Multidimensional Human Capital, Wages and Endogenous Employment Status in Ghana[†]

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December 7, 2006

JEL Classifications: I310, J240, O150
Keywords: Wage equations, employment status, human capital, literacy and numeracy, cognitive and non-cognitive skills, formal education, adult literacy programs, Ghana.

Abstract

Previous studies of labor market outcomes such as employment and wages have mostly been limited to investigating the impact of formal schooling only and, as a consequence, have seldom considered skills or alternative routes to acquiring skills, such as adult literacy programs, or other types of education. Examining a recent household survey for Ghana, this paper addresses these issues. The results on the one hand establish that there are substantial returns to basic cognitive skills in Ghana and on the other hand that the education system – mainly the lower levels of formal education – is relatively successful in creating these skills. At the same time the results hint at there being substantial returns to skills other than basic literacy and numeracy. These skills appear to be produced mostly from technical and vocational education and training and at higher levels of formal education. Adult literacy program participation yields substantial returns to individuals with no formal education, although the effects are too imprecisely measured and therefore statistically insignificant. Adult literacy participants are less likely to be economically inactive and more likely to be self-employed, however, hinting at the income-generating activities component of these programs having indirect effects on wages through its effect on labor market participation, especially for females, individuals with no formal education, and in urban areas.

[†] I am grateful to Bryan Boulier, Donald Parsons, David Ribar for helpful comments and suggestions. Remaining errors and omissions are my own. The data were kindly provided by the Ghana Statistical Service. The findings and interpretations, however, are those of the author and should not be attributed to the Ghana Statistical Service.

1. Introduction

One of the most important ways to improve one's livelihood comes through the acquisition of education and its subsequent return in the labor market. As a consequence, the issue of education – and especially how to improve it and bring more access to more people – has been at the center of the policy debate in most countries for quite some time. The effect of education on labor market outcomes such as employment and earnings also has received considerable interest in the academic literature, which has confirmed the positive association between education and economic success.

Yet, there are still issues related to education and labor market outcomes that would seem to require more attention, both related to the transition into the labor market and among different employment categories and to enumeration. Which types of education are successful in generating employment or self-employment? How are different types and levels of schooling enumerated? How much of the enumeration is accounted for by basic literacy and numeracy ability and how much by other human capital? These questions are particularly relevant for developing countries. The evidence here is more scarce due to data limitations but at the same time, addressing these questions is even more pertinent due to having less resources available for education.

Hence, while much of the human capital literature for developed countries has focused on formal education and within this further focused on higher levels of education, other types and other levels of education may be more relevant. In Ghana, for example, while few people go on to tertiary education, technical-vocational education is popular. Also, due to the low levels of formal educational attainment in Ghana, adult literacy programs have been offered for a number of years. The labor market in developing countries also differs from developed countries by having more individuals working either as self-employees or as unpaid family workers. Whereas previous studies have often focused on regular wage employees, a more appropriate approach may be to include all categories of work simultaneously.

Estimating wage and employment status equations simultaneously, this paper examines the three questions posed previously for the case of Ghana, taking the issues discussed previously into account. First, the set of human capital variables included in the wage and employment equations contain formal education, technical-vocational education, adult literacy programs and basic literacy and numeracy, thus broadening the more common approach of focusing at formal education, only. This will allow for contrasting and comparing the relative impact of different types and levels of education, as well as literacy and numeracy, on wages and employment status. Second, the categories in the employment status equation include regular wage employees, the self-employed, unpaid family workers and individuals not working. In addition to enabling me to examine the returns to human capital among regular wage employees and the self-employed, this also lets me examine how different human capital components affect the transition among different labor market categories, say, between unemployment and self-employment or between being an unpaid family worker and being self-employed. In doing so, the empirical analyses account for the endogeneity of employment status using a two-stage procedure, where the employment status is estimated in the first stage, and conditional on employment status, the wage structure is then estimated in the second stage.

The remainder of this paper is structured as follows. The next section presents the conceptual framework, while Section 3 reviews the previous research on human capital-wage linkages. Section 4 discusses the estimation strategy, while Section 5 presents the data and discusses empirical issues. Section 6 presents the results. Finally, Section 7 concludes and provides directions for further research.

2. Conceptual Framework

This section presents a theoretical analysis of wages and employment status and how they are affected by skills and schooling. Conditional on employment status (the j subscript), wages are assumed to be a function of skills (S); other observed individual background characteristics including age, gender and geographical location (B); and unobserved individual characteristics including ability (δ), giving rise to the following wage function:

$$W_j = W_j(S, B, \delta) \tag{1}$$

In (1), an increase in skills leads to an increase in wages, as well, holding the other factors constant.

I extend this discussion by considering, first, the different routes though which skills may be acquired, and, second, different types of skills. Following Blunch (2006), there are several routes for achieving skills, namely formal schooling obtained during childhood and adult literacy program participation later in life. Similarly, there are different skills that may affect wages through separate channels. Most importantly, an individual's wages may increase from participation in childhood schooling. This could be due to a direct productivity effect from cognitive skills such as literacy and numeracy in line with a standard human capital explanation or from non-cognitive skills such as socialization or discipline skills. Alternatively, earnings capacity may increase either from credentialism or signaling (Spence, 1973) obtained from schooling, especially at higher levels.

Wages may also increase from learning about income generating activities, which is an integral component of adult literacy programs in Ghana (Blunch and Pörtner, 2005). In addition to merely learning about different income generating activities, participants also frequently directly engage in income generating activities. Under the guidance of the teacher participants may, for example, engage in pottery, weaving or groundnut oil extraction. Both the learning and the more practical of these program components may affect wages (failing that, they still may affect the labor supply of participants, especially in terms of moving from being economically inactive to becoming self-employed).

Now, from (1), the wage structure is conditional on employment status, so that employment status clearly affects wages – for example, regular employees might earn higher wages than the self-employed, all else equal.[1] While this may be accounted for by merely including employment status as a variable in the vector of other observed background characteristics (B), employment status might more appropriately be treated as endogenous. For example, regular employees may be systematically different from individuals who are either self-employed or working as unpaid family workers. Similarly, individuals who are inactive may be systematically different from either of these groups. Additionally, however, the returns to skills and schooling may differ systematically depending on employment. For example, one might expect that the returns to certain skills may be greater for regular wage employees than for self-employed workers.

These considerations lead me to consider employment status as being governed by a separate process; this depends on five factors: skills (S), other observed individual background characteristics described previously (B), unobserved individual characteristics, including employment status preferences (δ), expected wages if working as a regular wage employee (W_1) and as a self-employed worker (W_2), and other job characteristics (η), giving rise to the following

[1] Or vice versa: self-employment may not necessarily be inferior to regular wage employment (Maloney, 2004).

employment status[2] function:

$$E = E(S, P, B, \delta, W_1, W_2, \eta) \tag{2}$$

The pathways through which skills and the other factors affect employment status in (2) include the following. Education may have a non-productivity effect, for example through signaling, connections or networks. For example, an educated individual would seem to be more likely to be working than not working and also more likely to be a regular wage employee than to be either self-employed or working as an unpaid family workers. Parental occupation is likely to affect search cost, so that individuals whose parents were white-collar workers would also seem to be more likely to work and, conditional on working, also more likely to be regular wage employees than to be either self-employed or unpaid family workers. The individual may also have strong preferences for one employment status over another, for example preferring the relative autonomy of self-employment or the job-security of being a regular wage employee. The employment choice is, thus, a trade-off between opportunity and return: the individual simply chooses the employment status, which yields the highest indirect utility in terms of monetary and non-monetary returns, conditional on having access to the employment category in question.[3]

From this discussion, there are several implications for the empirical analyses. First, due to possibility of employment status being endogenous, this framework highlights the importance of modeling the determinants of wages and employment status simultaneously. Second, the model points to the variables that should be included in the empirical analyses as explanatory variables.

[2] Due to rationing and barriers to entry into regular wage employment there might not be much of a choice between this and self-employment. There still is a choice between economic inactivity and self-employment, however. Again, at the other end of the spectrum, there is also still the possibility that self-employment is a sector of choice rather than a marginal sector (Maloney, 2004); in turn, this would induce selection for the full range of employment status possibilities.

[3] Regular wage employment may require personal connections and networks or self-employment may require credit for start-up costs, for example.

These include skills, parental employment status, and other observed individual background characteristics such as age, gender, and geographical location. Third, the model indicates that skills have both direct and indirect effects on wages, the latter coming through the impact on employment status.

Based on the previous discussion I will examine whether basic literacy and numeracy (basic cognitive skills) affect wages, in particular whether they have effects beyond those of schooling itself. Additionally, I will examine what the effect is on the schooling estimates from introducing literacy and numeracy. This effectively amounts to examining, on one hand, the relative importance of basic cognitive skills vis-à-vis schooling for individual earnings capacity, and, on the other, the efficiency of schooling in cognitive skills production.

I will also examine the impact of basic literacy and numeracy and schooling on employment status. As with the wage analyses, the focus is on whether skills have effects beyond those of schooling itself. This effectively amounts to examining the possibility of indirect wage effects – that is, effects coming through the effect on employment status.

For both sets of analyses two additional issues will be examined. First, one may ask whether economic conditions affect the returns to education and literacy and numeracy and/or their effect on employment status. Here, it is possible that both the returns to education and literacy and numeracy and their effect on employment status vary with characteristics such as geographical location. That is, rather than merely including geographical location in equations (1) and (2), these equations could be made conditional on geographical location. For example, I expect the returns to schooling and literacy and numeracy to be higher in areas where the returns to skilled labor are higher and in areas where incomes and/or the cost of living are higher.[4] The

[4] While migration for education and/or work purposes may be a potential issue here, incorporating migration would greatly complicate the analyses.

insight here is that urban areas are generally better off in terms of economic conditions than rural areas.[5] Second, attitudinal and social factors may affect schooling and skills returns and employment status, especially gender. To be sure, in many developing countries social norms and traditions prescribe "traditional" gender roles, which could, in turn, affect education and labor market outcomes and lead to substantial gender wage and employment status gaps. For example, it might be expected that males both earn more and are more likely to be regular wage employees than females, controlling for other factors.

3. Previous Research

Starting with the literature on schooling and wages, this literature generally finds large private returns to education.[6] For example, reviewing 133 studies for 98 different countries, Psacharopoulos and Patrinos (2004) calculate the average private returns to a year of education to be 10 percent. Developing regions generally experience much higher returns to education than OECD countries. The regional average Mincerian return for Sub-Saharan Africa, for example, is 11.7 percent, as compared to 7.5 percent for OECD countries.

These general findings for the (formal) schooling-wage (earnings) relationship also have been established for Ghana. For example, Glewwe (1996, 1999) found that an additional year of schooling increased wages by about 8.5 percentage-points for government and private sector workers as a whole. Similarly, positive effects of schooling are found on manufacturing sector wages (Teal, 2000), non-farm self-employment income (Vijverberg, 1995) and on farm and non-

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[5] Some regions are better off than others, as well; most notably the Greater Accra region is better off than the other nine regions in terms of economic conditions. However, since for the analyses here I am mainly interested in the gross returns to education and literacy and numeracy, I want to avoid including variables beyond an absolute minimum.

[6] Extensive reviews of this literature are provided in Card (1999), Psacharopoulos (1973, 1981, 1985, 1994), Psacharopoulos and Patrinos (2004), and Willis (1986).

farm (i.e. wage income and self-employment) profit (Joliffe, 2004).

Studies that have considered cognitive skills in the human capital-wage (earnings) relationship have generally found evidence of a separate effect from these skills, controlling for schooling. Adding controls for cognitive skills to a wage or earnings regression typically leads to a decrease in the estimated effect of formal schooling. In a seminal study of Kenya and Tanzania, Boissiere, Knight, and Sabot (1985) simultaneously considered formal educational attainment and cognitive skills, where the former was measured by a binary measure for secondary education completion (primary is the reference) and the latter were measured by scores from tests on reasoning, reading ability, and numeracy. Introduction of the cognitive skills measures decreased the estimated association between formal educational attainment and log earnings by nearly two-thirds. Similar results are found in Moll's (1998) study of South Africa.[7]

The literature examining the impact of cognitive skills on earnings (wages) in Ghana is much in line with that from other countries. Including English reading and mathematics test scores in a study of public and private sector wages, Glewwe (1996)[8] found a positive and statistically significant effect from numeracy on government sector wages of about 2.5-3.5 percentage-points depending on the specification – but not on private sector wages – even when formal educational attainment is included. English reading skills, on the other hand, were found to affect wages in the private sector positively, by about 3-3.5 percentage-points but were not found to affect wages in the government sector. Years of schooling and teacher training were positive and statistically significant in the government sector, which was taken to indicate the

[7] One should be careful in interpreting these results as ”only – or even mainly – cognitive skills matter”, since these skills are produced from schooling. Rather, they both indicate that schooling is successful in producing these skills and that there are additional components of schooling that affect wages in addition to cognitive skills.
[8] The results in Glewwe (1999) are similar as far as cognitive skills are concerned (schooling were not included in the specifications where cognitive skills were included).

existence of diploma effects.

The impact of cognitive skills on non-farm self-employment income in Ghana was examined by Vijverberg (1999), using the same dataset as Glewwe (1996, 1999). Linear specifications with either schooling or cognitive skills did not yield significant effects of human capital on non-farm self-employment income while interacted models (with years of schooling and cognitive skills) led to "sporadic evidence of positive links between elements of human capital (schooling or skills) and enterprise income" (p. 241).

Summing up, numerous studies find evidence of a positive association between formal schooling and wages. This is true for the general literature and also to some extent for the smaller literature, which examines wage determinants in Ghana. Only a subset of studies, for Ghana and elsewhere, incorporates literacy and numeracy in addition to formal educational attainment. The individual studies generally consider regular wage employment or self-employment separately, or alternatively aggregate employment categories, for example aggregating formal and non-formal (non-farm) employment into non-farm employment, rather than simultaneously examining regular wage employment and self-employment. Lastly, very few studies directly examine the effect of other types of schooling than formal schooling on wages (earnings). Participation in adult literacy programs or technical and vocational education may provide participants with literacy and numeracy and/or other skills, which may positively affect wages via their influence on productivity and therefore also would seem to belong in the human capital-wage relationship.

4. Estimation Strategy and Issues

From the conceptual framework in Section 2, I have suggested that skills can affect wages either directly or indirectly through their impact on employment status. Empirically, the direct effects can be estimated by a Mincer-equation (Mincer, 1974), augmented with skills, whereas the indirect effects can be estimated by a multinomial logit model of employment status, including skills as explanatory variables. Again, the endogeneity of wages and employment status warrants an estimation strategy that takes this into account.

These considerations lead me to pursue a two-stage estimation procedure. In the first stage, the employment status is estimated by a multinomial logit model. Let the indirect utility of individual i associated with employment status j be given as:

$$v_{ij} = \alpha_{0j} + \alpha_{1j} S_i + \alpha_{2j} B_i + \alpha_{3j} P_i + \varepsilon_{ij} \tag{3}$$

where S_i includes variables for formal educational attainment, adult literacy program participation, and literacy and numeracy, P_i includes variables for parental employment status, and B_i include other (control) variables, including age, gender and geographical location. ε_{ij} is an error-term capturing unobservables, and j = regular wage employee, self-employed, unpaid family worker, or not working. Individual i chooses employment status j if the indirect utility of status j exceeds that of all the other possible employment categories. Assuming that the errors across choices are independently and identically distributed such that $F(\varepsilon_{ii}) = \exp(e^{-\varepsilon_{ij}})$, this yields the multinomial logit model.

In the second stage, the conditional wage equation is estimated, including the Durbin-McFadden (1984) correction for selectivity (based on the multinomial logit model from the first stage):

$$W_{ij} = \beta_{0j} + \beta_{1j} S_i + \beta_{2j} B_i + \beta_{3j} \hat{\lambda}_{ij} + \psi_{ij}, \tag{4}$$

Where W_{ij} denotes (log) wages for individual i in employment status j, $\hat{\lambda}_{ij}$ is a vector of selection-terms (inverse Mills ratios) estimated from the first-stage employment equation, ξ_{ij} is an error-term capturing unobservables, and the other variables are defined similar to equation (3). While the parameter estimates are consistent, the standard errors must be corrected to take the two-stage nature of the estimation procedure into account. This is done by bootstrapping the standard errors. Also, the survey design (see the next section) is explicitly accounted for by incorporating sampling weights and clustering in the estimations throughout. In order to identify the model one or more exclusion restrictions must be imposed that is, one or more variables should be included in the employment status equation (4) but excluded from the wage equation (3). The parental occupation measures play that role, although this requires the somewhat unrealistic assumption that parental occupation has no independent effect on productivity. As motivated earlier, wage and employment status equations are estimated for the full sample, for females and males separately, for rural and urban areas separately, and for individuals with no formal education.

5. Data and Descriptive Analyses

The empirical analyses of this paper examine household survey data from the fourth round of the Ghana Living Standards Survey. The survey gathered information on income, labor supply, literacy and numeracy, formal educational attainment, and participation in adult literacy courses as well as other information such as age, gender, and geographical location.

Wages

One primary dependent variable in this paper is the natural logarithm of the hourly wage rate for the person's main occupation (if any). If an individual has worked during the past 12 months and has received or will receive money for carrying out work related to the main occupation, the survey records the amount last received, along with the number of hours spent in earning it. Additionally, the survey records information on bonuses, commissions, tips, allowances, monetized value of in-kind payments (including food, crops or animals), accommodation, transport, and any additional payments. For my analyses, the hourly wage rate is then constructed as the average hourly earnings, including all monetary and (monetized) non-monetary payments.

Employment status

The other primary dependent variable in this paper is employment status: working for pay for other enterprise (employee), working for pay for own enterprise (self employed), working but not for pay (unpaid family worker), and not working. Individuals were first asked whether they worked for pay and/or worked unpaid during the past 12 months, including regular employment, self employment, farming (in a field or herding livestock), and working unpaid for a household enterprise. If they answered yes to any of these four categories, I consider them as being economically active; if they answered no to all four categories, I consider them as being economically inactive. If individuals answered yes to having participated in at least one of the four economic activities, the survey recorded whether they were paid employees, self employed, unpaid family workers, or other.

Literacy and numeracy

The information on literacy skills from the GLSS 4 include Ghanaian reading and writing proficiency and English reading and writing proficiency, while the information on include the ability to do written calculations. The question on English reading (writing) skills is: "Can (NAME) read (write) a letter in English?" while the question on Ghanaian reading (writing) skills is: "In what Ghanaian language can (NAME) write a letter?" The question on written calculations is: "Can (NAME) do written calculations?" The respondent is either the head of household or a knowledgeable adult member.

Based on this information, I construct a binary "functional literacy" measure. This measure is one if the individual can either write in a Ghanaian language *or* English *and* do written calculations, and zero otherwise. The motivation for this measure is that writing skills may be interpreted as the higher standard relative to reading skills – if an individual writes, she also reads but not vice-versa. In sensitivity analyses I examine other specifications of cognitive skills.

Education variables

Educational attainment is measured as the highest level completed, ranging from "none" through "university" and also includes technical/vocational training. I consider a set of four binary variables, corresponding to the completion of primary school, middle and junior secondary school, secondary school and above, and technical/vocational training.[9] In terms of the interpretation of subsequent results, it should be noted that this implies that the base category of no formal education completed really consists of two groups, namely individuals who never attended school at all and individuals who completed some but not all six years of primary education.

In addition to formal educational attainment, there is also information available on

[9] Nine individuals in the full sample report having completed "other education." These are dropped since it is not clear what "other education" is.

participation in adult literacy programs. I construct a binary measure, indicating whether an individual has ever attended an adult literacy course program. A problem with this measure, of course, is that the time of participation is unknown. An individual may just have started attending a class, for example, in which case the impact from the program will not have taken full effect. This would lead to a downward bias in the estimated impact. The intensity of participation is also unknown. Additionally, the quality and content of adult literacy programs may vary across time or across areas, since these programs are – and for a long time have been – offered by many different providers, including several different NGOs and the government. There is only information on whether or not an individual participated, however, and not on whom the provider or what the content was. Since the government's program is both the largest and seem to be representative in terms of its curriculum and so on, however, participation will here be interpreted in the context of that program.

Other explanatory variables

Other explanatory variables include controls for the "divisions" described earlier, namely indicator variables for rural-urban location and female gender, as well as age and age squared and parental employment status, including white-collar and agriculture. The construction of these variables is straightforward and will therefore not be discussed further.

Sample restrictions

Individuals should have had a chance to complete primary schooling, while at the same time being eligible for participation in adult literacy programs (the lower age limit). Also, individuals should not be "too old," since measurement issues then start to become more important (the upper age limit). This leads me to restrict the initial sample to adults between 15 and 54 years of age (both included), which yields an initial 10,139 observations for the selection equation for the full sample. Some of these observations are missing on one or more variables, however. This leads to a drop in the estimation sample to 10,003 individuals. Further, 13 individuals report having completed "other" education; since it is not clear exactly what this means and since there are so few of these – leading to extremely thinly populated cells for some of the sub-group analyses – these are dropped, as well. The final, effective estimation sample for the selection equation therefore contains 9,990 individuals – corresponding to a drop of less than 1.5 percent relative to the initial sample. Descriptive statistics of the main variables (log hourly wages, employment status, literacy and numeracy, schooling) for the analyses samples are reported in Tables 2 and 3 below.

Descriptive analyses

To examine the unconditional associations in the data, I first examine the descriptive statistics for employment status, wages, formal educational attainment, adult literacy course participation, and the literacy and numeracy for the six estimation samples. Table 1 below presents descriptive statistics for employment status (from the first-stage regression). From the table, regular employees are predominantly male and from urban areas and, not surprisingly, not prevalent among individuals with no formal education. Self-employment is roughly evenly split between males and females but more prevalent in rural areas and among individuals with no formal education. Unpaid family workers tend to be female and from rural areas – presumably working on the family farm – and are also very prevalent among individuals with no formal education. Individuals, who are not working, are slightly less prevalent among males but more prevalent in urban areas.

[Table 1 about here]

Table 2 presents descriptive statistics for wages, schooling and literacy and numeracy (from the second-stage regression). The other dependent variable, wages, on average are higher for males than for females, higher in urban areas than in rural areas, and lowest among individuals with no formal education – both for regular wage employees and for the self-employed. The gender gap and the education gap are much lower among the self-employed, however, possibly reflecting enumeration being more in line with productivity among the self-employed. Among regular wage employees, average hourly wages range between about 542 Cedis for individuals with no formal education to about 1656 Cedis in urban areas, while the range among the self-employed is between about 463 Cedis for individuals with no formal education to about 1331 Cedis in urban areas. To put this into perspective, the exchange rate in 1999 was about 6000 Cedis per US dollar, so that an individual with no formal education with a full day's work could barely attain the "one-dollar-per-day" poverty threshold used by, among others, the World Bank.

[Table 2 about here]

Turning next to the explanatory variables, formal education and regular wage employment appears to be positively associated – only about 13 percent have not completed any formal education, as compared to about 41 percent among the self-employed, about 64 percent among unpaid family workers and about 27 percent among the non-working. In terms of non-formal education, as measured by adult literacy course participation, at about 9 percent, the self-employed have the highest share, with 7 percent among unpaid family workers, about 3 percent among regular wage employees, and less than 2 percent among the non-working. Not surprisingly, therefore, the regular wage employees also are more likely to be literate and numerate – almost 80 percent in this group overall are literate and numerate, as compared to about 46 among the self-employed and about 23 percent among unpaid family workers.

While suggestive, however, the descriptive analyses do not take into account the simultaneity of wages and employment status, and also do not simultaneously control for the joint effect of all the explanatory variables on wages and employment status. This, therefore, is the object of the multivariate analyses to which I now turn.

6. Results

In this section reduced form estimates of the employment status and wage models are presented and discussed. The models are estimated for the full sample, and for five different sub-samples: females, males, rural areas, urban areas, and for individuals with no formal education completed. Since the focus of the paper is on the effect of literacy and numeracy and schooling, the results for the other explanatory variables – including variables for gender, age, age squared, rural-urban location, and, for the employment status regressions, only: marital status, marital status interacted with gender, and variables for parental employment status – are not reviewed here (they are available upon request).

Employment Status

Since the multinomial logit model is non-linear, estimated parameters depend on the values of all the other variable sin the model. To ease the interpretation of the estimated effects, therefore, the results are presented in Table 3 in terms of marginal effects, evaluated at the mean of the other explanatory variables. Starting from the top of the table, the first set of results is for regular employees, followed by the self-employed, unpaid family workers and inactive individuals. For each of these categories, the table gives the results for the full sample in the first column and the sub-groups – the female, male, rural and urban samples, and the sample for individuals with no completed formal education – in columns two through six. From Table 3 a few overall results stand out in particular.

[Table 3 about here]

First, not surprisingly, formal education – especially at the higher levels – predominantly leads to regular wage employment, while adult literacy program participation leads to self-employment. Noticeably, this last result is both substantively large, ranging from about 2 percentage-points for individuals from urban areas to about 16 percentage-points for males, and mostly also statistically significant. Note that while it may appear that adult literacy course participation is "bad" for regular wage employment, the preferred estimation sample for judging the effect on adult literacy course participation is the sample of individuals with no formal education. And for this estimation sample, the estimated association between adult literacy program participation and formal wage employment is nil, both in substantive and statistical terms.

Second, adult literacy course participation decreases economic inactivity, especially for females and in urban areas. So, while – as we will see later – participation in adult literacy programs does not have a direct effect on wages, conditional on employment status, it does have a substantial indirect effect on wages through its impact on employment status – namely by enabling individuals to move from economic inactivity into self-employment.

Third, employment status is strongly affected by parental employment status (results not shown in the Table). Individuals, whose parents were white collar workers are more likely to be regular employees and less likely to be self-employed, unpaid family workers or not working.

Wages

Turning to the results for the wage equation, the marginal effects of the schooling and literacy and numeracy variables – using Kennedy's (1981) bias correction[10] – are shown in Table 4. The Table is organized similar to the employment status regression results in Table 3, except that now there are only results from the employment categories, which obtain wages – namely regular employees and the self-employed; also, the models are estimated in two flavors: one, where everything but literacy and numeracy is included and one, which adds literacy and numeracy.[11] Again, the reason for this is that I want to examine the extent to which literacy and numeracy skills affects the schooling premium and the extent to which literacy and numeracy adds additional explanatory power to the wage equations.

[Table 4 about here]

From Table 4 the first specification, which is estimated for the full sample and includes formal schooling and adult literacy participation, reveals a large positive and statistically significant association between formal education and wages. This is true across all estimation samples. The finding of a large return to formal education accords with the findings in the

[10] The marginal effects for dummy variables in semi-logarithmic models are not merely given as the estimated coefficients (although some studies treat them as such); therefore, the estimated coefficients are not interpretable "as is." While direct exponentiation (via the formula: marginal effect = exp(coefficient) – 1) is a common way of converting the estimated coefficients of dummy variables from semi-logarithmic models into marginal effects, Kennedy (1981) suggests that this is a biased estimator for the "true" marginal effect. He offers a bias correction – involving the variance of the estimate – which is used here, as well.

[11] Estimating the employment status equation in both flavors revealed that the results generally were quite robust to whether or not literacy and numeracy was included, which is why the results for the specification with literacy and numeracy excluded was not shown for the employment equation.

previous literature reviewed in Section 3 in this paper. Again, while it may appear that adult literacy course participation is “bad” for wages, the preferred estimation sample for judging the effect on adult literacy course participation is the sample of individuals with no formal education. And for this estimation sample, the estimated association between adult literacy program participation and wages, while negative, is not statistically significant for regular wage employment. For self-employment, it is positive (but not statically significant).

Adding literacy and numeracy in the second specification causes a substantial drop in the premium to formal education for wage employees, often also losing statistical significance, while the skills premium at the same time is large and positive. The returns to middle and junior secondary school, for example, drops from about 51 percentage-points to about 3 percentage-points in the full sample. This is consistent with earlier findings for Kenya and Tanzania (Boissiere, Knight, and Sabot; 1985) and South Africa (Moll; 1998). The literacy and numeracy premium ranges from about 13 to 95 percentage-points for regular wage employment and from 2.6 to about 13 percentage-points for self-employment; it is mostly statistically significant for the regular wage employees, while it is somewhat imprecisely measured for the self-employed and therefore not statistically significant. R^2 remains constant, indicating very little independent explanatory power in literacy and numeracy, once schooling has been controlled for.

What do these results mean? The finding of an individual skills effect, separate from that of education, confirms that it is not only schooling per se that is important for wages: the cognitive skills obtained from schooling are important, too, possibly through their impact on productivity and therefore on wages. It also confirms that the Ghanaian education system is successful in creating skills; this has been examined more extensively elsewhere, however (Blunch, 2006). This is all consistent with a standard human capital explanation.

While literacy and numeracy are important determinants of wages, however, the results also indicate that education is important, even after controlling for cognitive skills – in accord with the findings in Boissiere, Knight, and Sabot (1985), Moll (1998), and Glewwe (1996). In other words, skills achieved through schooling other than basic cognitive skills are important, as well. Such skills may include more advanced cognitive skills and non-cognitive skills such as socialization or discipline skills; conceptually, these skills would seem to be produced mainly at higher levels of formal education, and through technical-vocational education or adult literacy course participation. Formal education may also generate diploma or signaling effects (Spence, 1973), which would also affect wages; conceptually, the signaling effect would only seem to be relevant for higher levels of formal education and that only for regular wage employees. Hence, for secondary education, it is not possible empirically to distinguish between production of more advanced cognitive skills or non-cognitive skills and the "production" of signaling.

Empirically, the results are consistent with the advanced cognitive skills, non-cognitive skills, or signaling explanation for secondary education and the advanced cognitive skills explanation for technical-vocational education. The former is particularly strong for females and individuals from urban areas, while the latter is particularly strong in urban areas. Again, this is also consistent with the returns to these more advanced skills partly coming about through the existence of better economic opportunities in urban areas.

Turning to the differences between regular employees and self-employed, the drop in the education premium when including cognitive skills is not nearly as dramatic for the self-employed; the statistical significance of estimates is also retained to a greater degree than what was the case for regular wage employees. The education premium in self-employment is much lower to begin with, however – for secondary and above for the full sample, for example, less than a third of that of regular wage employees. These results indicate that the returns to human capital generally are lower for the self-employed – which is consistent with this segment of the labor market possibly employing relatively less skilled labor, as is also revealed by the descriptive statistics in Table 3.

In sum, the human capital effects have been decomposed into two individual groups of effects: basic cognitive skills and advanced cognitive, non-cognitive skills, or signaling effects, both of which are important in the human capital-wage relationship.

Lastly, the selection terms are frequently statistically significant, supporting the importance of employing the Durbin-McFadden (1984) procedure used here. To further assess the validity of this procedure, tests for the joint significance of the over-identifying variables[12] in the employment status equation were undertaken. The results (not shown) indicate that the set of identifying instruments as a whole are strong predictors of employment status, being statistically significant at 0.01 percent or better in all cases. Since conceptually the instruments should not affect wages, conditional on employment status, the selectivity correction procedure employed here appears both justified and valid.

Besides these main patterns in the wage regression results, there are also some additional interesting results pertaining to some of the subgroup analyses. For example, the cognitive skills and education premia are substantially higher in urban regular wage employment than in rural regular wage employment. The reason for this is probably that the labor market conditions and economic opportunities more generally are greater in urban than in rural areas, especially as they pertain to skilled workers, and here especially regular wage employees. Expanding educational opportunities, therefore, have the highest effect if carried out in an environment with economic opportunities. Alternatively, educational expansion might benefit from associated policies

[12] Marital status, marital status interacted with gender, and dummy variables for parental employment status.

aiming at enabling such economic opportunities. Also, in rural areas the results for formal education are strongest and most consistent for technical and vocational education and training. This is consistent with practical skills being more valued in rural areas, which again is in line with signaling and non-cognitive skills mainly mattering for regular wage employment.

Sensitivity Analyses

I also performed sensitivity analyses to assess the robustness of the previous results. Specifically, I experimented with several different alternative functional literacy (cognitive skills) measures. Specifically, in addition to the preferred measure (Ghanaian *or* English writing *and* written calculations), I re-estimated the model for the full sample using Ghanaian *or* English reading *and* written calculations, Ghanaian *and* English reading *and* written calculations, and Ghanaian *and* English writing *and* written calculations. The wage premium to the three alternative functional literacy measures was found to be substantial, though of differing magnitude depending on the measure in question; it was also not always statistically significant. These discrepancies notwithstanding, the results from the sensitivity analyses do not appear to detract from the overall conclusions of the main analyses of there existing large returns to literacy and numeracy, controlling for schooling.

7. Conclusion

This paper examines the determinants of wages in Ghana, focusing on the effect from a set of human capital variables that captures formal and non-formal education and cognitive and non-cognitive skills, treating employment status as endogenous. Previous research has mostly treated human capital as a "black box," typically incorporating measures for formal education but not for nonformal education or literacy and numeracy when examining the association of human capital and wages. By incorporating also cognitive skills such as basic literacy and numeracy and also including adult literacy course participation, this paper is an attempt to open the black box – to pin down a bit more the exact pathways through which human capital affects wages and also examine the relative importance of the individual human capital components for wages and employment status.

Among the main findings, the introduction of basic literacy and numeracy in the human capital-wage relationship decreases the estimated effects of formal schooling, especially at the lower levels, often rendering the effect statistically insignificant. In turn, this indicates that "cognitive skills matter," not only schooling in and by itself is what matters. At the same time, these results also confirm that the Ghanaian education system is successful in creating basic cognitive skills. This is all consistent with a standard human capital explanation.

Additionally, the continued importance of technical-vocational education and secondary and higher indicate that skills achieved through schooling other than basic cognitive skills are important, as well. Such skills may include more advanced cognitive skills and non-cognitive skills such as socialization or discipline skills. Formal education may also generate diploma or signaling effects (Spence, 1973), which would also affect wages, however. The results are consistent with the non-cognitive skills/signaling explanation for secondary education, and that mainly for females (who also have the smaller share of above-primary education and therefore would seem to face a higher marginal return) and individuals from urban areas.

In addition to the direct effects from skills and schooling on wages, however, several indirect effects – coming through the impact on employment status – are established. First, not surprisingly, formal education predominantly leads to more regular wage employment. Second, the opposite is true for self-employment, where workers are less likely to have completed formal education but more likely to have attended an adult literacy program. Third, adult literacy course participation decreases economic inactivity, especially for females, individuals with no formal education, and in urban areas. So, while participation in adult literacy programs does not have a direct effect on wages, conditional on employment status, it does have a substantial indirect effect on wages through its impact on employment status.

What are the policy implications of these results? First, policy makers should care more about educational outputs rather than education and educational enrollment per se. If educational programs – in the broadest sense, including formal and non-formal education alike – do not produce useful skills, such as literacy and numeracy, for example, they should either be adjusted and improved or abandoned in favor of programs that do.

Cost-effectiveness is crucially important in this connection, especially for developing countries. If adult literacy programs indeed have positive indirect effects on wages, through the effect on employment status – as the evidence here suggests they do, especially for females and in urban areas – they may well be cost-effective relative to formal education; at least they may be a useful complement to formal education, especially for individuals with low stocks of formal human capital. Since participants meet a couple of hours a few times a week, typically of a duration of about two years, and participation is mostly free, except for a small reward to the facilitator (typically in the form of a bike or a sewing machine), the main cost are foregone earnings. At such modest costs even moderate returns in terms of wages (through the decrease in economic inactivity) would seem to make these programs and their further strengthening worthwhile. Indeed, there are other potential effects from these programs which will positively affect peoples' livelihoods in addition to wages, such as increased child health arising from the health component of these programs (Blunch, 2006).

A few comments are in order, however, regarding the frequently quite high returns to skills and schooling estimated here. As Glewwe (1991: 318) also notes, since such estimates are conditional on past choices in asset accumulation, estimated returns tend to overestimate the returns to education for the general population. Policy makers, therefore, should not expect quite as massive results if human capital levels were to increase for the economy at large. Even if these estimates are upper bound estimates of the "true" effects, however, continued investment in human capital in Ghana should remain a priority for Ghanaian policy makers and international development organizations in the future.

Also, while suggestive, the results and analyses here represent only a first attempt at opening the black box in the human capital-wage relationship, however – more research is needed. Above all, the analysis of more and better data is required: do the results here pertain to other (West) African countries – and other developing countries more generally? Also, the measures of literacy and numeracy examined here were arguably crude. Rather than self-reported (binary) measures of literacy and numeracy ability, one would prefer more objective (continuous) test score based measures.

Similarly, there are obvious timing issues related to the adult literacy course participation measure: it is known if a person participated but not when, in which program or whether the program was completed. With that information, much richer analyses could be performed. Future research, using more precise measures of participation, could validate the findings here while also more precisely estimating impacts and possible asymmetries in effects from different providers of adult literacy programs.

As researchers, we mostly have to simply accept the data, we are given – only rarely do we have the resources available to collect exactly the data, we need for a particular analysis. One can only urge national statistical agencies, the World Bank, UNICEF, ILO and others carrying out large-scale household surveys in developing countries to continuously refine their survey instruments, keeping in mind the issues raised here.

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Table 1. Descriptive Statistics for Employment Status from Estimation Samples (Employment Status Equations)

	Full sample:		*Females:*		*Males:*		*Rural:*		*Urban:*		*No education:*	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Regular employee	0.131	0.337	0.062	0.241	0.219	0.413	0.088	0.284	0.209	0.407	0.043	0.204
Self-employed	0.560	0.496	0.565	0.496	0.554	0.497	0.595	0.491	0.495	0.500	0.594	0.491
Unpaid family worker	0.167	0.373	0.222	0.415	0.098	0.297	0.225	0.418	0.060	0.238	0.269	0.443
Not working (reference)	0.142	0.349	0.152	0.359	0.129	0.336	0.091	0.288	0.236	0.424	0.094	0.292
N	9881		5560		4321		6382		3499		3937	

Notes: Calculations incorporate sampling weights and clustering.
Source: Ghana Living Standards Survey (Round 4, 1998/99).

Table 2. Descriptive Statistics for Wages, Schooling, and Literacy and Numeracy (Wage Equations)

	Full sample:		*Females:*		*Males:*		*Rural:*		*Urban:*		*No education:*	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Regular employee:												
Hourly wages (Cedis)	1375.1	8197.5	876.8	1285.6	1550.5	9496.0	1008.0	1234.0	1656.4	10835.0	542.4	567.7
No education	0.133	0.339	0.154	0.362	0.125	0.331	0.167	0.373	0.106	0.308	1.000	0.000
Primary	0.070	0.254	0.067	0.250	0.070	0.256	0.091	0.288	0.053	0.224	0.000	0.000
Middle/JSS	0.372	0.484	0.368	0.483	0.373	0.484	0.384	0.487	0.363	0.481	0.000	0.000
Secondary and above	0.348	0.477	0.333	0.472	0.353	0.478	0.319	0.467	0.370	0.483	0.000	0.000
Technical/Vocational	0.078	0.268	0.078	0.268	0.078	0.269	0.039	0.194	0.108	0.311	0.000	0.000
Literacy course	0.028	0.166	0.060	0.238	0.017	0.130	0.024	0.152	0.032	0.177	0.104	0.306
Literate and numerate	0.791	0.406	0.753	0.432	0.805	0.397	0.736	0.441	0.834	0.373	0.042	0.201
N	1162		297		865		488		674		149	
Self-employed:												
Hourly wages (Cedis)	764.0	4714.4	693.4	2719.3	855.4	6435.3	498.1	1085.5	1331.4	8166.3	463.3	842.2
No education	0.414	0.493	0.485	0.500	0.323	0.468	0.469	0.499	0.298	0.458	1.000	0.000
Primary	0.152	0.359	0.168	0.374	0.130	0.337	0.155	0.362	0.143	0.351	0.000	0.000
Middle/JSS	0.360	0.480	0.297	0.457	0.441	0.497	0.331	0.471	0.421	0.494	0.000	0.000
Secondary and above	0.049	0.215	0.029	0.167	0.074	0.262	0.036	0.187	0.075	0.263	0.000	0.000
Technical/Vocational	0.026	0.159	0.022	0.145	0.032	0.176	0.009	0.093	0.063	0.244	0.000	0.000
Literacy course	0.094	0.292	0.098	0.298	0.088	0.283	0.119	0.324	0.039	0.194	0.160	0.367
Literate and numerate	0.459	0.498	0.345	0.476	0.606	0.489	0.404	0.491	0.577	0.494	0.026	0.159
N	5263		2983		2280		3590		1673		2171	

Table 2. cont…

	Full sample:		*Females:*		*Males:*		*Rural:*		*Urban:*		*No education:*	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Unpaid family worker:												
No education	0.645	0.479	0.707	0.455	0.466	0.499	0.669	0.471	0.479	0.501	1.000	0.000
Primary	0.114	0.318	0.111	0.315	0.121	0.327	0.116	0.320	0.100	0.301	0.000	0.000
Middle/JSS	0.192	0.394	0.158	0.365	0.288	0.454	0.174	0.380	0.313	0.465	0.000	0.000
Secondary and above	0.047	0.211	0.021	0.143	0.120	0.326	0.038	0.191	0.104	0.306	0.000	0.000
Technical/Vocational	0.003	0.050	0.002	0.046	0.004	0.062	0.002	0.048	0.004	0.064	0.000	0.000
Literacy course	0.070	0.255	0.085	0.279	0.026	0.160	0.072	0.259	0.051	0.221	0.090	0.286
Literate and numerate	0.231	0.422	0.173	0.379	0.397	0.490	0.208	0.406	0.391	0.489	0.009	0.096
N	1728		1283		445		1504		224		1093	
Not working:												
No education	0.266	0.442	0.322	0.467	0.183	0.387	0.327	0.470	0.223	0.416	1.000	0.000
Primary	0.144	0.351	0.157	0.364	0.125	0.331	0.142	0.350	0.145	0.353	0.000	0.000
Middle/JSS	0.452	0.498	0.434	0.496	0.480	0.500	0.464	0.499	0.444	0.497	0.000	0.000
Secondary and above	0.115	0.319	0.073	0.260	0.179	0.383	0.055	0.228	0.158	0.365	0.000	0.000
Technical/Vocational	0.022	0.148	0.015	0.121	0.033	0.180	0.012	0.109	0.030	0.169	0.000	0.000
Literacy course	0.016	0.127	0.018	0.133	0.014	0.118	0.018	0.133	0.015	0.123	0.038	0.191
Literate and numerate	0.590	0.492	0.499	0.500	0.726	0.446	0.508	0.500	0.649	0.478	0.065	0.246
N	1430		824		606		567		863		351	

Notes: Calculations incorporate sampling weights and clustering.
Source: Ghana Living Standards Survey (Round 4, 1998/99).

Table 3. Marginal Effects for Education and Literacy and Numeracy from Employment Status Equation

	Full sample:	*Female:*	*Male:*	*Rural:*	*Urban:*	*No formal educ.:*
Regular wage emp.:						
Primary	0.042*	0.013	0.095*	0.040	0.030	
	[0.023]	[0.020]	[0.053]	[0.028]	[0.041]	
Middle/JSS	0.109***	0.070***	0.183***	0.088***	0.137***	
	[0.024]	[0.023]	[0.055]	[0.030]	[0.032]	
Secondary and above	0.467***	0.442***	0.548***	0.461***	0.462***	
	[0.058]	[0.095]	[0.073]	[0.090]	[0.057]	
Technical/Vocational	0.316***	0.241***	0.404***	0.361***	0.332***	
	[0.053]	[0.076]	[0.088]	[0.093]	[0.050]	
Literacy course	-0.034**	0.010	-0.130***	-0.040***	0.048	-0.009
	[0.017]	[0.024]	[0.028]	[0.009]	[0.092]	[0.008]
Literate and numerate	-0.015	0.010	-0.087	-0.013	-0.017	-0.005
	[0.013]	[0.010]	[0.048]	[0.016]	[0.025]	[[0.011]
Self-employed:						
Primary	0.004	0.060*	-0.083	0.034	-0.022	
	[0.026]	[0.035]	[0.053]	[0.033]	[0.052]	
Middle/JSS	-0.053	0.024	-0.180***	0.010	-0.111**	
	[0.033]	[0.045]	[0.056]	[0.036]	[0.044]	
Secondary and above	-0.422***	-0.356***	-0.537***	-0.382***	-0.418***	
	[0.050]	[0.074]	[0.064]	[0.073]	[0.064]	
Technical/Vocational	-0.206***	-0.067	-0.352***	-0.263***	-0.197***	
	[0.054]	[0.082]	[0.087]	[0.097]	[0.047]	
Literacy course	0.106***	0.092**	0.164***	0.111***	0.023	0.097**
	[0.024]	[0.039]	[0.032]	[0.024]	[0.100]	[0.038]
Literate and numerate	0.026	0.001	0.105**	0.031	0.008	-0.018
	[0.024]	[0.040]	[0.049]	[0.025]	[0.039]	[0.050]
Unpaid fam. worker:						
Primary	-0.052***	-0.088***	-0.018**	-0.077***	-0.023***	
	[0.011]	[0.020]	[0.008]	[0.019]	[0.007]	
Middle/JSS	-0.068***	-0.123***	-0.012	-0.108***	-0.018	
	[0.015]	[0.025]	[0.015]	[0.026]	[0.011]	
Secondary and above	-0.041***	-0.096***	-0.004	-0.068**	-0.015*	
	[0.014]	[0.031]	[0.015]	[0.030]	[0.009]	
Technical/Vocational	-0.092***	-0.165***	-0.036***	-0.125***	-0.042***	
	[0.013]	[0.025]	[0.010]	[0.029]	[0.010]	
Literacy course	-0.020	-0.032	-0.017*	-0.046**	0.016	-0.055
	[0.015]	[0.029]	[0.010]	[0.022]	[0.023]	[0.036]
Literate and numerate	-0.029*	-0.029	-0.030	-0.031	-0.020	-0.070*
	[0.015]	[0.026]	[0.017]	[0.024]	[0.015]	[0.042]

Table 3. cont…

	Full sample:	*Female:*	*Male:*	*Rural:*	*Urban:*	*No formal educ.:*
Not working:						
Primary	0.005	0.016	0.006	0.002	0.014	
	[0.015]	[0.024]	[0.015]	[0.010]	[0.029]	
Middle/JSS	0.013	0.029	0.008	0.010	-0.009	
	[0.016]	[0.024]	[0.014]	[0.011]	[0.030]	
Secondary and above	-0.004	0.010	-0.006	-0.011	-0.030	
	[0.018]	[0.038]	[0.015]	[0.011]	[0.030]	
Technical/Vocational	-0.019	-0.008	-0.017	0.027	-0.094**	
	[0.022]	[0.034]	[0.015]	[0.038]	[0.039]	
Literacy course	-0.052***	-0.070***	-0.017	-0.025***	-0.086**	-0.033***
	[0.013]	[0.019]	[0.014]	[0.008]	[0.035]	[0.012]
Literate and numerate	0.018	0.018	0.013	0.013*	0.029	0.093**
	[0.013]	[0.022]	[0.010]	[0.007]	[0.041]	[0.040]
Pseudo-R^2	0.27	0.21	0.32	0.26	0.23	0.23
N	9881	5560	4321	6382	3499	3937

Notes: Estimations employ Robust Huber-White (Huber, 1967; White, 1980) standard errors, sampling weights and clustering. *: statistically significant at 10 percent; **: statistically significant at 5 percent; ***: statistically significant at 1 percent.
Source: Ghana Living Standards Survey (Round 4, 1998/99).

Table 4. Marginal Effects for Schooling and Literacy and Numeracy from Wage Equation

	Full sample:		*Female:*		*Male:*		*Rural:*		*Urban:*		*No formal education:*	
	Only schooling	*Sch. + lit/num*	*Only schooling*	*Sch. + lit/num*	*Only schooling*	*Sch. + lit/num*	*Only schooling*	*Sch. + lit/num*	*Only schooling*	*Sch. + lit/num*	*Only schooling*	*Sch. + lit/num*
Regular wage employee:												
Primary	0.074	-0.019	0.311	0.256	-0.189	-0.218	-0.175	-0.292	0.374	0.345		
Middle/JSS	0.513***	0.028	1.178***	0.124	0.092	-0.035	0.247	-0.302	0.681**	0.431		
Secondary and above	3.071***	1.649***	5.663***	2.072***	1.968***	1.596***	2.634***	0.895**	3.023***	2.428***		
Technical/Vocational	1.124***	0.425	0.959	-0.178	-0.943	-0.021	1.368**	0.025	-0.990	-0.716		
Literacy course	-0.324	-0.312	0.047	0.140	-0.634	-0.633	-0.206	-0.186	-0.346	-0.342	-0.518	-0.545
Literate and numerate		0.519***		0.950***		0.129		0.860		0.165		0.264
Selection term, self-employment	0.759***	0.741***	1.154**	1.025*	0.654**	0.657***	0.827**	0.774***	0.665*	0.650**	1.071	1.130
Selection term, unpaid family worker	-0.078	-0.075	0.120	0.134	-0.330*	-0.322*	-0.188*	-0.189*	-0.018	-0.020	-0.379*	-0.373*
Selection term, not working/inactive	-0.105	-0.103	-0.051	0.038	0.013	0.013	-0.022	-0.007	-0.124	-0.121	0.131	0.138
R^2	0.26	0.27	0.40	0.41	0.23	0.23	0.33	0.35	0.21	0.21	0.21	0.23
N	1162		297		865		488		674		149	
Self-employed:												
Primary	0.185**	0.140*	0.085	0.082	0.137	0.142	0.225**	0.188**	-0.055	-0.103		
Middle/ JSS	0.313***	0.190*	0.053	0.033	0.139	0.273	0.397***	0.268**	0.121	0.009		
Secondary and above	0.867***	0.675***	0.759**	0.708*	0.661***	0.850**	0.398**	0.248	1.275***	1.014**		
Technical/Vocational	0.614***	0.421	0.051	0.072	-0.936	-0.977	1.091***	0.889**	-0.983	-0.955		
Literacy course	-0.154*	-0.160*	-0.089	-0.105	-0.322	-0.324	-0.012	-0.019	-0.172	-0.169	0.079	0.071
Literate and numerate		0.121		0.026		-0.134		0.115		0.121		0.134
Selection term, self-employment	0.109*	0.107*	0.246**	0.239*	-0.049	-0.047	0.189***	0.187**	-0.070	-0.079	0.050	0.055
Selection term, unpaid family worker	-0.041	-0.041	0.088	0.083	-0.324*	-0.323*	0.035	0.034	-0.156*	-0.156*	-0.091	-0.085
Selection term, not working/inactive	-0.168***	-0.171**	-0.034	-0.049	0.002	0.002	-0.137***	-0.137**	-0.010	-0.015	0.046	0.040
R^2	0.12	0.12	0.10	0.10	0.14	0.14	0.07	0.07	0.06	0.07	0.07	0.07
N	5263		2983		2280		3590		1673		2171	

Notes: Models are estimated using the multinomial selection model developed in Durbin-McFadden (1984). Marginal effects are calculated using Kennedy's (1981) bias correction for binary variables in semi-logarithmic equations. Estimations employ Robust Huber-White (Huber, 1967; White, 1980) standard errors; incorporate sampling weights and clustering; and bootstrap standard errors using 100 replications. *: statistically significant at 10 percent; **: statistically significant at 5 percent; ***: statistically significant at 1 percent.
Source: Ghana Living Standards Survey (Round 4, 1998/99).