

Allocation of Labour in Urban West Africa. Implication for Development Policies.

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Abstract: With the use of unique data from seven West African capitals, we attempt to assess the rationale behind development policies targeting high rates of school enrolment through the prism of allocation of labour and returns to skills across the formal and informal sectors. In particular, we try to find out whether the reason for the allocation of highly educated people into the small formal sector and not working and people with low levels education into the informal sector is a reflection of low usability of the existing stock of education and a flourishing informal sector that cherishes different types of human capital, or whether it is a reflection of barriers to formal sector employment together with a hidden unemployment quality of the informal sector. We find that although the pattern of self-selection by unobserved characteristics varies across the countries, it tends to be more consistent with queuing for formal jobs and opting for informal jobs only as a second best option than with the perception of the informal sector as a sector of dynamic entrepreneurship. These results have important policy implications.

JEL Classification: J24, J31, O12

Key words: Returns to skills, allocation of labour, self-selection, informal sector, Sub-Saharan West Africa

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1. Introduction

Educational investment in general and investment in basic education in particular have long been among the main targets of both bilateral and multilateral donors. Between the 1960s and the turn of the 21st century, the World Bank, the single largest donor, doubled its total investment, while the eight largest bilateral donors reached a contribution of more than USD 100 million per annum (EFA Global Monitoring Report, 2005). As Sub-Saharan Africa has consistently been the primary destination of educational investment, it is not surprising that gross elementary school enrolment rates in the sub-continent increased from 40% in the 1960s to 87% in the 1990s, while gross secondary school enrolment rates rose from 3.4% to 26% over the same period (World Bank, 2004). Yet, the number of adults without basic literacy increased from 131.4 million in 1990 to 136 million in 2000, more than one in 10 children continued to repeat at least one grade in more than half of the Sub-Saharan African countries and the expected link between increasing levels of educational enrolment and growth remains as elusive as ever (UNESCO, 2007; Pritchett, 2001).

A plausible, but often ignored, explanation of the above pattern could be the absence of productive opportunities and the misallocation of resources in the Sub-Saharan African labour market, which decrease both the individual incentive to accumulate human capital and the association between educational enrolment and growth. The two strands of literature touching upon this issue have failed to reach a consensus. On the one hand, there has been an ongoing debate on the appropriate measurement of returns to different types of education. Some authors find a convex relationship between education and earnings (Schultz, 2004; Söderbom et al., 2006; Kuepie et al., 2006), while others assume this relationship to be concave (Psacharopoulos and Patrinos, 2002). At least part of the inability to reconcile these findings - with clearly conflicting policy implications - comes from empirical shortcomings related to concordance of data sampling and econometric techniques across different countries, as well as an adequate accounting for unobserved characteristics in estimates of returns to observed skills (Bennell, 1996).

On the other hand, research on the allocation of skills across different labour market niches has established that following the structural reform of the 1980s, the formal urban sector across Sub-Saharan Africa shrank, while allocation of people into the informal sector and not working rose (Rama, 1998; Calvès and Schoumaker, 2004). In several countries, this process coincided with the rising inflow of highly educated people into the pools of informal, unemployed and discouraged labourers (Serneels, 2004; World Bank, 2006). However, there is no answer to the question of whether this pattern prevails across African countries and if so, whether the primary culprit is low “mastery” level of observed skills, i.e. low level of usability of skills in the changing environment, as opposed to a shortage of productive job opportunities that puts barriers to their effective utilization (World Bank, 2006). The ambiguity is further aggravated by the fact that more than half of the workers in these countries are not protected by labour legislation and work in small, informal enterprises. At the same time, the literature addressing the functioning of the informal sector in developing countries has failed to adequately resolve the debate between market dualism, which looks at the informal sector as a disadvantaged sector and sector of exploitation of underprivileged workers (Mazumdar, 1983; Fields, 1990) as opposed to a sector of personal choice or dynamic entrepreneurship that shows few of the characteristics of a stylised dual economy (Maloney, 1999; 2004).

The primary purpose of this paper is to find out whether and how human capital resources in West Africa are wasted, and if so, whether the primary culprit is an inadequate usability of skills required or the absence of appropriate productive opportunities for the effective use of these skills. With the use of a sophisticated econometric technique, we first explore the determinants of the allocation of labour across the formal sector, different modalities of the informal sector and not working in the West African urban markets.

The pattern of resource allocation established in the first stage, useful as it is in telling us where people with different levels of education go, tells us little about the usability of resources and their possible misallocation in the labour market. Indeed, both the allocation of people with high and low levels of education out of working and in the informal sector may be a reflection of an efficiently functioning labour market. For instance, the allocation of highly educated people out of the labour force may be a

reflection of low mastery of skills and skill obsolescence while the allocation of highly educated people into the informal sector could be consistent with the development of productive niches in the informal sector. This scenario can equally be consistent with either high institutional barriers to formal employment or paucity of the “good” formal sector jobs, which precludes the allocation of people with high levels of observed and unobserved skills into the small formal sector, while the informal sector is a sector of hidden unemployment which absorbs people with high levels of both observed and unobserved skills. At the same time, the allocation of people with low levels of education into the informal sector would not necessarily be a reflection of low levels of productivity of this sector in an environment where observed educational stocks are not an indicator of adequate education quality and unobserved skills like entrepreneurship are rewarded in a flourishing informal sector.

In the second stage of our empirical exercise, we therefore estimate earnings equations for the different employment sectors, after controlling for the influence of unobserved skills on the selection of employment sector. Our methodology will help us find whether people are positively or negatively selected in each of the sectors explored. For instance, if the estimates of returns to education to people selected into the informal sector decrease after correcting for selectivity because their unobserved skills are such that they would have performed better elsewhere end up in the informal sector, we can provide an answer as to whether these people would have performed better in the formal sector, or whether their unobserved characteristics are highly correlated with (hidden) unemployment. If we find a negative selectivity of people in the formal sector, this could be an indication of high levels of nepotism and barriers to formal sector employment. If, on the other hand, we find no selectivity problem in the formal sector or a positive selection of people in the formal sector together with negative selectivity in the informal sector, this could indicate an absence of entrepreneurship or productive opportunities in the informal sector. High quality comparable data across seven West African countries allow us to draw a fairly general picture on the pattern of allocation of labour and returns to skills in the sub-continent.

Our results indicate that workers with higher education predominantly allocate to the formal sector and receive high returns to their observed skills. In the meantime, a

significant proportion of individuals with high levels of education allocate into not working. Although the pattern of self-selection by unobserved characteristics varies across the countries, it tends to be more consistent with queuing for formal jobs and opting for informal jobs only as a second best option than with the perception of the informal sector as a sector of dynamic entrepreneurship.

The rest of the paper is organised as follows. Section 2 outlines the empirical methodology. In section 3 we provide some details on the data used. Section 4 comments on the regression results and Section 5 concludes.

2. Methodology

Our basic model is given by:

$$Y_s = X_s \beta_s + U_s, \quad [1]$$

and

$$Y_s^* = Z_s \gamma_s + \eta_s, \quad s = 1 \dots M, \quad [2]$$

where Y_s refers to the earnings associated with a specific sector, Y_s^* is a discrete choice variable indicating the sector of employment, X_s and Z_s are demographic and other explanatory variables and the disturbance U_s satisfies $E(U_s | X) = 0$ and $V(U_s | X, Z) = \sigma_s^2$. When using OLS, the earnings equations are run separately. However, if there are unobserved characteristics of individuals that affect both their choice of employment and their earnings, the error terms U_s and η_s will be correlated and the OLS estimates of β_s will be inconsistent.

To correct for the potential inconsistency, applied research has traditionally employed the bias correction method embedded in Lee's (1983) extension of the Heckman (1979) two-stage selection model to the multinomial logit case. The exact equivalent of the Heckman inverse-Mill's ratio in each sectoral earnings equation is based on the correlation between the disturbance term of each wage equation and the cumulative distribution of ε_s , where $\varepsilon_s = \max_{j \neq s} (y_j^* - \eta_s)$. The joint distribution of U_s and

ε_s depends on all $Z_j\gamma_j$ and the related bias correction term incorporates all the information from the multinomial logit model. Its sign indicates the direction of the selection bias resulting from the selection of individuals in the sector for which an earnings equation is estimated as opposed to all other sectors taken together.

Bourguignon, Fournier and Gurgand (2007, hereafter BFG) argue that clubbing together all information based on the multinomial logit model makes the selectivity correction mechanism unnecessarily restrictive. They offer an alternative, which takes into account the correlation between the disturbance terms from each earnings equation and the disturbance terms from each multinomial logit equation (namely U_s and η_s). This link is incorporated in their model by assuming a linear association between U_s and η_s , $U_i = \sigma_i \sum_s \rho_s \eta_s^* + \omega_i$, for each i , i.e., a latent equation. Hence, the conditional expected value of the disturbances from the latent equation is $E(U_i | Y_i^* > \max_{j \neq i}(y_j^*)) = \sigma_i \sum_s \rho_s E(\eta_s^* | y_i^s > \max_{j \neq i}(y_j^s))$. After substituting this conditional expected value into the earnings equation and performing several algebraic manipulations in the spirit of Lee, we are left with the following bias-corrected earnings equation:

$$Y_1 = X_1\beta_1 + \sigma_1[\rho_1 m(P_1) + \sum_s \rho_s \frac{P_s}{(P_s - 1)} m(P_s)] + v_1, \quad [3]$$

where P_s is the probability that a category s is chosen, $v_1 = \eta_1 + \log P_1$ and $m(P_s) = \int J(v - \log P_s) g(v) dv$. The number of bias correction terms in this equation is equal to the number of multinomial logit choices.

The BFG methodology thus allows us to identify not only the direction of the bias related to the allocation of individuals in a specific sector, but also which choice among any two alternative sectors this bias stems from. For instance, a positive bias correction coefficient related to selection equation 3 in earnings equation 1 highlights higher earnings of individuals in sector 1 compared to individuals taken at random, due to the allocation of people with worse unobserved skills out of sector 1 into sector 3.

The BFG model is appealing. Monte Carlo experiments show that while the Lee (1983) model performs well only in relatively small samples, the BFG method tends to be the universally preferred econometric methodology for selectivity correction based on the

multinomial logit, even when flexible (e.g., non-linear) specifications are present and the IIA condition does not hold.¹

Given the fact that the satisfaction of the IIA condition is often a numerically difficult task, driven by the tolerance levels used, we perform and first report the marginal effects from a multinomial probit analysis of sectoral choice. We then report the results from our BFG estimations, after correcting for potential biases in earnings determination. Note that while the second stage estimates from BFG are consistent, they have inefficient standard errors due to the two-step nature of the procedure. We obtain efficient standard errors with the use of bootstrapping.

3. Data

3.1. The 1-2-3 surveys

Our empirical analysis uses data from urban household surveys in West Africa (the *1-2-3 Surveys*), conducted in seven major Western African Economic and Monetary Union (WAEMU) capitals – Abidjan, Bamako, Cotonou, Dakar, Lomé, Niamey and Ouagadougou – between 2001 and 2002². They were carried out by the countries' National Statistical Institutes, AFRISTAT and DIAL as part of the PARSTAT Project, the regional statistical assistance project for multilateral monitoring, sponsored by the WAEMU Commission. The project consists of three different phases, collecting three different sets of data: (1) individual socio-demographic and labour market characteristics, (2) firm level informal sector characteristics, and (3) household level consumption and living conditions. Our study is based on data from phase one. To assure consistency with the labour economics literature, we restrict our samples to include only individuals in the formally recognised working age group of 15-65.

The survey methodology is aimed at assuring high quality, high degree of representativeness and comparability across countries. It includes data from 2,500

¹ For an overview of all known methods for selectivity correction based on the multinomial logit, and justification for the universally preferable qualities of the BFG method, see Bourguignon et al. (2007). Further examples of the use of the BFG methodology in empirical research and discussion of its advantages over all alternative selectivity correction models based on multiple choices can be found in Dimova and Gang (2007), Smith et al. (2004) and Ewoudou and Vencatachellum (2006).

² The survey was not carried out in Guinea-Bissau.

households in each of the seven cities, with the exception of Cotonou where the number of households is 3,000. Overall 17,841 households answered the questionnaire. This corresponds to 93,213 individuals, 69,565 of whom are over the age of 10. Details on the actual data collection can be found in Brilleau, Roubaud and Torelli (2005), Brilleau, Ouedraogo and Roubaud (2005) and Kuepie et al. (2006).

The data allows us to distinguish between people holding different types of employment. Our categorization is based on the sector of employment for the individual's main job.

The definition of our two informal sector categories is based on the ILO standards, described in Maloney (1999, 2004). Specifically, an informal self-employed worker is somebody who owns an individual business that is not formally registered according to the national regulations. An informal salaried worker, on the other hand, is a person employed by an informal firm. The employment of this worker is not regulated by a labour contract, formal pay-slips and social security benefits. The qualitative distinction between these two categories is a priori unclear. It is plausible to assume that the informal self-employment sector in the context of high regulatory barriers develops as a sector of dynamic entrepreneurship, while the informal salaried sector absorbs workers unable to sustain employment in the formal salaried sector. It is equally plausible to assume that in a dualistic market, both sectors develop as inferior sectors of hidden unemployment, with no obvious qualitative difference between them.

Our formal sector category includes people who are either employed by formal institutions and firms (including public administration) or work for an officially registered business as independent workers. The latter of these formal categories includes less than 1% of the workers in our samples, typically including professions such as doctors or lawyers. The small size of this sample makes it impossible for us to explore it as a sector of its own.

One of the most difficult tasks in our study is the appropriate measurement of earnings. This is due to the fact that workers in the informal sector do not have formal pay slips and are not obliged to disclose their incomes. To overcome these difficulties, the interviewers were asked to help the respondents reconstruct their earnings by recapping their monetary inflows and outflows over the reference period. People who

were not able or were unwilling to disclose their exact earnings were asked to give a bracket, defined as a multiple of the minimum wage in the labour force. Nearly half of the employed workers (48%) declared a precise income figure and over one third (36%) gave a bracket. Less than 6% provided no information. For both workers who refused to disclose their earnings and those who gave only a bracket, earnings were imputed by an econometric estimation based on an income equation³. We use earnings per hour as a dependent variable in our earnings regressions. Incomes are synchronized across the different capitals with the use of purchasing power parity indexes.

3.2. Descriptive statistics of the samples

Figures 1 and 2 highlight some preliminary statistics on the allocation of labour and educational distribution across the different capitals. Figure 1 indicates that in virtually all capitals, the proportion of working age people with no education accounts for approximately 50-60% of the samples. It is followed by the proportion of people with completed primary education, while education higher than the basic level is a scarce commodity. Figure 2 highlights that the majority of working age people either do not have permanent employment or work in the informal sector. The formal sector, on the other hand, employs at most 15% of the working age populations in these economies.

³ In a first step, an income model was estimated for the employed workers who disclosed their precise earnings based on their observed characteristics. In a second step, the predicted values from this model were imputed for the individuals with missing earnings. Finally, random sampling was conducted for these latter individuals and the result added to the estimated income until the sum obtained came within the bracket declared by the interviewee. Sensitivity tests of this methodology over alternative techniques have been conducted in Kuepie et al. (2006) and show that estimates of the earnings equations are only marginally modified and remain qualitatively unchanged.

Figure 1. Distribution of education across the West African cities

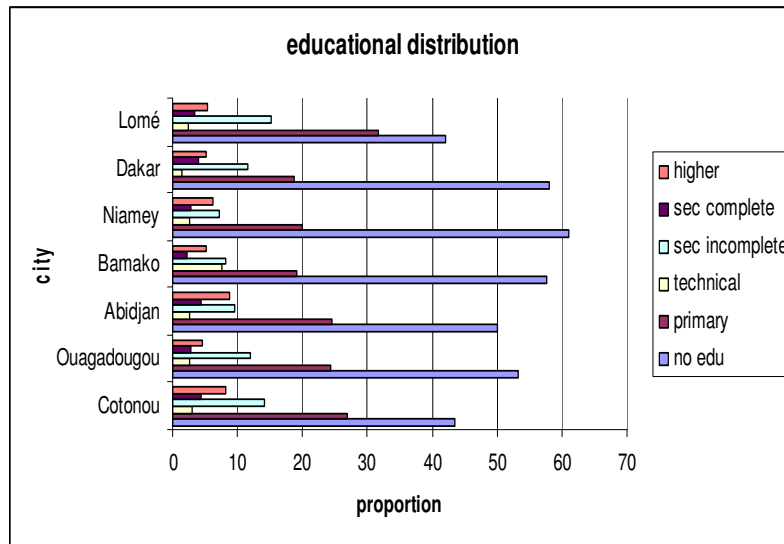
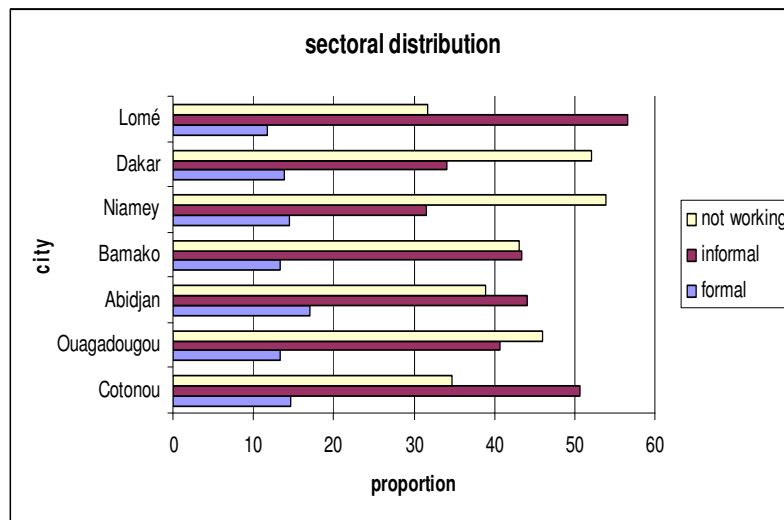


Figure 2. Allocation of labour across the formal and informal sectors in the West African cities



Source: 1-2-3 surveys, Phase 1, 2001-2002 (National Institutes of Statistics, AFRISTAT, DIAL); Authors' calculations.

Some additional descriptive statistics are reported in Tables 1a and 1b. The statistics indicate that in all countries formal sector earnings exceed informal sector earnings and there is no significant difference between earnings in the informal self-employment and the informal salaried sectors. This observation is consistent with the assumption of queuing for formal sector jobs and allocation of people who are not able to obtain these preferred jobs into the informal sector. The absence of significant differences in the

variance of self-employment sector earnings provides some additional support for this proposition. It identifies the self-employment sector more as a second choice sector for people unable to sustain formal employment than as a sector of dynamic entrepreneurship characterised by high variance in returns as compensation for different levels of risk.

We define six different categorical education variables which help us identify differences in demand for specific types of education (e.g. vocational versus general training). These differences are difficult to explore with the use of a continuous education variable. Unfortunately, high levels of school drop-out in the African context make it impossible for us to define these variables along the lines of completed degrees of education. We therefore define the following education variables. Education_1 includes people with complete primary school or incomplete middle school education. Education_2 includes individuals with secondary vocational training. Education_3 includes people with complete middle school and incomplete secondary education. Education_4 includes individuals with complete secondary education and Education_5 includes people with education higher than the secondary level. The omitted category includes people with no education or incomplete primary education.

Our descriptive statistics indicate that while there is a slightly non-linear link between educational attainment and formal sector employment in that in most countries people with complete primary education are more likely to sustain formal sector jobs than people with vocational training or people with complete secondary education, better educated people are in general more likely to be allocated to the formal sector than either not work or be in the informal sector. This is especially true for people with tertiary education, the proportion of which is higher than 25% in the formal sector but approximately 1-4% in the informal sector.

Interestingly, the proportion of non-working people with all types of education higher than the omitted category typically exceeds the proportion of such people allocated to the informal sector. This pattern is inconsistent with that characterizing developed or transition economies and indicates some degree of misuse of resources in the West African urban labour markets.

Female labourers are more likely to either not work or work for the informal self-employment sector than male labourers. The higher levels of non-employment and lower

levels of formal employment among women are consistent with gender discrimination patterns around the world, while the higher levels of informal self-employment perhaps indicate a higher willingness of women to opt for second best jobs in that sector more as a complement to family income than in pursuing a career track (Hundley, 2000).

In our empirical analysis we follow a version of the classical Mincer-type of wage equation, which includes education variables, age variables as a proxy for experience and a female dummy variable. However, it is much more difficult to find exogenous determinants of sector choice correlated with the sector, but uncorrelated with the error terms of the earnings equation.

In keeping with the literature, we give preference to parental occupation categories as an excluding condition in our two stage analysis (Evans and Leighton, 1989; Earle and Sakova, 2000). Specifically, we define a dummy variable taking the value of one if the respondent's father was an informal sector employee during the respondent's childhood, and a dummy variable taking the value of one if the respondent's father was a formal sector employee. The omitted category is a father who did not have permanent employment during the respondent's childhood. We find that, as expected, the children of informal sector workers are more likely to work for the informal sector themselves, but the link between the occupation of the father and formal employment of the child is not as straightforward. The test of joint significance of these variables in the first stage and insignificance in the second stage of the regression analysis, reported in Table A1 in the Appendix, highlight the appropriateness of their choice as excluding conditions in 19 cases out of 21⁴.

⁴ The exceptions are the formal sector in Bamako and the informal self-employment sector in Ouagadougou, where the appropriateness of the two excluding conditions is rejected at the 5 and 10% respectively in the second stage equations. Estimating the models in these two cases with the use of only the dummy variable indicating whether the respondent's father worked for the formal sector confirmed the appropriateness of this variable as an excluding condition. Since the rest of the results for these two cases did not differ whether the two or one of the excluding conditions were used, we report the results including both dummy variables for paternal employment status in order to assure comparability of the estimates across the countries. Note that the second-stage equation is still identified without excluding conditions for the need of the tests since identification relies then on the distributional assumption of the BFG models (Bourguignon et al., 2007).

4. Specification and Econometrical Results

Following our preceding discussion, our empirical specification is:

$$\begin{aligned} \text{Sector} = & \beta_0 + \beta_1 \text{Age} + \beta_2 \text{Age squared} + \sum \beta_{3i} \text{Education} + \beta_4 \text{Female} \\ & + \beta_6 \text{Dad Formal} + \beta_7 \text{Dad Informal} + v \end{aligned} \quad [4]$$

$$\begin{aligned} \text{Ln Hourly Earnings} = & \alpha_0 + \sum \alpha_{1i} \text{Education} + \alpha_2 \text{Age} + \alpha_3 \text{Age squared} \\ & + \alpha_4 \text{Female} + u \end{aligned} \quad [5]$$

where [4] is the selection equation and [5] is the earnings equation.

Our results are reported in Tables 2-8. Tables 2-5 report the marginal effects from our multinomial probit analysis of sectoral choice, separately for the formal sector, informal self-employment sector, informal salaried sector and not working. Tables 6-8 highlight the results from our earnings equations with the use of the BFG methodology, with each of these tables highlighting the results from our earnings estimations for the formal sector, informal self-employment sector and informal salaried sector, respectively.

4.1. Multinomial probit results

The marginal effects from our multinomial probit analysis confirm our assumptions from the analytical framework and descriptive statistics. The formal sector results, reported in Table 2, indicate that higher education increases the probability of working for the formal sector. In all the seven capitals, the positive marginal effect of the tertiary education variable (Education_5), on average 0.25-0.30 exceeds the positive marginal effects of all education variables higher than the omitted category of no education or incomplete primary education. Furthermore, we see that in the majority of the countries the marginal effect of vocational education (Education_2) is higher than those of the general secondary schooling variables.

We also observe that age has the expected concave influence on working for the formal sector, and female labourers in general face a lower probability of working for the

formal sector than male workers. Finally, respondents whose fathers had consistent employment during their childhoods face a higher probability of working for the formal sector and that probability is typically higher for respondents whose fathers worked for the formal sector.

The marginal effects on allocation into the informal sector, reported in Tables 3 and 4, respectively, reveal a strikingly different pattern. Higher levels of education have a negative impact on choosing either the informal self-employment sector or the informal salaried sector. However, the negative marginal effects of education are typically higher in the informal self-employment equation. This confirms our descriptive statistics results whereby the more educated labourers allocate to the formal sector and the least educated labourers allocate to the informal sector. Once again the link between age and employment is concave in the informal self-employment equation indicating a lower probability of working for that sector with the increase in age, but the age-employment relationship in the informal salaried equation varies across countries.

Female workers face a lower probability of working for the informal salaried sector than male workers, a pattern consistent with that observed in our descriptive statistics. However, there are some gender differences in informal self-employment across the different countries with women in Cotonou, Abidjan and Lomé facing a higher probability of working for the informal self-employment sector, women in Niamey and Dakar facing a lower probability than males in working for that sector and women in Ouagadougou and Bamako facing the same probabilities as males in allocating to the informal self-employment sector. These patterns perhaps reflect ethnic and religious differences across the different countries. Finally, the children of informal sector workers typically face a higher probability of working for the informal sector and children of formal sector workers typically face a lower probability of working for the informal sector.

While the results on labour allocation across the formal and informal sectors are highly consistent with our assumption of queuing for formal sector jobs and allocation of people with lower level of observed skills into the informal sector, the results on allocation into not working are inconsistent with conventional wisdom and evidence from more developed economies. Aside from Ouagadougou and Niamey, where workers with

tertiary education face a lower probability of not working, the marginal effects of all education variables higher than the omitted category are positive and significant. This observation reveals a waste of resources in the West African urban labour markets and raises questions about the effectiveness of education policies and the creation of productive labour opportunities in these economies.

The rest of the marginal effects in the non-working sector are consistent with conventional wisdom and our descriptive statistics. The age variable has a convex impact on allocation into not working, female workers are more likely to face idleness than male labourers and people whose fathers had consistent employment typically face a lower probability of not being employed themselves.

4.2. Earnings estimations

We now turn to the estimation of our earnings equations, after accounting for the self-selection of individuals into the four sectors. The BFG estimates for the formal sector for each of the seven capitals are reported in Table 6. The estimates for the informal self-employment sector are shown in Table 7, and the estimates for the informal salaried sector are reported in Table 8.

For each sector-based earnings estimation, a negative (positive) selectivity coefficient related to any of the alternative sectors indicates lower (higher) earnings than those of randomly chosen individuals on account of the allocation of individuals with better (worse) unobserved characteristics out of the given sector and into the respective alternative sector. For instance, if we observe a negative selectivity correction coefficient associated with self-employment in the formal sector equation, this indicates lower than randomly chosen rewards to the skills of individuals working for the formal sector due to the allocation of individuals with better unobserved characteristics out of the formal sector into self-employment.

The results reported in Table 6 highlight the fact that for Cotonou, Ouagadougou and Abidjan the selection coefficients associated with informal self-employment are positive and the selection coefficients associated with informal salaried employment are negative in the formal sector regressions. The same is true for the selection coefficients in the regression for Lomé, although only the selection coefficient associated with informal

self-employment is significant, while the selection coefficient associated with informal salaried employment is not significant. This indicates that in these countries workers with unobserved skills more suited to the formal sector allocated to the informal salaried sector, while workers with skills less suited to the formal sector allocated out of the formal sector into self-employment.

Moreover, in the regressions for Niamey and Dakar, the selection coefficients associated with not working are positive in the formal sector earnings regressions. In other words, workers with inferior unobserved skills allocated out of the formal sector into not working. Finally, in the regression for Dakar the selection coefficient associated with formal sector work is negative in the formal sector equation, indicating misallocation of resources into that sector. None of the selection coefficients are significant in the regression for Bamako.

In sum, the significance of the selectivity terms in the formal sector highlights the need to take adequately into account the impact of unobserved characteristics when estimating the returns to skills from different sectors in these economies. The selectivity pattern shows that while in the urban labour markets of countries like Niger and Senegal people with inferior unobserved characteristics drop out of the labour force, in Benin, Burkina Faso and Côte d'Ivoire there appears to be queuing for formal sector jobs and while people that would have performed better in formal employment tend to opt for informal salaried employment, the informal self-employment sector absorbs workers with unobserved skills less suited for the formal sector. The latter observation may well be associated with entrepreneurial skills which make those opting for self-employment unsuited for salaried jobs. But it can equally be indicative of development of the informal self-employment sector along the working poor or hidden unemployment outskirts of the economy.

The rest of the formal sector earnings estimates are consistent with conventional wisdom in that, in general, higher education leads to higher earnings. For all but two of the capitals the tertiary education coefficients are positive and highly significant, and the same is true for the coefficients of the remaining education variables. Finally, the selectivity corrected female dummy variables are not significant and age does not have a significant impact on earnings, except in the Bamako and Abidjan regressions where the

relationship between age and earnings is concave and, in the Ouagadougou case, where the impact of age is linear and positive.

As in the case of inter-sectoral allocation of labour, the results reported in Table 7 and Table 8 indicate a qualitatively different pattern of earnings determination in the informal sectors as opposed to the formal sector. In particular, with the exception of the earnings regressions for Burkina Faso, there is virtually no association between observed skills and in particular between education and earnings in the informal sector.

Once again, the selectivity coefficients are in general significant, but the selectivity patterns differ across the countries. In the case of self-employment, the majority of the selectivity coefficients are negative, indicating downward earnings bias in this sector or the allocation of individuals that would have been better suited into an alternative employment into the self-employment sector. For instance, the regressions for Ouagadougou and Bamako highlight the fact that people with inferior unobserved characteristics allocate out of non-employment and the formal sector into informal self-employment, while in Lomé people better suited for formal sector employment allocate into self-employment and people with unobserved characteristics unsuitable for self-employment opt for informal self-employment jobs. Finally, we observe that females face lower returns to skills in the informal self-employment sector than males and there is no clear and consistent association between age and earnings in the informal self-employment sector.

While, as mentioned earlier, the earnings pattern in the informal salaried sector is similar to that in the informal self-employment sector in that there is virtually no association between observed skills like education and performance in these sectors, there are slight differences in the selectivity patterns across these two sectors. The most interesting pattern is perhaps that associated with the allocation of individuals across the informal self-employed sector and the informal salaried sector. In particular, in the regressions for Abidjan and Niamey the positive selectivity coefficients associated with informal self-employment indicate that people with better unobserved skills allocate from informal self-employment into informal salaried employment. However, the opposite is true in the case of Lomé, where people with worse unobserved characteristics allocate out

of the formal sector, the informal self-employment sector and not working into the informal salaried sector.

Overall, our earnings estimates are consistent with the results highlighted by our selection equations. We see that the relatively small formal sector attracts people with better observed skills, in particular education, and provides high reward to these people compared to people with no education or low levels of education. Both the informal self-employment and salaried sectors, on the other hand, attract people with lower levels of education and provide no reward to people with higher level of observed skills. The selectivity patterns, on the other hand, are more consistent with the assumption of queuing for formal sector jobs and opting for informal sector jobs only when the formal sector preferences are not satisfied. Indeed, these selectivity patterns indicate that people with inferior unobserved characteristics, i.e. characteristics less suited for informal sector employment and self-employment allocate into these sectors out of formal employment and non-employment.

5. Concluding remarks

The development of high levels of human capital, and in particular, high levels of education has long been seen as a panacea for the developmental problems of lower income economies. This perception has found expression in policy making and has led to prolific body of academic literature on the quality of education and the success of individual programs in assuring high school enrollment levels. Significantly less attention has been attributed to the rentability of the education obtained, and in particular, the allocation and adequate use of observed and unobserved skills across formal, informal sectors and not working in the labour markets of these economies. The literature on allocation of resources across the different sectors of urban Sub-Saharan Africa has been particularly scarce.

The main purpose of this paper is to fill the gap of the literature and provide a comprehensive description of the link between allocation of resources and returns to skills across the Western Sub-Saharan African urban labour markets. Specifically, we relate the allocation of labour across the formal sector, informal self-employment sector,

informal salaried sector and not working to the returns to observed and unobserved characteristics in each of these sectors.

Our results contradict many of the observations from more developed economies and reveal a pattern of significant misuse of human capital in urban West Africa. Indeed, although allocation of resources into the relatively small formal sector in the West African capitals is consistent with conventional logic in that people with higher education allocate to that sector and receive high returns to the human capital supplied, the patterns of allocation of resources into the significantly larger informal sector and not working are not consistent with the assumption of efficient resource allocation. On the one hand, we observe that people with high levels of education allocate into not working. On the other hand, there is a negative selection into the informal sector, whereby people with inferior unobserved skills allocate out of the formal sector and not working into the informal sector.

This pattern is inconsistent with that observed in other low income parts of the world like Latin America, and makes the allocation of resources into the largest informal sector in urban West Africa more consistent with hidden unemployment than dynamic entrepreneurship. Overall, our results point to failures of the institutional framework of the Western Sub-Saharan African urban labour market, which appears to provide adequate returns to the current stock of accumulated skills only in the relatively small and increasingly declining formal sector. They raise important questions related to future policies in improving the productive use of human capital. A careful study of the determinants of low levels of returns to observed skills and entrepreneurship in the informal sectors as well as the apparent inability or unwillingness of informal workers to “formalise” their jobs would be an important first step in the right direction.

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Table 1a: Descriptive statistics

	Cotonou	Ouagadougou	Abidjan	Bamako	Niamey	Dakar	Lomé
Formal Sector							
Age	37.8(9.34)	37.09(9.32)	36.5(9.53)	38.3(9.55)	37.2(9.32)	38.1(10.4)	37.4(9.16)
Education_1	0.19(0.39)	0.20(0.40)	0.24(0.43)	0.14(0.34)	0.18(0.38)	0.17(0.38)	0.28(0.44)
Education_2	0.06(0.23)	0.08(0.27)	0.06(0.23)	0.25(0.43)	0.10(0.30)	0.04(0.20)	0.08(0.27)
Education_3	0.21(0.41)	0.25(0.43)	0.15(0.35)	0.07(0.26)	0.12(0.32)	0.19(0.39)	0.22(0.42)
Education_4	0.08(0.28)	0.06(0.23)	0.07(0.25)	0.02(0.14)	0.05(0.23)	0.09(0.29)	0.08(0.27)
Education_5	0.31(0.46)	0.21(0.41)	0.26(0.44)	0.22(0.42)	0.26(0.44)	0.19(0.39)	0.18(0.39)
Female	0.27(0.44)	0.29(0.45)	0.22(0.42)	0.21(0.40)	0.26(0.44)	0.26(0.44)	0.21(0.41)
Dad formal	0.43(0.50)	0.36(0.48)	0.35(0.48)	0.37(0.48)	0.31(0.46)	0.42(0.49)	0.38(0.48)
Dad informal	0.33(0.47)	0.38(0.49)	0.51(0.50)	0.41(0.49)	0.41(0.49)	0.28(0.45)	0.43(0.50)
Ln Earnings	4.19(0.76)	4.34(0.84)	4.66(0.89)	4.23(0.89)	4.25(0.87)	4.52(0.86)	4.00(0.89)
N Obs	969	1029	1193	950	1122	1563	573
Informal Self-employed Sector							
Age	35.2(10.8)	35.3(11.1)	33.8(10.4)	34.1(11.3)	36.9(11.9)	36.5(11.7)	33.3(10.2)
Education_1	0.23(0.42)	0.16(0.37)	0.18(0.38)	0.15(0.36)	0.12(0.32)	0.14(0.35)	0.30(0.46)
Education_2	0.02(0.13)	0.01(0.11)	0.02(0.13)	0.03(0.17)	0.01(0.09)	0.01(0.08)	0.01(0.12)
Education_3	0.08(0.12)	0.03(0.16)	0.04(0.20)	0.03(0.17)	0.02(0.15)	0.05(0.22)	0.09(0.29)
Education_4	0.01(0.11)	0.01(0.07)	0.02(0.13)	0.01(0.08)	0.01(0.09)	0.02(0.13)	0.01(0.11)
Education_5	0.02(0.13)	0.01(0.10)	0.02(0.15)	0.01(0.11)	0.01(0.12)	0.01(0.11)	0.02(0.14)
Female	0.61(0.49)	0.53(0.50)	0.58(0.49)	0.54(0.50)	0.47(0.50)	0.52(0.50)	0.63(0.48)
Dad formal	0.25(0.43)	0.16(0.37)	0.21(0.41)	0.19(0.39)	0.15(0.36)	0.28(0.45)	0.27(0.45)
Dad informal	0.50(0.50)	0.61(0.49)	0.60(0.49)	0.58(0.49)	0.60(0.49)	0.43(0.49)	0.53(0.50)
Ln Earnings	3.19(0.90)	2.89(1.01)	3.14(0.89)	3.23(1.02)	3.15(0.99)	3.52(0.92)	2.77(0.94)
N Obs	2859	2237	2089	2489	1783	2570	2614

Note: the figures in brackets are standard deviations. Education_1 includes people with complete primary school or incomplete middle school education. Education_2 counts individuals with secondary vocational training. Education_3 includes people with complete middle school and incomplete secondary education. Education_4 includes individuals with complete secondary education and Education_5 includes people with education higher than the secondary level.

Table 1b: Descriptive statistics

	Cotonou	Ouagadougou	Abidjan	Bamako	Niamey	Dakar	Lomé
Informal Salaried Sector							
Age	27.6(9.25)	27.0(10.0)	27.1(0.41)	25.5(9.10)	30.11(11.07)	26.10(9.52)	27.9(9.85)
Education_1	0.26(0.44)	0.25(0.43)	0.21(0.41)	0.16(0.37)	0.16(0.37)	0.13(0.33)	0.33(0.47)
Education_2	0.01(0.11)	0.02(0.14)	0.01(0.10)	0.04(0.19)	0.01(0.11)	0.01(0.07)	0.02(0.13)
Education_3	0.09(0.28)	0.08(0.27)	0.05(0.21)	0.04(0.20)	0.02(0.15)	0.04(0.20)	0.14(0.34)
Education_4	0.02(0.13)	0.02(0.12)	0.01(0.10)	0.01(0.09)	0.01(0.10)	0.01(0.10)	0.03(0.16)
Education_5	0.04(0.19)	0.03(0.16)	0.02(0.15)	0.03(0.17)	0.04(0.20)	0.01(0.12)	0.03(0.18)
Female	0.39(0.49)	0.28(0.45)	0.43(0.50)	0.38(0.49)	0.23(0.42)	0.46(0.50)	0.39(0.49)
Dad formal	0.28(0.45)	0.24(0.43)	0.25(0.43)	0.21(0.40)	0.21(0.40)	0.28(0.45)	0.25(0.43)
Dad informal	0.44(0.50)	0.50(0.50)	0.55(0.50)	0.58(0.49)	0.54(0.50)	0.40(0.49)	0.50(0.50)
Ln earnings	3.09(0.74)	2.97(0.91)	3.27(0.50)	2.83(0.99)	3.04(0.92)	3.15(0.82)	2.75(0.87)
N Obs	499	908	995	592	651	1271	626
Not working Sector							
Age	26.2(12.9)	26.6(11.9)	25.9(11.1)	27.5(12.5)	27.22(11.8)	28.4(12.8)	26.7(12.4)
Education_1	0.34(0.48)	0.31(0.45)	0.31(0.46)	0.25(0.43)	0.24(0.43)	0.22(0.42)	0.35(0.48)
Education_2	0.04(0.19)	0.02(0.15)	0.02(0.16)	0.05(0.23)	0.02(0.13)	0.01(0.10)	0.02(0.14)
Education_3	0.20(0.40)	0.15(0.36)	0.13(0.34)	0.14(0.34)	0.09(0.29)	0.14(0.35)	0.21(0.41)
Education_4	0.07(0.26)	0.04(0.19)	0.07(0.25)	0.04(0.20)	0.03(0.17)	0.04(0.21)	0.05(0.22)
Education_5	0.08(0.27)	0.03(0.16)	0.09(0.28)	0.03(0.18)	0.03(0.18)	0.04(0.20)	0.06(0.24)
Female	0.52(0.50)	0.60(0.49)	0.58(0.49)	0.61(0.49)	0.66(0.47)	0.65(0.48)	0.52(0.50)
Dad formal	0.41(0.49)	0.30(0.46)	0.43(0.50)	0.28(0.45)	0.27(0.45)	0.37(0.48)	0.40(0.49)
Dad informal	0.37(0.48)	0.41(0.49)	0.37(0.48)	0.40(0.49)	0.44(0.50)	0.26(0.44)	0.34(0.47)
N Obs	2311	3554	2719	3054	4156	5878	1814

Note: the figures in brackets are standard deviations.

Table 2: Determinants of the allocation of people to the formal sector (Marginal effects from multinomial probit model on sectoral choice)

	Cotonou (Benin)	Ouagadougou (Burkina Faso)	Abidjan (Côte d'Ivoire)	Bamako (Mali)	Niamey (Niger)	Dakar (Senegal)	Lomé (Togo)
Age	0.0372*** (0.0135)	0.0339*** (0.0017)	0.0399*** (0.0024)	0.0260*** (0.0017)	0.0336*** (0.0018)	0.0302*** (0.0014)	0.0241*** (0.0020)
Age²	-0.0004*** (0.0003)	-0.0004*** (0.0002)	-0.0005*** (0.0001)	-0.0003*** (0.0001)	-0.0004*** (0.0001)	-0.0003*** (0.0002)	-0.0026*** (0.0003)
Education_1	0.0748*** (0.0135)	0.1163*** (0.0129)	0.0885*** (0.0133)	0.0298*** (0.0101)	0.0955*** (0.0131)	0.0496*** (0.0095)	0.0495*** (0.0114)
Education_2	0.2328*** (0.0412)	0.3310*** (0.0397)	0.1616*** (0.0352)	0.2831*** (0.0245)	0.4168*** (0.0387)	0.2763*** (0.0416)	0.2404*** (0.0445)
Education_3	0.1628*** (0.0199)	0.2723*** (0.0207)	0.1281*** (0.0204)	0.0584*** (0.0176)	0.1949*** (0.0233)	0.1210*** (0.0131)	0.1095*** (0.0178)
Education_4	0.1747*** (0.0320)	0.1946*** (0.0338)	0.1138*** (0.0274)	0.0094 (0.0226)	0.1676*** (0.0335)	0.1430*** (0.0210)	0.1626*** (0.0352)
Education_5	0.3166*** (0.0275)	0.4239*** (0.0317)	0.2479*** (0.0230)	0.2920*** (0.0293)	0.3452*** (0.0265)	0.2465*** (0.0215)	0.2138*** (0.0306)
Female	-0.0889*** (0.0086)	-0.0622*** (0.0063)	-0.1386*** (0.0088)	-0.1152*** (0.0076)	-0.1130*** (0.0075)	-0.1245*** (0.0064)	-0.0858*** (0.0083)
Father formal	0.0187* (0.0109)	0.0072 (0.0085)	0.0531*** (0.0142)	0.0718*** (0.0121)	0.0194* (0.0102)	0.0353*** (0.0075)	0.0140 (0.0105)
Father informal	-0.0058 (0.0104)	-0.0101 (0.0074)	0.0289** (0.0121)	0.0384*** (0.0085)	-0.0074 (0.0081)	0.0177** (0.0076)	0.0037 (0.0096)

Note: ***, ** and * indicate significance at the 1%, 5% and 10% level. The figures in brackets are standard errors. The sample sizes for the different country-based multinomial probit models can be inferred from Table 1. The Wald and Log-likelihood tests indicate that the model specifications are appropriate.

Table 3: Determinants of the allocation of individuals to the informal self-employment sector (Marginal effects from multinomial probit model on sectoral choice)

	Cotonou (Benin)	Ouagadougou (Burkina Faso)	Abidjan (Côte d’Ivoire)	Bamako (Mali)	Niamey (Niger)	Dakar (Senegal)	Lomé (Togo)
Age	0.0939*** (0.0161)	0.0576*** (0.0027)	0.0599*** (0.0032)	0.0546*** (0.0029)	0.0378*** (0.0024)	0.0444*** (0.0020)	0.0792*** (0.0036)
Age²	-0.0011*** (0.0001)	-0.0007*** (0.0001)	-0.0007** (0.0001)	-0.0007*** (0.0001)	-0.0004*** (0.0001)	-0.0005*** (0.0003)	-0.0099*** (0.0005)
Education_1	-0.2036*** (0.0161)	-0.1399*** (0.0125)	-0.1735*** (0.0127)	-0.1268*** (0.0153)	-0.1146*** (0.0116)	-0.0929*** (0.0095)	-0.1308*** (0.0171)
Education_2	-0.3398*** (0.0235)	-0.2305*** (0.0150)	-0.2280*** (0.0178)	-0.2879*** (0.0146)	-0.1974*** (0.0118)	-0.1608*** (0.0168)	-0.3284*** (0.0320)
Education_3	-0.3579*** (0.0151)	-0.2813*** (0.0094)	-0.2509*** (0.0123)	-0.2727*** (0.0162)	-0.1925*** (0.0108)	-0.1727*** (0.0083)	-0.2786*** (0.0193)
Education_4	-0.4188*** (0.0141)	-0.2756*** (0.0093)	-0.2585*** (0.0134)	-0.3118*** (0.0193)	-0.1917*** (0.0131)	-0.1790*** (0.0097)	-0.3865*** (0.0232)
Education_5	-0.4721*** (0.0101)	-0.2739*** (0.0091)	-0.3054*** (0.0093)	-0.3353*** (0.0131)	-0.2204*** (0.0082)	-0.2080*** (0.0070)	-0.3926*** (0.0196)
Female	0.0511*** (0.0146)	-0.0107 (0.0113)	0.0612*** (0.0123)	-0.0109 (0.0127)	-0.0834*** (0.0103)	-0.0662*** (0.0085)	0.1402*** (0.0151)
Father formal	-0.0399** (0.0192)	0.0124 (0.0173)	-0.0409** (0.0180)	0.0440** (0.0187)	0.0222 (0.0163)	0.0257** (0.0108)	0.0286 (0.0203)
Father informal	0.0314* (0.0179)	0.0672*** (0.0137)	0.0178 (0.0163)	0.1111*** (0.0151)	0.0618*** (0.0124)	0.0855*** (0.0109)	0.0810*** (0.0188)

Note: ***, ** and * indicate significance at the 1%, 5% and 10% level. The figures in brackets are standard errors. The sample sizes for the different country-based multinomial probit models can be inferred from Table 1. The Wald and Log-likelihood tests indicate that the model specifications are appropriate.

Table 4: Determinants of the allocation of individuals to the informal salaried sector (Marginal effects from multinomial probit model on sectoral choice)

	Cotonou (Benin)	Ouagadougou (Burkina Faso)	Abidjan (Côte d’Ivoire)	Bamako (Mali)	Niamey (Niger)	Dakar (Senegal)	Lomé (Togo)
Age	-0.0013 (0.0021)	-0.0035* (0.0021)	-0.0030 (0.0025)	-0.0092*** (0.0017)	0.0058*** (0.0001)	-0.0008 (0.0016)	-0.0060** (0.0024)
Age²	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)	0.00001*** (0.0001)	-0.0001*** (0.0001)	-0.0001** (0.0001)	0.0003** (0.0024)
Education_1	-0.0465*** (0.0078)	-0.0567*** (0.0088)	-0.0883*** (0.0092)	-0.0527*** (0.0070)	-0.0449*** (0.0069)	-0.0772*** (0.0059)	-0.0284*** (0.0106)
Education_2	-0.0776*** (0.0081)	-0.0559*** (0.0186)	-0.1172*** (0.0143)	-0.0433*** (0.0104)	-0.0554*** (0.0116)	-0.0782*** (0.0146)	-0.0411 (0.0259)
Education_3	-0.0715*** (0.0069)	-0.0964*** (0.0077)	-0.1325*** (0.0084)	-0.0740*** (0.0061)	-0.0783*** (0.0057)	-0.0983*** (0.0055)	-0.0527*** (0.0114)
Education_4	-0.0842*** (0.0060)	-0.1038*** (0.0096)	-0.1482*** (0.0077)	-0.0754*** (0.0071)	-0.0751*** (0.0066)	-0.1005*** (0.0058)	-0.0722*** (0.0156)
Education_5	-0.0785*** (0.0062)	-0.0803*** (0.0119)	-0.1503*** (0.0072)	-0.0350*** (0.0128)	-0.0548*** (0.0078)	-0.0920*** (0.0067)	-0.0767*** (0.0132)
Female	-0.0674*** (0.0083)	-0.1479*** (0.0086)	-0.0883*** (0.0096)	-0.0829*** (0.0075)	-0.1320*** (0.0075)	-0.0679*** (0.0065)	-0.0911*** (0.0101)
Father formal	-0.0145 (0.0102)	0.0016 (0.0121)	-0.0342** (0.0134)	0.0104 (0.0111)	0.0042 (0.0102)	-0.0175** (0.0077)	-0.0395*** (0.0121)
Father informal	-0.0141 (0.0096)	0.0204** (0.0102)	0.0063 (0.0125)	0.0271*** (0.0089)	0.0123 (0.0081)	0.0269*** (0.0080)	0.0035 (0.0118)

Note: ***, ** and * indicate significance at the 1%, 5% and 10% level. The figures in brackets are standard errors. The sample sizes for the different country-based multinomial probit models can be inferred from Table 1. The Wald and Log-likelihood tests indicate that the model specifications are appropriate.

Table 5: Determinants of the allocation of individuals to not working (Marginal effects from multinomial probit model on sectoral choice)

	Cotonou (Benin)	Ouagadougou (Burkina Faso)	Abidjan (Côte d’Ivoire)	Bamako (Mali)	Niamey (Niger)	Dakar (Senegal)	Lomé (Togo)
Age	-0.1299*** (0.0034)	-0.0880*** (0.0030)	-0.0969*** (0.0172)	-0.0714*** (0.0030)	-0.0772*** (0.0029)	-0.0737*** (0.0024)	-0.0973*** (0.0033)
Age²	0.0016*** (0.0001)	0.0011*** (0.0001)	0.0012*** (0.0001)	0.0009*** (0.0001)	0.0009 (0.0001)	0.0009*** (0.0001)	0.0124*** (0.0005)
Education_1	0.1753*** (0.0187)	0.0804*** (0.0168)	0.1733*** (0.0172)	0.1497*** (0.0176)	0.0638*** (0.0169)	0.1204*** (0.0131)	0.1097*** (0.0176)
Education_2	0.1845*** (0.0236)	-0.0446 (0.0408)	0.1836*** (0.0403)	0.0480* (0.0271)	-0.1640*** (0.0397)	-0.0373 (0.0441)	0.1291** (0.0518)
Education_3	0.2666*** (0.0236)	0.1053*** (0.0219)	0.2552*** (0.0236)	0.2882*** (0.0230)	0.0787*** (0.0251)	0.1501*** (0.0155)	0.2218*** (0.0235)
Education_4	0.3284*** (0.0347)	0.1874*** (0.0352)	0.2928*** (0.0304)	0.3778*** (0.0301)	0.0993*** (0.0358)	0.1365*** (0.0233)	0.2961*** (0.0405)
Education_5	0.2340*** (0.0294)	-0.0697** (0.0327)	0.2078*** (0.0249)	0.0783** (0.0323)	-0.0699** (0.0281)	0.0535** (0.0230)	0.2555*** (0.0352)
Female	0.1052*** (0.0146)	0.2209*** (0.0125)	0.1658*** (0.0135)	0.2090*** (0.0131)	0.3283*** (0.0118)	0.2585*** (0.0099)	0.0367** (0.0143)
Father formal	0.0357* (0.0190)	-0.0212 (0.0181)	0.0220 (0.0195)	-0.1262*** (0.0179)	-0.0457** (0.0183)	-0.0435*** (0.0125)	-0.0032 (0.0184)
Father informal	-0.0114 (0.0179)	-0.0775*** (0.0153)	-0.0529*** (0.0180)	-0.1766*** (0.0154)	-0.0667*** (0.0148)	-0.1301*** (0.0125)	-0.0883*** (0.0173)

Note: ***, ** and * indicate significance at the 1%, 5% and 10% level. The figures in brackets are standard errors. The sample sizes for the different country-based multinomial probit models can be inferred from Table 1. The Wald and Log-likelihood tests indicate that the model specifications are appropriate.

Table 6: Earnings equation estimates for the formal sector

	Cotonou (Benin)	Ouagadougou (Burkina Faso)	Abidjan (Côte d'Ivoire)	Bamako (Mali)	Niamey (Niger)	Dakar (Senegal)	Lomé (Togo)
Constant	1.5220 (2.1999)	-0.3765 (2.6672)	-1.9819 (1.7443)	0.6493 (1.0691)	1.7144 (1.8418)	4.8400*** (1.4362)	5.4155 (4.3105)
Age	0.0913 (0.0953)	0.1887* (0.1105)	0.2797*** (0.0836)	0.1533*** (0.0478)	0.0842 (0.0721)	-0.0033 (0.0565)	0.0077 (0.1742)
Age²	-0.0007 (0.0011)	-0.0019 (0.0013)	-0.0029*** (0.0010)	-0.0015*** (0.0006)	-0.0006 (0.0008)	0.0003 (0.0007)	0.0002 (0.0020)
Education_1	0.1730 (0.1671)	0.4714* (0.2448)	0.1140 (0.1954)	0.0378 (0.1607)	0.4371*** (0.1504)	0.0262 (0.1028)	-0.3353 (0.3601)
Education_2	0.6371** (0.3108)	0.7507* (0.4119)	0.3578 (0.3125)	0.1548 (0.3779)	0.7412** (0.3365)	0.0557 (0.2455)	-0.8967 (0.9147)
Education_3	0.3856 (0.2813)	0.6753 (0.4656)	0.3709 (0.2932)	0.1783 (0.3099)	0.7217*** (0.2572)	0.1318 (0.1732)	-0.4354 (0.6690)
Education_4	0.6397* (0.3402)	0.9873** (0.4922)	0.5955* (0.3523)	0.1511 (0.3316)	1.0725*** (0.2614)	0.2605 (0.2214)	-0.5328 (0.9251)
Education_5	0.7850** (0.3756)	1.2075** (0.4791)	0.9728*** (0.3688)	0.5856 (0.4184)	1.1588*** (0.3094)	0.4724* (0.2790)	-0.2001 (0.9557)
Female	0.0666 (0.1045)	-0.0224 (0.1643)	-0.1527 (0.1616)	-0.2106 (0.1382)	0.0900 (0.2303)	0.1659 (0.1764)	1.1016** (0.4527)
BFG formal sector	0.0574 (0.2491)	0.1039 (0.3160)	0.2551 (0.2691)	-0.0905 (0.2535)	0.1590 (0.2693)	-0.4975** (0.2427)	-0.9961 (0.7534)
BFG informal self-employed	0.9921** (0.2490)	1.3718* (0.7277)	1.9805*** (0.6728)	0.4942 (0.6161)	0.8056 (0.5286)	0.5099 (0.4974)	2.4854* (1.4170)
BFG informal salaried	-2.1154** (1.0326)	-1.8778*** (0.7199)	-1.9406*** (0.6026)	-0.4321 (1.1313)	-0.8044 (0.5831)	-0.4566 (0.5547)	-3.2889 (2.3148)
BFG not working	0.2222 (0.5779)	0.4081 (0.7437)	-0.8309 (0.5957)	-0.4666 (0.5080)	0.9146* (0.5561)	0.7216* (1.4362)	0.7338 (0.9414)
Adj Rsq	0.3647	0.5526	0.5174	0.3453	0.4888	0.4035	0.3841

Note: ***, ** and * indicate significance at the 1%, 5% and 10% level. The figures in brackets are bootstrapped standard errors.

Table 7: Earnings equation estimates for the informal self-employment sector

	Cotonou (Benin)	Ouagadougou (Burkina Faso)	Abidjan (Côte d'Ivoire)	Bamako (Mali)	Niamey (Niger)	Dakar (Senegal)	Lomé (Togo)
Constant	2.6615* (1.6207)	1.6360 (1.1987)	-2.0270 (2.5769)	2.5798*** (0.8468)	0.7793 (1.4606)	1.3109* (0.7754)	2.7767** (1.3122)
Age	0.0381 (0.0691)	0.0765 (0.0508)	0.1824* (0.1044)	0.0278 (0.0308)	0.0900 (0.0597)	0.1113*** (0.0323)	-0.0134 (0.0551)
Age²	-0.0004 (0.0008)	-0.0009 (0.0006)	-0.0018 (0.0012)	-0.0003 (0.0003)	-0.0008 (0.0007)	-0.0012*** (0.0003)	0.0003 (0.0007)
Education_1	0.1300 (0.1292)	0.0958 (0.0953)	0.0501 (0.2075)	-0.0287 (0.0904)	0.0500 (0.1107)	0.1416** (0.0640)	0.0614 (0.0758)
Education_2	0.0383 (0.2901)	0.5738* (0.2930)	-0.0605 (0.3252)	-0.0373 (0.2245)	-0.1159 (0.3831)	0.0614 (0.3078)	0.1863 (0.2443)
Education_3	0.1811 (0.2215)	0.2452 (0.2393)	0.1488 (0.3434)	-0.1513 (0.1702)	-0.1070 (0.2765)	-0.0349 (0.1440)	0.2233 (0.1627)
Education_4	0.1543 (0.3387)	0.4188 (0.5036)	0.1072 (0.3865)	-0.3616 (0.3014)	-0.4933* (0.2843)	0.2107 (0.1449)	0.2018 (0.2848)
Education_5	0.3011 (0.4158)	1.2135*** (0.3786)	-0.1354 (0.4844)	0.0376 (0.3008)	-0.1766 (0.3523)	0.0487 (0.2584)	0.5490* (0.2998)
Female	-0.6466*** (0.1134)	-1.1063*** (0.1503)	-0.1206 (0.1412)	-0.8345*** (0.1095)	-0.9065*** (0.2478)	-0.8148*** (0.0926)	-0.4199*** (0.1400)
BFG formal sector	-0.3118 (0.5657)	-1.1081* (0.5795)	-0.7430 (0.5831)	-2.0691*** (0.6188)	-0.2985 (0.6684)	0.3108 (0.6008)	-1.9706*** (0.4345)
BFG informal self-employed	0.3433 (0.3177)	-0.1398 (0.3251)	0.8287* (0.4512)	-0.2711 (0.3381)	0.5250 (0.3470)	0.5265** (0.2269)	-0.4694* (0.2844)
BFG informal salaried	0.3434 (0.9112)	0.6243 (0.7494)	-3.4239*** (0.8118)	0.2267 (0.8298)	-0.3719 (0.9508)	-0.3059 (0.5419)	-0.9684 (0.7980)
BFG not working	0.5664 (0.7532)	-0.9763** (0.4760)	-0.2191 (0.8463)	-1.0067* (0.5512)	-0.1865 (0.5218)	0.3953 (0.4231)	-0.0957 (0.5507)
Adj Rsq	0.2537	0.3422	0.2249	0.2970	0.2723	0.2246	0.2297

Note: ***, ** and * indicate significance at the 1%, 5% and 10% level. The figures in brackets are bootstrapped standard errors.

Table 8: Earnings equation estimates for the informal salaried sector

	Cotonou (Benin)	Ouagadougou (Burkina Faso)	Abidjan (Côte d'Ivoire)	Bamako (Mali)	Niamey (Niger)	Dakar (Senegal)	Lomé (Togo)
Constant	0.6427 (1.7072)	1.6648** (0.7597)	0.3651 (1.0357)	0.5080 (0.8100)	3.9892** (1.6679)	1.5936*** (0.5622)	-0.0092 (1.6192)
Age	0.1914** (0.0938)	0.1461*** (0.0469)	0.0041 (0.1668)	0.0675 (0.1022)	0.2034** (0.0800)	0.1281*** (0.0361)	0.0228 (0.1081)
Age²	-0.0021* (0.0011)	-0.0015*** (0.0005)	0.3744 (0.3735)	-0.0007 (0.0011)	-0.0018* (0.0010)	-0.0015*** (0.0004)	-0.0003 (0.0013)
Education_1	0.1852 (0.1952)	0.4017*** (0.1181)	0.0041 (0.1668)	-0.0826 (0.2019)	0.1661 (0.2047)	-0.0041 (0.1159)	0.0768 (0.1585)
Education_2	0.5982 (0.3888)	0.6633*** (0.1999)	0.3744 (0.3734)	0.7334* (0.4577)	0.1370 (0.4757)	-0.2987 (0.3010)	0.3667 (0.4629)
Education_3	0.4078 (0.3417)	0.7616*** (0.2215)	0.0372 (0.2421)	0.2881 (0.3422)	0.3526 (0.5427)	-0.1605 (0.2024)	0.3607 (0.2705)
Education_4	0.8052 (0.5599)	1.1176*** (0.2948)	0.3608 (0.3341)	0.3240 (0.3640)	0.4474 (0.7174)	0.3126 (0.2644)	0.4682 (0.4259)
Education_5	0.6130 (0.4472)	1.2933*** (0.2199)	0.2060 (0.4531)	0.8991* (0.5429)	0.5248 (0.3937)	0.5849 (0.3676)	0.6052 (0.4668)
Female	-0.1567 (0.2122)	0.0982 (0.2521)	-0.2721* (0.1597)	-0.5720** (0.2604)	0.5638 (0.5134)	-0.3611*** (0.1207)	-0.3044 (0.2433)
BFG formal sector	0.3775 (0.8692)	-0.1222 (0.5873)	1.1448 (0.7168)	-0.7007 (1.1586)	1.0806 (1.2099)	-0.0462 (0.7067)	-2.6484*** (0.6722)
BFG informal self-employed	1.0297 (1.4613)	1.1449 (0.8702)	2.9825** (1.3412)	-1.3867 (1.7549)	5.6692*** (1.6252)	1.2099 (0.9561)	-2.5223** (1.2450)
BFG informal salaried	-0.5039 (0.4033)	-0.5608* (0.3225)	-0.4450 (0.2885)	0.1406 (0.5966)	-1.5990*** (0.5733)	0.2078 (0.2700)	0.0881 (0.4537)
BFG not working	-0.4130 (1.1977)	1.1224* (0.6353)	0.0407 (0.7244)	-0.8284 (0.9078)	2.0389** (0.8477)	0.7611 (0.6603)	-1.6031* (0.9991)
Adj Rsq	0.3722	0.5271	0.3762	0.4248	0.4454	0.3039	0.3604

Note: ***, ** and * indicate significance at the 1%, 5% and 10% level. The figures in brackets are bootstrapped standard errors.

Appendix

Table A1: Test of appropriateness of the excluding conditions in the BFG estimations

Cotonou	Ouagadougou	Abidjan	Bamako	Niamey	Dakar	Lomé
Test of joint significance of fathformal and fathinformal in the multinomial probit equation						
Chi2(6)=23.53 Prob>Chi2=0.0000	Chi2(6)=48.41 Prob>Chi2=0.0006	Chi2(6)=48.41 Prob>Chi2=0.0000	Chi2(6)=158.50 Prob>Chi2=0.0000	Chi2(6)=39.51 Prob>Chi2=0.0000	Chi2(6)=151.00 Prob>Chi2=0.0000	Chi2(6)=53.24 Prob>Chi2=0.0000
Test of joint significance of fathformal and fathinformal in the wage equations						
Formal sector						
Chi2(2)=1.51 Prob>Chi2=0.4697	Chi2(2)=0.80 Prob>Chi2=0.6712	Chi2(2)=4.27 Prob>Chi2=0.1185	Chi2(2)=4.68 Prob>Chi2=0.0961	Chi2(2)=0.90 Prob>Chi2=0.6361	Chi2(2)=1.49 Prob>Chi2=0.4750	Chi2(2)=4.23 Prob>Chi2=0.0.1206
Informal self-employment sector						
Chi2(2)=1.31 Prob>Chi2=0.5198	Chi2(2)= 3.69 Prob>Chi2=0.0252	Chi2(2)=4.12 Prob>Chi2=0.1277	Chi2(2)=1.68 Prob>Chi2=0.4322	Chi2(2)=1.86 Prob>Chi2=0.6505	Chi2(2)=2.95 Prob>Chi2=0.2292	Chi2(2)=2.13 Prob>Chi2=0.3452
Informal salaried sector						
Chi2(2)=1.81 Prob>Chi2=0.4045	Chi2(2)=1.70 Prob>Chi2=0.7040	Chi2(2)=0.08 Prob>Chi2=0.9582	Chi2(2)=0.44 Prob>Chi2=0.8040	Chi2(2)=1.94 Prob>Chi2=0.3800	Chi2(2)=0.77 Prob>Chi2=0.6798	Chi2(2)=1.08 Prob>Chi2=0.5839