.03, 0.04\}$
mean log earn. (wage-emp.)	7.26	7.76	$\{7.66, 7.86\}$	8.07	8.03	$\{7.92, 8.13\}$
mean log earn. (agric.)	6.67	6.54	$\{6.45, 6.63\}$	7.25	6.64	$\{6.63, 6.90\}$
mean log earn. (entrep.)	7.41	7.85	$\{7.66, 8.03\}$	7.76	7.99	$\{7.75, 8.23\}$
sd log earn. (wage-emp.)	1.68	1.04	$\{0.97, 1.14\}$	1.69	1.12	$\{1.02, 1.24\}$
sd log earn. (agric.)	1.14	1.17	$\{1.13, 1.22\}$	1.27	1.25	$\{1.14, 1.38\}$
sd log earn. (entrep.)	1.77	1.52	$\{1.36, 1.79\}$	1.46	1.29	$\{1.12, 1.30\}$

note: UB and LB are the upper and lower bounds of a 95% confidence interval around the data moment

Table 8: Matched Moments 1

Moment	Fitted	Data	{LB, UB}
proportion of high-educ. workers	0.28	0.29	$\{0.28, 0.31\}$
proportion of low-educ. workers in top wealth decile	0.29	0.33	$\{0.28, 0.38\}$
high/low-educ. wage earnings ratio in top wealth decile	1.15	1.08	$\{1.02, 1.15\}$
high/low-educ. agric. earnings ratio in top wealth decile	1.08	0.99	$\{0.83, 1.19\}$
high/low-educ. entrep. earnings ratio in top wealth decile	1.04	0.99	$\{0.86, 1.07\}$
proportion of low-educ. unemployed workers aged 16-24	0.15	0.16	$\{0.13, 0.19\}$
proportion of high-educ. unemployed workers aged 16-24	0.06	0.06	$\{0.05, 0.09\}$

note: UB and LB are the upper and lower bounds of a 95% confidence interval around the data moment

Table 9: Matched Moments 2

The model fits the data quite well; almost all the moment estimates lie within a 95% confidence interval around their empirical counterparts, as Tables 8 and 9 show. Exceptions are the mean of log earnings in high-education agriculture, and the standard deviation of log earnings in the wage sector, which the model struggles to fit. The fit of the remaining earnings moments is quite good, and the unemployment moments, in particular, are very closely matched.

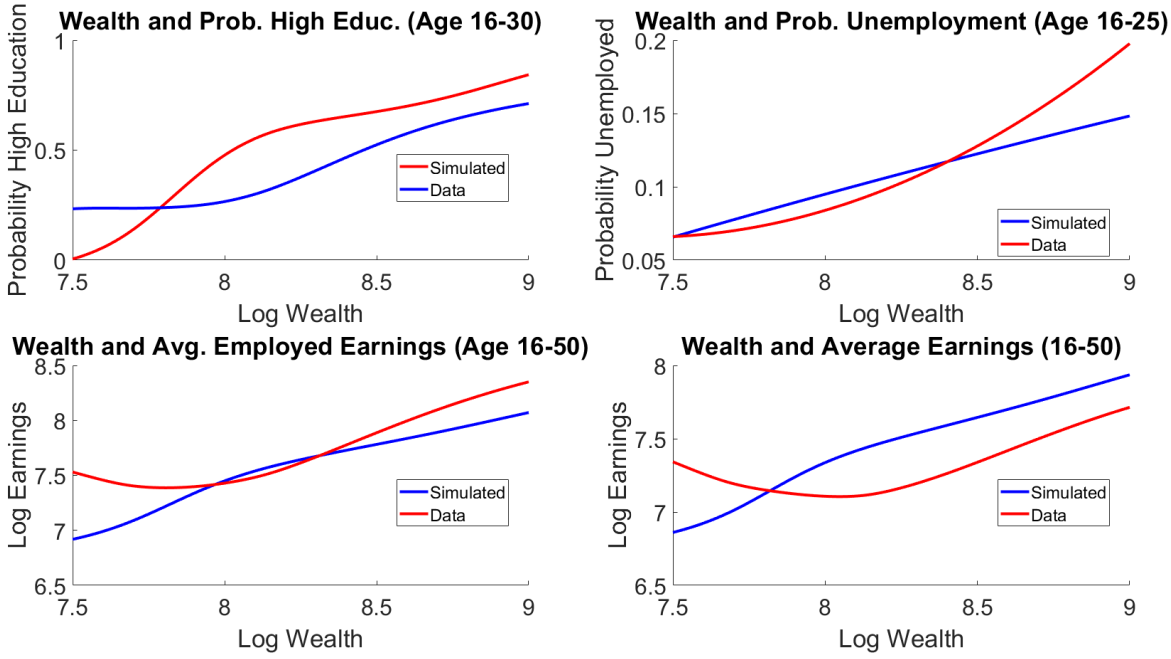

Figure 12: Log Wealth and Labout Market Outcomes

The manner in which the level of parental wealth influences youth labour market outcomes is the central concern of this paper. Figure 12 thus shows the positive correlation between parental wealth and each of the following: education choice, life-cycle earnings and probability of unemployment. As before, results from the simulated model provide a good match to their empirical counterparts.

The probability of education and of unemployment are both increasing in wealth. Average lifetime earnings are also increasing in wealth, and this effect is strengthened by conditioning on employment - this is as expected, given that wealthy workers are more likely to experience unemployment in their youth.

4.5 Wealth Effects on Education and Employment Choice: Consequences for Equity and Efficiency

These empirical results draw attention to the fact that differences in initial parental wealth underlie a strong selection effect in terms of education choice, sectoral choice and lifetime earnings, driven by a combination of labour market search frictions and credit constraints on workers. As discussed in the model set-up, wealth affects these outcomes through two main channels: education choice and unemployment duration, which jointly offer access to higher-productivity jobs.

Figure 13 illustrates the importance of the latter channel in this context, by comparing the distributions of offered and accepted earnings in each occupation. In each case, the distribution of accepted earnings lies significantly to the right of the offer distribution, indicating a preference among workers for rejecting low-productivity offers and waiting in unemployment for better ones.

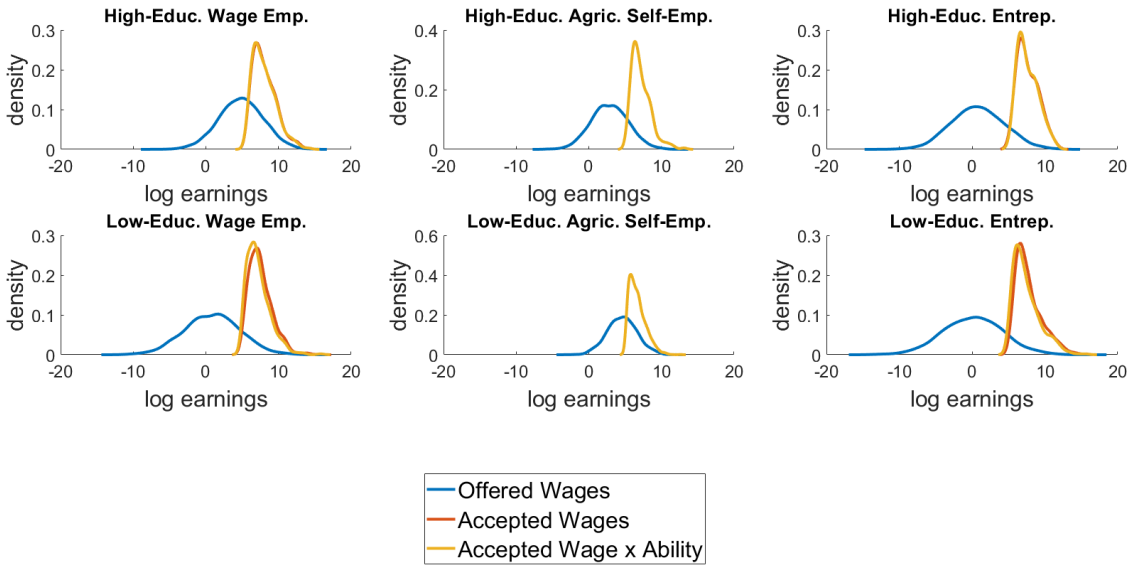

Figure 13: Job Selection Effects by Occupation

Table 10 decomposes the wealth effect into its two channels: education choice and unemployment duration. This is achieved by regressing the log of annual earnings (averaged over the life-cycle, from age 16 to age 50) in the simulated model on the log of parental wealth, shutting down each of the education and unemployment channels in turn. Thus, the first column of Table 10 shows the total effect of wealth on earnings; the second shows the effect of wealth on earnings when all workers accept employment offers immediately, with no time spent in unemployment, and leaving education choices unchanged from (1); finally, the third column shows the effect of wealth on earnings when all workers are low-educated. This decomposition reveals that 63% of the effect of wealth on earnings comes through an increased probability of being highly-educated, while the remaining 37% is attributed to higher unemployment among

the wealthy. Thus, the ability to wait for a good job is an important component of the earnings premium gained by workers from wealthier family backgrounds.

	(1) *total wealth effect* log annual earnings	(2) *education effect* log annual earnings	(3) *unemployment effect* log annual earnings
log parental wealth	0.38***	0.24***	0.14***
	(0.02)	(0.02)	(0.02)
% of total wealth effect	100	63	37
N	3728	3728	3728

Standard errors in parentheses

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

Table 10: Wealth Effect Decomposition

Differences in initial (parental) assets therefore drive a significant inequality in earnings. Furthermore, the combination of wealthy individuals delaying entry into the labour-market and accessing jobs not only with higher earnings levels but also higher earnings growth than their low-asset counterparts means that this inequality is increasing over the life-cycle, as Figure 14 shows. Individuals in the lowest wealth decile actually begin with higher earnings than those in the top wealth decile (due to high early-life unemployment among the latter group), but are overtaken by their mid-20s. Thus, the earnings gap between the richest and poorest 10% of the wealth distribution increases over the life-cycle, thereby exacerbating the problem in the next generation, whose starting wealth is precisely a function of these, more unequal, earnings.

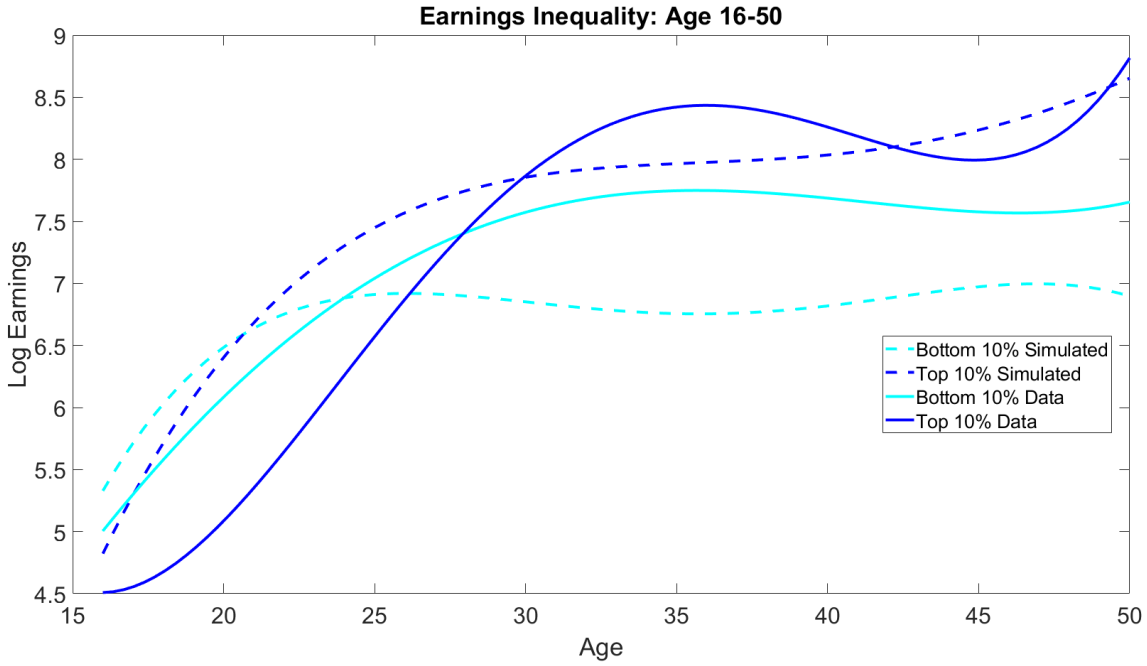

Figure 14: Earnings Inequality Over the Life-Cycle

Recall that the theoretical framework predicts an ambiguous relationship between ability and unemployment, whose overall sign is governed by the relative magnitudes of an "asset de-accumulation" effect and a "sectoral shift" effect. When high-ability workers are relatively more impatient than low-ability workers to become employed, the issue of earnings inequality is somewhat ameliorated: the earnings gap between low- and high-ability workers is then lower compared to the case with positive assortative matching between workers and jobs and, consequently, the aggregate earnings distribution is relatively compressed. This is due to the complementarity between worker and firm productivities in the returns to wage-employment and entrepreneurship. By contrast, when low-ability workers exit unemployment more quickly than their high-ability counterparts, the earnings gap widens. As Figure 15 shows, under the estimated parameters for Ghana, the "asset de-accumulation" channel is dominant over the "sectoral shift channel", such that low-ability workers have a longer school-to-work transition than their high-ability counterparts, except at the very top of the wealth distribution.[17] Thus, the earnings gap is smaller than it would have been in the opposite case.

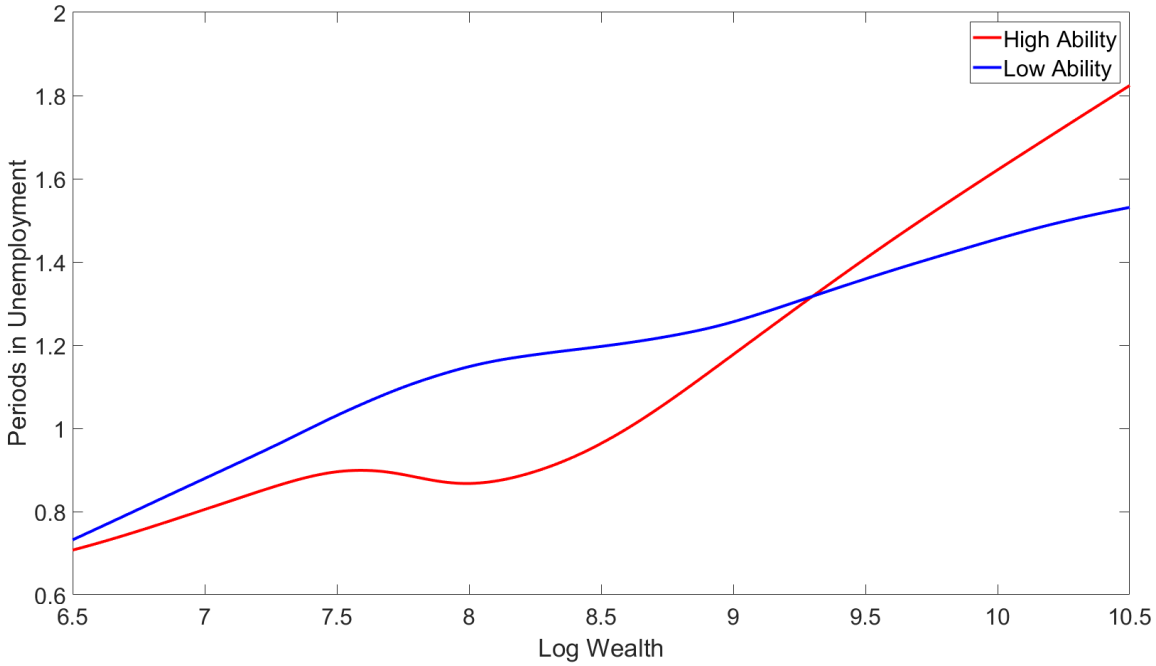

Figure 15: Log Wealth and Unemployment Duration by Ability

The effect of wealth on individual decision-making has undesirable consequences, not just for equity, however, but also for efficiency. The first, and most obvious, manifestation of this is the fact that the search frictions reduce total productivity compared to a case in which they did not exist, partly because workers must now spend in unemployment time that could have been spent on productive labour, and partly because workers now accept lower-productivity jobs because they cannot afford to wait for better ones. Under these parameter estimates, workers spend an average of 0.98 years in unemployment.

[17] See Appendix F for a discussion of why the relationship between ability and unemployment varies along the distribution of initial wealth

The complementarities in the production functions for wage and entrepreneurial employment mean that this issue of lower total productivity is exacerbated whenever high-ability workers are relatively more reluctant to remain unemployed (which, as previously discussed, is true in this case). This is because, even though high-ability workers earn more on average (they have a higher total match productivity as earnings in the wage and entrepreneurial sectors are complementary in firm productivity and worker ability), low-ability workers match with weakly higher-productivity firms. This is illustrated in Figure 16; only at higher levels of wealth do high-ability workers catch up with their low-ability counterparts in terms of the productivity of matched firms. Thus, the size of the welfare loss is exacerbated by the fact that it is low-wealth, *high-ability* workers who are unable to access high-productivity jobs.

Figure 16: Log Wealth and Log Productivity by Ability

Finally, wealth affects efficiency through determination of education choice: to the extent that high-productivity jobs are located among the high-education occupations, low-wealth workers are inefficiently matched to low-productivity jobs in low-educated occupations.[18] The fact that 45% of sampled workers are employed in low-education agricultural production, the occupation with the lowest average earnings, clearly exemplifies this problem.

5 Counterfactual Policy Simulations

In this section, I examine the effects of a pair of policy interventions – namely, an education subsidy and unemployment insurance – that target earnings inequality and aggregate productivity. In particular, I consider which of these policies

[18] The model's prediction that low-wealth workers fail to invest in education when returns are highly dispersed is in line with Banerjee et al. (2016), who use a cross-country approach to make a similar argument: namely, that relatively high unemployment risk in high-education jobs located in poor countries is an important determinant of low educational take-up in the presence of high returns to education. Relatedly, Meghir et al. (2015) show, using a search-and-matching framework estimated on Brazilian data, that the existence of an informal sector contributes significantly to the number of workers in low-productivity employment, thereby reducing output and welfare.

has the greatest impact when implemented by a government with a resource constraint. I denote the government's total policy budget by G.

With a fixed resource constraint, the government may face a trade-off between equity and efficiency in selecting the optimal policy target group. If solely concerned with improving the equity of labour market outcomes, it may target resources towards the poorest individuals. By contrast, a government motivated by improving aggregate productivity could focus its resources on improving the job prospects of high-ability workers, given the complementarity between worker and firm productivity in the wage and entrepreneurial sectors. Thus, in the discussion that follows, I consider three targeting options for each policy: first, a baseline policy in which the policy is offered to everyone, second, an alternative in which the policy is offered only to individuals of high-ability, and finally, an alternative in which the policy is offered to low-wealth individuals.

Tables 11 and 12 show the effect of the policy interventions considered in this section on a number of key outcomes: educational attainment, youth unemployment, income inequality and aggregate productivity. The first column of results in each table shows the baseline outcome, and the following rows show the outcome for the relevant policy counterfactual under each of the three targeting options.

My measure of inequality is the "20/20 ratio" (the ratio of average earnings in the top 20% of the income distribution to average earnings in the bottom 20%). This measure is used for the United Nations Development Programme's Human Development Indicators. The baseline value of inequality is 25.74: that is, the top 20% of earners earn 25.74 times more on average than the bottom 20%. Aggregate productivity is measured by the sum of individuals' average income across all years in the labour-force.

5.1 Counterfactual Simulation 1: Subsidise Education Cost

The first policy I examine is a subsidy on the cost of education. This mimics a policy actually implemented by the Ghanaian government: in 2017, it introduced a 100% subsidy on senior high-school education, in an attempt to raise educational attainment. The parsimonious model framework of this paper does not, however, allow for a consideration of the labour market effects that such a policy would generate as a result of increasing the supply of educated workers. Thus, I consider instead a 20% education subsidy, in order to avoid this additional complexity.

First, I set the government's policy budget, G, at 396,960 Ghanaian cedis (approximately US$ 82,324). This is the total cost of a 20% education subsidy when offered to the entire sample of 3728 individuals, of whom 1654 take it up; I fix G at this value for the remainder of this section in order to simplify comparison across policies.[19]

As previously discussed, I consider three separate targeting options: first, the government offers a 20% subsidy to all individuals, regardless of their characteristics. Second, it aims to improve worker-firm matching efficiency by targeting the subsidy at high-ability workers. This change in targeting raises the value of the subsidy to 21%, when G is held

[19] As shown in Table 11, a total of 1654 individuals choose high education when the subsidy is offered to everyone - the total cost outlay is thus $0.2 * 1200 * 1654 = 396,960$ GHc.

constant. Finally, the government attempts to address equity concerns by targeting the subsidy at individuals drawn from the bottom of the initial wealth distribution. There are now two options for determining the eligibility cut-off: first, retain the subsidy value used when targeting the group of high-ability workers and allow differential compliance to the policy, or second, adjust the subsidy value such that the same number of targeted individuals (who chose low education in the baseline) take up education as under efficiency targeting. I employ the former option, in order to compare the targeting alternatives in terms of the number, as well as the composition, of individuals who respond to the subsidy by altering their education choices.

	baseline	target all	target efficiency	target equity
Proportion of Educated Workers	0.2751	0.4013	0.3967	0.4053
(% change)		(46%)	(44%)	(47%)
Proportion of Unemployed Workers (Age 16-25)	0.0845	0.0909	0.0903	0.0911
(% change)		(8%)	(7%)	(8%)
20/20 ratio (Income Inequality)	25.74	27.38	27.51	27.75
(% change)		(6%)	(7%)	(8%)
Aggregate Productivity	65946.78	82198.89	82465.08	82813.97
(% change)		(25%)	(25%)	(26%)

Table 11: Counterfactual 1 (Education Subsidy): Policy Outcomes

The first, and perhaps most obvious, outcome of this policy intervention is that the proportion of highly-educated workers increases by 12 percentage points, from 28% to 40%. The newly-educated are almost all high-ability individuals; less than 2% of low-ability workers respond to the subsidy when offered it (see Figure 17). Further, youth unemployment increases slightly, from 8% to 9%. Two mechanisms underlie this: firstly, more workers now enter a labour sub-market in which there are greater benefits to waiting in unemployment, and secondly, a substitution effect – some recipients of the subsidy chose to be educated even in the baseline case; thus, they now channel the savings made on education costs into funding a lengthier school-to-work transition. While higher youth unemployment may seem undesirable from a policy-maker's perspective, it is important to observe that any demand-side interventions in this labour-market framework must raise unemployment in order to achieve either (or both) higher output and lower inequality.

The expected effect on income inequality of this policy is ambiguous: first, we might expect the education subsidy to reduce inequality by allowing lower-wealth individuals to access better-paying (high-education) jobs. Conversely, however, targeting the subsidy at everyone results in the substitution effect just described, which allows wealthier individuals to wait longer in unemployment for even better jobs. As Table 11 shows, the aggregate result is an increase in inequality. This is unsurprising given that individuals in the bottom 20% of the wealth distribution do not respond to the subsidy (see Figure 17); thus, the inequality measure reflects only the income gains at the top of the distribution.

Finally, I consider the effects of the policy on aggregate productivity. Unsurprisingly, there is an increase (of 25% above

the baseline) in productivity, as workers responding to the policy change access better jobs, through a combination of accessing occupations with higher returns and waiting longer for them.

Strikingly, for this policy, changing the targeting group does not appear to have much effect on these key outcomes. This is because the composition of workers induced to alter their education choice in response to the subsidy is virtually the same under all three targeting options, as take-up is almost exclusively among high-ability workers.

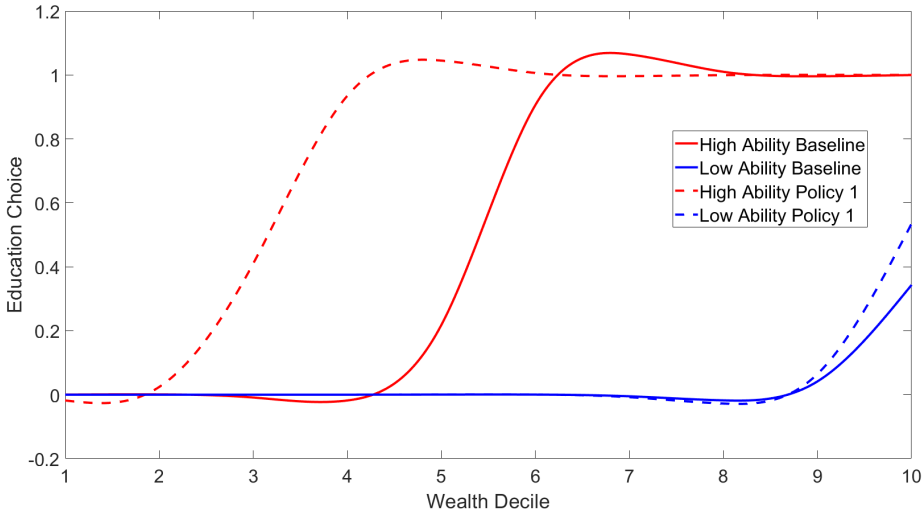

Figure 17: Education Choice by Wealth and Ability

In summary, therefore, we see that, while some high-ability workers respond to the education subsidy, take-up among low-ability workers is very low, such that the aggregate effect on productivity is muted and, further, that income inequality rises. These results are very much in keeping with the predictions of the model, which are that an education subsidy alone is unlikely to be a sufficient policy tool in this context. This is because, when returns to educated employment require a lengthy wait in unemployment, take-up of education may remain relatively low even when subsidised. Further, even if the subsidy induces additional take-up of education, the fact that initial wealth continues to drive job quality conditional on education means that it has limited effects on aggregate productivity and income inequality.

5.2 Counterfactual Simulation 2: Introduce Unemployment Insurance

The second policy I consider is the introduction of unemployment insurance.[20] Table 12 shows the results of this intervention. As before, I allow for three different types of targeting. In the first case, with everyone eligible for UI, the per period payment is 105 GHc. In the remaining two cases, where the target group is either high-ability or low-wealth individuals, the relevant amount is 188 GHc.

Firstly, the effect of this policy on educational attainment is negligible: the model predicts that raising consumption in

[20] see Shimer and Werning (2007) and Shimer and Werning (2008) for a discussion of optimal unemployment insurance when workers are risk-averse.

	baseline	target all	target efficiency	target equity
Proportion of Educated Workers	0.2751	0.2790	0.2790	0.2790
(% change)		(1%)	(1%)	(1%)
Proportion of Unemployed Workers (Age 16-25)	0.0845	0.0889	0.0893	0.0888
(% change)		(5%)	(6%)	(5%)
20/20 ratio (Income Inequality)	25.74	25.51	25.66	25.33
(% change)		(1%)	(0%)	(2%)
Aggregate Productivity	65946.78	66679.07	67038.09	66790.92
(% change)		(1%)	(2%)	(1%)

Table 12: Counterfactual 2 (Unemployment Insurance): Policy Outcomes

unemployment (here, via unemployment insurance) can alter education choices by making individuals more likely to enter a labour sub-market in which returns are highly dispersed, but this result does not materialise. This is due to the small size of the policy change; increasing the per-period payment to 1000 GHc, for instance, causes the proportion of highly-educated workers to fall to zero, and the unemployment rate to rise sharply, to 28%, as Table 13 shows.[21]

Second, the policy change has a comparable effect on youth unemployment to that of the education subsidy – the proportion of unemployed 16-25 year-olds increases to approximately 9% - a 5% change. The direction of this effect is as expected – unemployment insurance allows individuals to remain unemployed longer in order to access higher-productivity jobs.

It follows then that the policy should also reduce income inequality and increase aggregate productivity; Table 12 shows that this is, in fact, what occurs. The increase in productivity is much smaller than under the education subsidy (a 1% change compared to 25%) but, while the larger increase in the latter case came at the expense of higher income inequality, there is no equity-efficiency trade-off under this policy option. This is because the resulting increase in unemployment is proportionally larger at the bottom of the wealth distribution than at the top, as Figure 18 shows.[22]

As expected, targeting the policy to high-ability individuals is most effective in raising aggregate productivity, while targeting low-wealth individuals is better at reducing income inequality. Finally, targeting everyone is a strictly dominated option.

In conclusion, therefore, with a fixed resource constraint of 396,960 GHc, an education subsidy is the best option in terms of increasing aggregate productivity, while unemployment insurance is the optimal choice for reducing income

[21] The proportion of highly-educated workers drops to zero because workers face a trade-off in terms of expending resources on education and on drawing out the time spent in unemployment. Given the fixed cost of education and the relative means and variances of high-education and low-education earnings, the introduction of relatively high-valued unemployment insurance makes it optimal for workers to remain at a low level of education and allocate more resources towards staying unemployed, rather than to expend them on higher education.

[22] Relatedly, Browning and Crossley (2001) show that unemployment insurance improves consumption smoothing among the poor but not the wealthy.

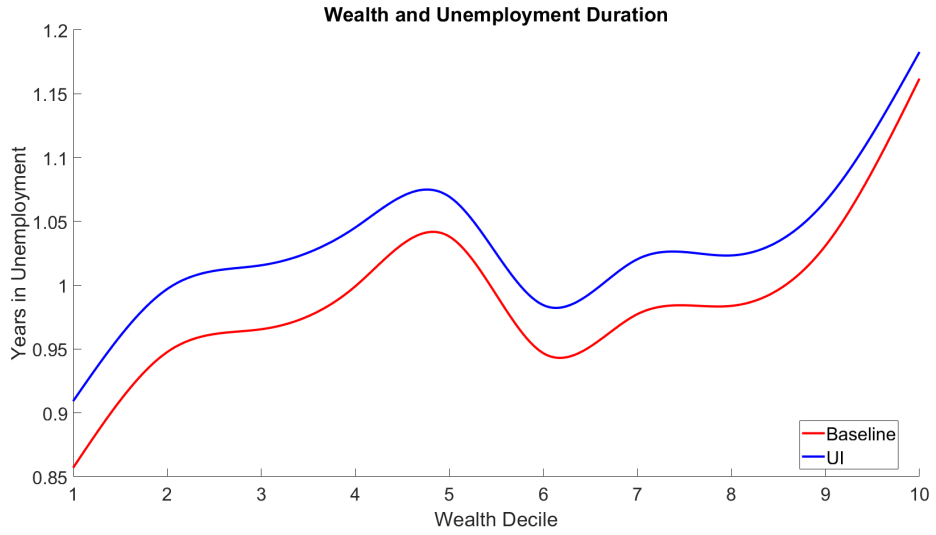

Figure 18: Unemployment Duration and Wealth

	high-educated (%)	unemployed (16-25) (%)	aggregate prod. 1000s of GHc	20/20 ratio
	0	27.81	101454.39	11.80
% change from baseline	(100%)	(229%)	(54%)	(54%)

Table 13: Key Outcomes with $UI = 1000$ GHc

inequality. Thus, the optimal policy prescription for a resource-constrained government will depend on its preferences over equity and efficiency; in the absence of such constraints, a combination of the education subsidy and unemployment insurance would be effective in tackling both issues.

6 Conclusion

In this paper, I set up and estimate a discrete-choice model of education and occupation choice, in order to quantify the relationship between youth unemployment and parental wealth in Ghana. I show that this relationship is positive, in line with descriptive evidence from studies of developing-country labour markets. This is because, as in McCall models of search, higher levels of liquid assets allow workers to remain unemployed for longer, in an attempt to secure a high-productivity job. Using the results from a structural estimation of the model's parameters, I show that this waiting behaviour leads to a number of undesirable labour market outcomes, compared to a case without credit or search frictions in the labour market. These are, firstly, a high degree of income inequality that grows over the life-cycle; secondly, low average educational attainment, as high dispersion in the returns to education discourages investment in education by workers who cannot afford to wait in unemployment for long; and finally, low aggregate productivity. This last outcome is due to a combination of two factors: first, output loss from time spent waiting in unemployment, and second, output loss from inefficient worker-firm matching, as high-ability workers are less willing

to wait in unemployment than their low-ability counterparts and, as such, match with lower-productivity firms.

Further, I use the estimated model to decompose the effect of parental wealth on average lifetime earnings into an education and a waiting channel, and show that the latter is an important channel, accounting for 37% of the total effect. Finally, I evaluate the effects of two alternative labour-market policies: an education subsidy and unemployment insurance. I find that the first of these is most effective at raising aggregate productivity, but does so at the expense of also raising income inequality. Unemployment insurance has a smaller impact on productivity, but has the additional benefit of lowering income inequality. The optimal policy tool thus depends on the government's preferences over efficiency and equity.

The results of this paper suggest a number of important considerations for policy. First, policy-makers seeking to improve educational attainment in such a setting would need to take account of the additional, indirect costs of investment in education caused by the need to wait for "good" jobs, which are disproportionately high for the poor. Second, in terms of optimal labour market policy, it it clear that demand-side policies are a second-best solution to the problems generated by wealthy workers waiting for better jobs, and each has its own shortcomings: education subsidies increase inequality, while unemployment insurance may improve worker-firm match efficiency and inequality, but results in an output loss due to more time spent in unemployment. By contrast, policy efforts focused on improving the average quality of high-education jobs are more likely – by targeting labour market frictions directly – to be effective.

Possible directions for further research on this subject are to consider the ways in which parental wealth affects the likelihood of unemployment later in life, rather than simply during the transition from school to work; to expand the model framework to allow for job-to-job transitions, in order to understand how the possibility of on-the-job search affects the relationship between parental wealth and youth unemployment; and to expand the employment decision space to include the possibility of labour market inactivity, in order to consider how parental wealth may affect the decision to delay labour market entry (i.e. searching for employment) among youth, rather than simply the choice between unemployment and employment for those currently active in the labour market.

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Appendices

A Computing Parental Wealth

First, I compute household wealth for families in the GLSS 2012 using a rich household asset module. Household wealth is defined as the sum of the listed value of all household durable goods, savings, livestock and agricultural equipment.

Second, I regress the log of this wealth measure on the education level, occupation and geographic region of males aged 35 to 60 (35 is the youngest reasonable age for a father of workers aged at least 15). Education is measured on a 12-point scale ranging from no education to a post-graduate degree. Occupations are classified by 8 major groups based on the International Standard Classification of Occupations (ISCO-88). Results are shown in Table 14.

	(1) ln_wealth
_cons	8.692***
	(0.148)
education dummies	Yes
occupation dummies	Yes
region dummies	Yes
N	5701

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 14: Wealth Regression for Men Aged 35 to 60

Third, I use the coefficients from this regression to predict the wealth of sampled individuals' fathers based on information regarding the latter's education and occupation, and the former's birth region. Figures 19, 20 and 21 show the variation in household wealth over fathers' education, occupation and region, respectively.

To test the performance of this measure, I consider its correlation with the child's educational attainment. Table 15 shows that this correlation is strongly positive, as expected.

	(1) years of education
log parental wealth	1.657***
	(0.137)
_cons	-4.714***
	(1.073)
N	9059

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 15: Parental Wealth and Educational Attainment for Males Aged 16-50

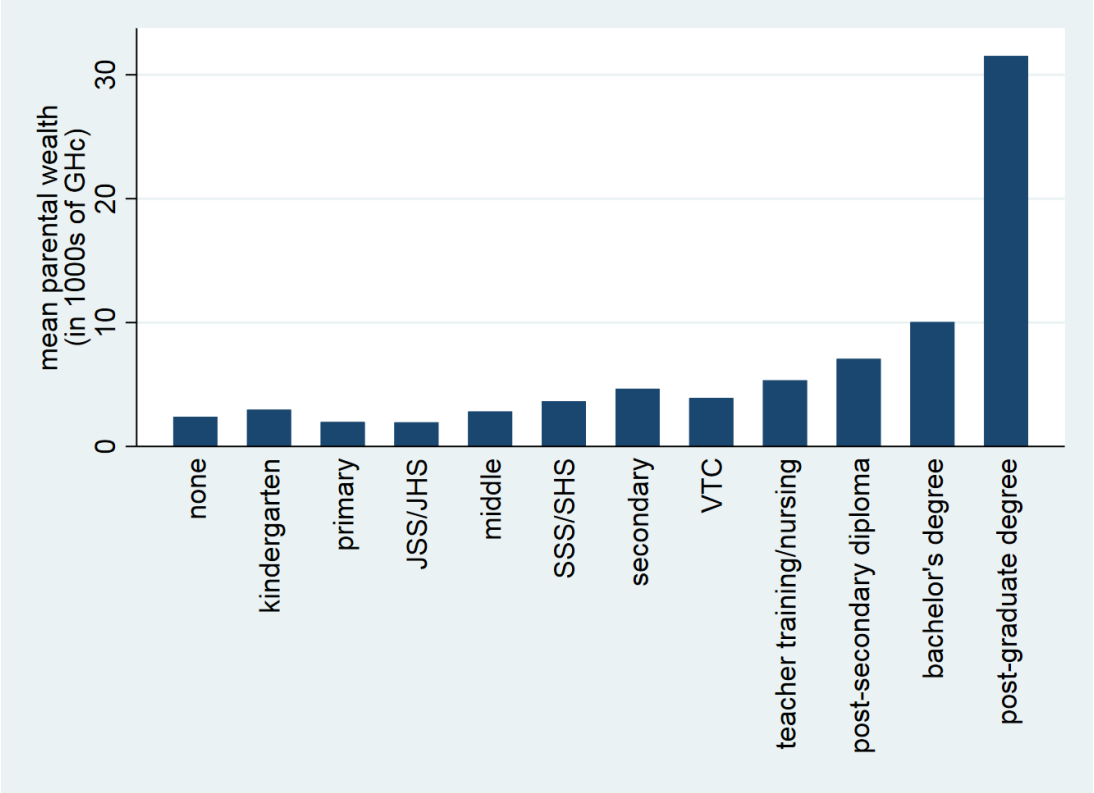

Figure 19: Parental Wealth and Father's Educational Attainment for Males Aged 16-50

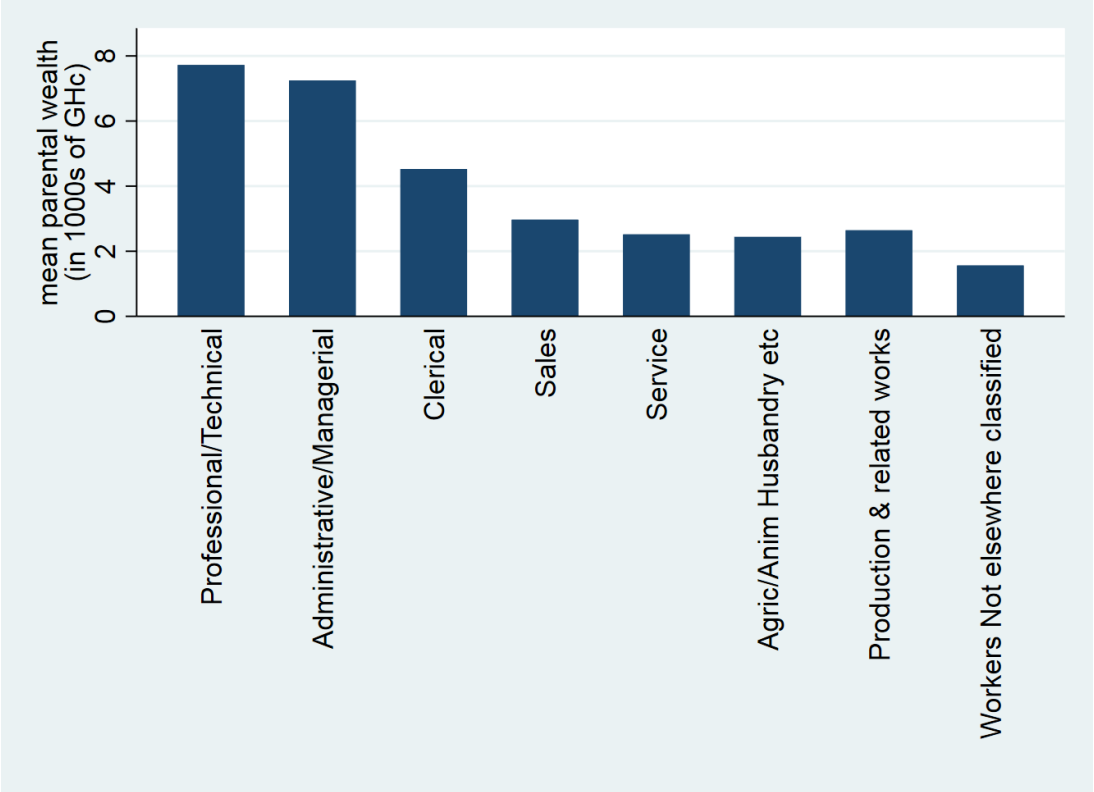

Figure 20: Parental Wealth and Father's Occupation for Males Aged 16-50

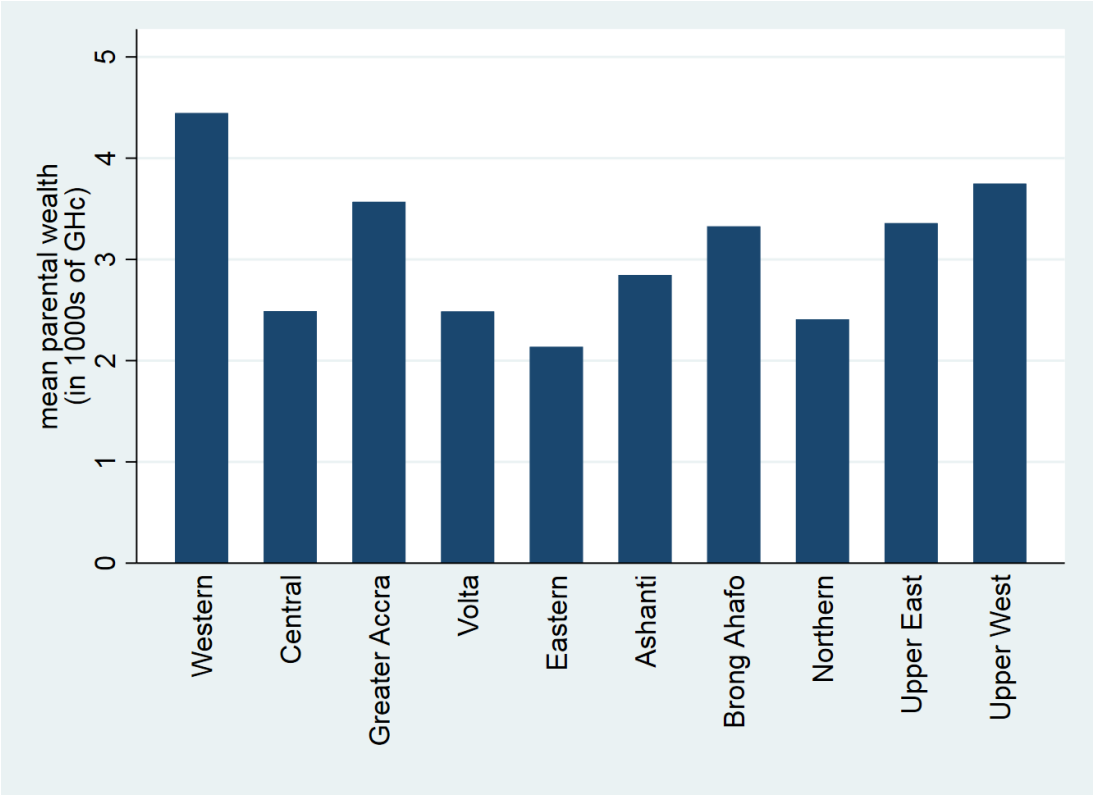

Figure 21: Parental Wealth and Birth Region for Males Aged 16-50

B Stylised Facts: Robustness Checks

Table 16 replicates the results for Ghana from Table 1 using a probit specification in place of a linear probability model.

Table 17 uses a different dependent variable, namely the number of years between the end of schooling and the start of the first job, and demonstrates a positive and significant relationship between parental wealth and this new measure of youth unemployment.

Table 18 replicates the results from Table 1 using a secondary data source, namely the first three rounds of the Ghana Urban Household Panel Survey (2004-2006), which include information on respondents' labour market histories. Standard errors are clustered at the individual level. The results are very similar to those in Table 1.

To show that these patterns are not unique to the Ghanaian context but, rather, may also be present in other sub-Saharan African countries, I replicate the trio of stylised facts outlined in Section 2 for Uganda, using data from the fourth round of the Uganda National Panel Survey (2013/2014). Note that this data source has no substantive data available for workers older than 50 years.

First, the 2012 unemployment rate among Ugandan men aged 15-24 is 4.7%. Second, I replicate the educational attainment results from Figure 1 in Figure 22. Finally, I replicate the results from Table 1 in Table 19. The patterns are very similar across both countries: youth unemployment is low; educational attainment is very low, with only a

	(1) Age 15-29 Unemployment = 1	(2) Age 30-60 Unemployment = 1	(3) Age 15-29 Unemployment = 1	(4) Age 30-60 Unemployment = 1
log parental wealth	0.055***	0.009	0.039**	0.009
	(0.011)	(0.005)	(0.012)	(0.005)
age	-0.007***	0.000	-0.009***	0.000
	(0.001)	(0.000)	(0.001)	(0.000)
urban	0.070***	0.006	0.060***	0.006
	(0.011)	(0.004)	(0.010)	(0.004)
region dummies	Yes	Yes	Yes	Yes
education dummies	No	No	Yes	Yes
N	3328	7172	3328	7172

Marginal effects; Standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

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

Table 16: GLSS 2012 Parental Wealth and Male Unemployment: Probit (Average Marginal Effects)

	(1) Age 30-60 transition years	(2) Age 30-60 transition years
log parental wealth	7.748***	7.078**
	(2.301)	(2.212)
log parental wealth^2	-0.472***	-0.420**
	(0.141)	(0.135)
age	0.021**	0.022**
	(0.007)	(0.007)
urban	0.680***	0.665***
	(0.127)	(0.132)
region dummies	Yes	Yes
education dummies	No	Yes
mean (transition years)	3.800	3.800
N	3598	3598

Standard errors in parentheses

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

Data Source: GLSS 2012

Table 17: GLSS 2012 Parental Wealth and Male School-to-Work Transition Duration

	(1) Age 15-29 Unemployment = 1	(2) Age 30-60 Unemployment = 1	(3) Age 15-29 Unemployment = 1	(4) Age 30-60 Unemployment = 1
log parental wealth	0.048**	0.028	0.044**	0.034
	(0.016)	(0.025)	(0.017)	(0.025)
age	-0.007***	-0.000	-0.006**	0.000
	(0.002)	(0.001)	(0.002)	(0.001)
region dummies	Yes	Yes	Yes	Yes
education dummies	No	No	Yes	Yes
N	6846	7297	6797	7255

Standard errors in parentheses

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

Table 18: Ghana UHPS: Parental Wealth and Male Unemployment

small proportion of workers completing high school; and parental wealth is a positive and significant determinant of youth unemployment, but does not affect workers' unemployment status later in life. Note that these patterns hold despite the stark sub-regional differences between Ghana and Uganda, the former a part of West Africa, and the latter located in East Africa.

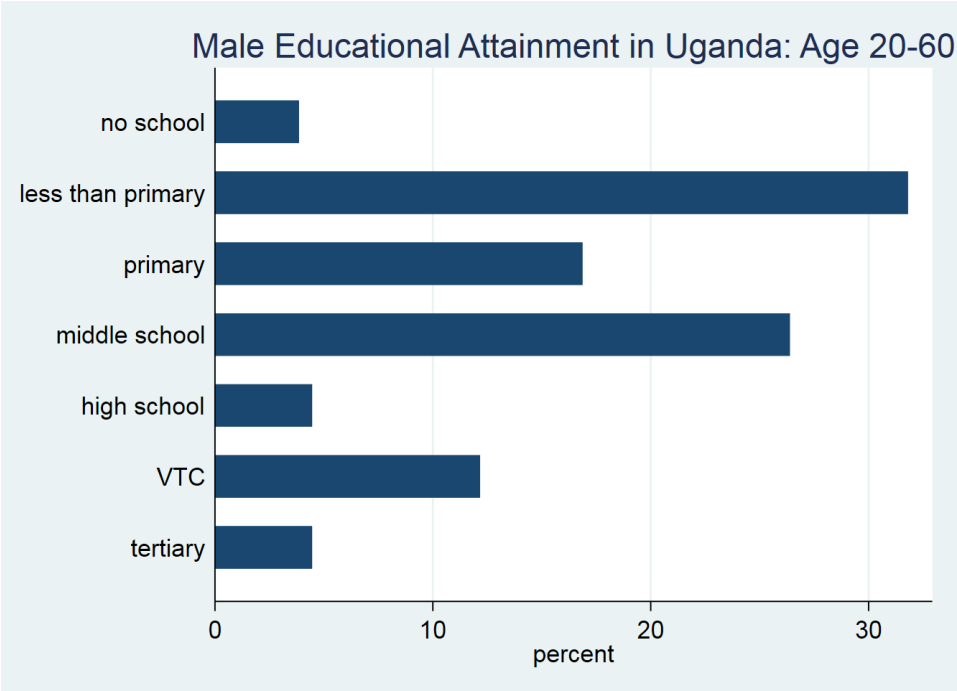

Figure 22: Educational Attainment of Ugandan Males Aged 20-60

	(1) Age 15-29 Unemployment = 1	(2) Age 30-60 Unemployment = 1	(3) Age 15-29 Unemployment = 1	(4) Age 30-60 Unemployment = 1
log parental wealth	0.183***	0.054	0.129**	0.055
	(0.044)	(0.045)	(0.045)	(0.049)
age	-0.007	-0.003	-0.012*	-0.003
	(0.005)	(0.003)	(0.005)	(0.003)
urban	0.031	0.007	-0.010	0.009
	(0.041)	(0.034)	(0.042)	(0.037)
region dummies	Yes	Yes	Yes	Yes
education dummies	No	No	Yes	Yes
N	422	251	422	251

Standard errors in parentheses

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

Table 19: Uganda National Panel Survey: Parental Wealth and Unemployment

C Model Assumptions: Employment is an Absorbing State

To justify the assumption that workers stay in a single job for their lifetime in the model framework of this paper, I use data from the Ghana Urban Household Panel survey (2004) to show that job-to-job transitions in this context are very low, as Table 20 shows. Note that I use this auxiliary dataset because the GLSS 2012 (the main dataset used in this paper) does not contain information about individuals' labour market histories.

I restrict the sample to workers aged between 30 and 40 years, because the labour market history data goes back to a maximum of 20 years, such that including older workers would lead to a potential underestimation of the number of jobs per worker. Similarly, including younger workers, who have spent only a short while in the labour force, would also lead to an underestimation.

N	mean	s.d.
575	1.95	0.95

Data Source: Ghana Urban Household Panel Survey 2005

Table 20: Lifetime Jobs per Worker: Age 30-40

D Summary Statistics: Male Labour-Force Participants Aged 16-50

observations	9059	
urban (%)	38.03	
highly-educated (%)	24.33	
	mean	s.d.
age (years)	33.47	9.22
education (years)	8.24	6.19
median parental assets (US$)	513.97	508.78

Table 21: Summary Statistics: Male Labour-Force Participants Aged 16-50

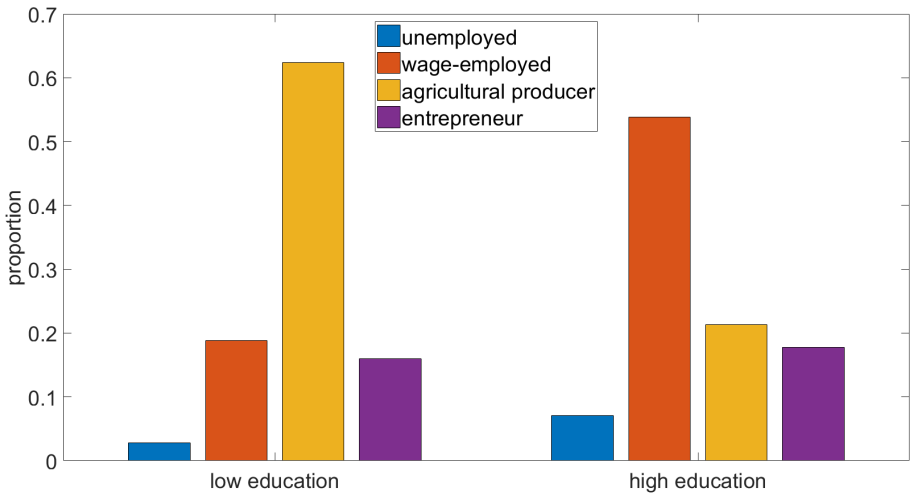

Figure 23: Employment Status by Education

E Estimating Earnings Growth Parameters

	(1) wage-employed	(2) agric. self-employed	(3) entrepreneurs
age	0.00638	0.00442	0.0101
	(0.007)	(0.006)	(0.009)
constant	7.903***	6.701***	7.994***
	(0.271)	(0.234)	(0.363)
N	680	2018	627

Standard errors in parentheses

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

Table 22: Log Earnings and Age for Low-Education Males Aged 31-50

	(1) wage-employed	(2) agric. self-employed	(3) entrepreneurs
age	0.0276***	0.0431	0.0236
	(0.007)	(0.028)	(0.017)
constant	7.791***	5.414***	7.693***
	(0.282)	(1.100)	(0.670)
N	574	124	206

Standard errors in parentheses

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

Table 23: Log Earnings and Age for High-Education Males Aged 31-50

F Ability and Unemployment Duration by Wealth

As discussed in Section 3.5.4, the relationship between ability and unemployment duration has an ambiguous sign, as the "asset de-accumulation" channel is negative, and the "sectoral shift" channel is positive. Further, the relationship is not constant along the support of initial wealth; specifically, the "sectoral shift" channel becomes relatively more, and the "asset de-accumulation" channel relatively less, important at higher levels of wealth. This is because the difference between high- and low-ability workers in the value of wage employment and entrepreneurship is decreasing in wealth. Formally:

$$\frac{\partial^2(VM_{i,m,k,t}|h_i = H^H)}{\partial a_{i0}^2} < \frac{\partial^2(VM_{i,m,k,t}|h_i = H^L)}{\partial a_{i0}^2} \quad \forall \quad m \in \{w, e\} \tag{14}$$

Figure 24 shows this quite clearly for the high-education wage-employment sector. The intuition underlying this is that, as the value of employment for high- and low-ability workers draws closer together at high wealth levels, the differences across ability types in consumption behaviour while unemployed become negligible, such that the "asset de-accumulation" channel diminishes in influence, such that high-ability workers become relatively more likely to remain unemployed.

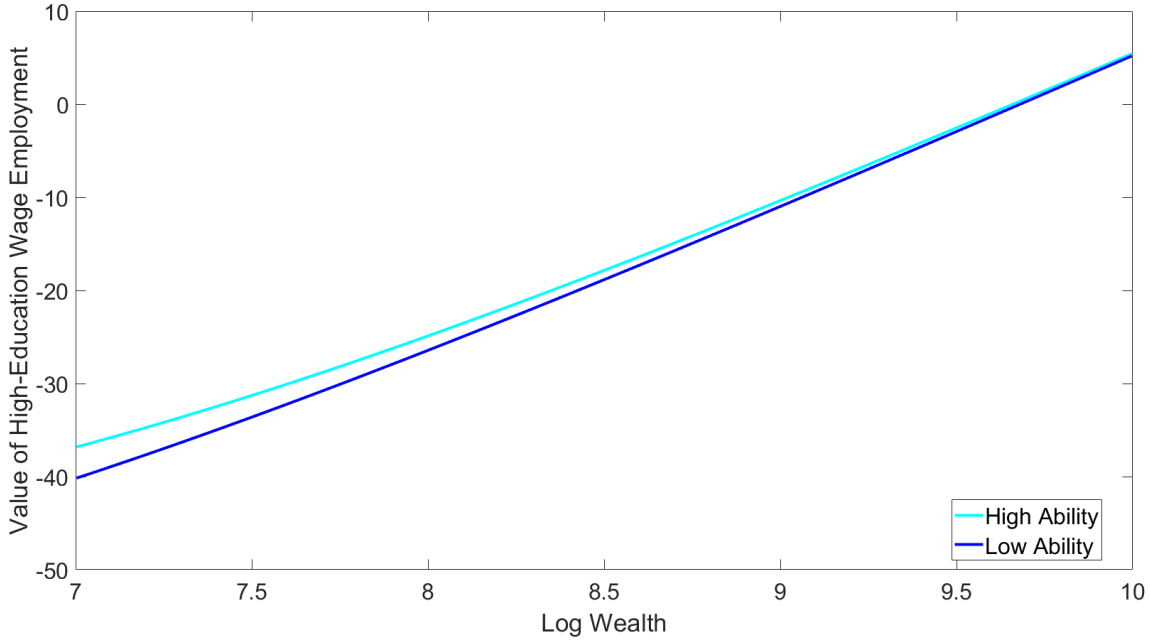

Figure 24: Value of High-Education Wage Employment by Log Wealth