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Full Length Research Paper

The effects of educational attainment on employment outcomes in Kenya

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Employment outcomes in developing countries are likely to have significant distributional implications. This paper investigates the extent to which education influences the structure of employment and earnings in rural and urban Kenya for men and women, using data from a nationally representative household survey. Kenya is an interesting case to take given persistent policy focus on rapid expansion of education since independence in 1963. We estimate multinomial logit models with a broader range of employment types, and earnings functions with correction for sample-selectivity bias. It is observed that men and women access to informal and agricultural employment requires relatively low levels of education. In contrast, higher levels of education are the avenue to formal employment and higher annual earnings. Existing education policies seem to mainly focus on improving access to primary education. However, for individuals to access employment opportunities with higher earnings requires more than primary education.

Key words: Earnings, employment, selection models, Kenya.

INTRODUCTION

Wide and growing disparities in access to income generating activities, has become an important issue for developing countries, because of the potential adverse effects on both sustainable economic growth and poverty reduction. Although it is widely acknowledged that educational attainment has the potential to equalize the distribution of employment and earnings, empirical evidence has mainly focused on monetary return to educational attainment. Psacharopoulos and Patrinos (2002) provide a recent update. Relatively less evidence is available on the role of educational attainment in influencing entry into employment.

This study investigates the relationship between em-ployment, earnings and educational attainment in Kenya. Since independence in 1963, Kenya has em-braced investment in education as a key component of her development strategy. Persistent public policy focus on education is linked to its potential to increase labor earnings and reduce poverty. Although there is evidence that employment type matters for poverty status in Kenya (Oiro et al., 2004), the role of individual and household characteristics in influencing entry into employment requires further research. Previous studies on this topic for Kenya (Bigsten, 1984; Knight and Sabot, 1990; Appleton et al., 1999; Kabubo-Mariara, 2002), consider a narrow range of employment options. In particular, unpaid family workers, and agricultural employment are rarely included in these models. A large number of Kenyan workers are allocated to the two types of employment. For example in 1998 to 1999, 39.6% of employed persons aged 15 to 64 years were unpaid family workers (Republic of Kenya, 2003).

The primary motivation for this study is to fill the existing gap by estimating models incorporating the broader array of employment types found in Kenya (wage employment, informal sector employment, agricultural employment, unpaid family work). This broader perspective is important to provide policy makers with a comprehensive view of the potential role of education in labor allocation. In developing countries like Kenya where wage employment is a relatively small, share of total employment focusing on earnings benefits of education in wage employment misses a large segment of the working age population in non wage employment.

The questions addressed are: To what extent does education facilitate entry into various employment types? To what extent is education associated with higher earnings within labour subsectors? Education may improve

individual's access to high paying employment and conditional on entry; education may raise labor earnings. To answer the two questions, multinomial logit models of employment entry and earnings functions are estimated. The wage premium to education is estimated by sectors (private wage, public wage, informal) and for different levels of education. In estimating the wage premium to education, the paper also attempts to correct for potential selectivity biases associated with labour allocation in different labour subsectors.

EMPLOYMENT ALLOCATION AND EARNINGS DIFFERENCES

Because the outcome variable is categorical but unordered, the multinomial logit model was estimated to determine the individual and household characteristics that influence entry to various employment types. The form of the multinomial logit (Long, 1997) is

$$\Pr ob(y_i = m) = p_{im} = \frac{e^{\beta_m' x_i}}{\sum_{j=1}^{J} e^{\beta_j' x_i}}, i = 1,\ldots N; m = 1,\ldots J \quad (1)$$

where *i* is index individuals, *j* and *m,* index employment type, *N*, sample size, x_i, a vector of individual and household characteristics. The probability of individual *i* being in employment type *m* is P_{im}. An important and restrictive property of multinomial logit model is the Independence of Irrelevant Alternatives (IIA) assumption. This states that the odds of being in employment type *m* over employment type *n* are independent of all other employment types, and of the number of employment types in the set. This restriction was tested for in this paper.

The response variable with *k* categories in multinomial logit model would generate a system of k binary logit equations to derive probabilities for each category. However, such a system is not identified, that is, more than one solution to the coefficients that lead to the same probabilities can be obtained. To identify the system, one of the coefficients is set to 0 and is the base category. This leaves *k-1* equations. Each of the *k-1* equations is a binary logistic regression comparing each category with the base category. The *k-1* logits are estimated simultaneously. The model tests all possible combinations among the *k* categories but only displays coefficients for the *k-1* comparisons.

Consequently, the multinomial logit model requires care in interpretation (Borooah, 2001; Greene, 1997; Long, 1997). First, it is a non-linear model. Second, the coefficient on the *kth*-determining variable for outcome *j* indicates how the variable affects the odds ratio; probability of being in employment *j* relative to normalized outcome. A positive coefficient would indicate that when the variable increases, the probability of outcome *j* relative to the base category increases.

The marginal effects give an indication of partial changes in probability from change in a regressor. For a continuous variable x_k, the partial change is

$$\frac{\partial \Pr(y = m \mid x)}{\partial x_k} = P(y = m \mid x)\left[\beta_{km} - \sum_{j=1}^{J} \beta_{kj} \Pr(y = j \mid x)\right] \quad (2)$$

For dummy variable switch from x_s to x_e, the difference in predicted probability is

$$\Delta \Pr(y = m \mid x) = \Pr(y = m \mid x, x_k = x_e) - \Pr(y = m \mid x, x_k = x_s) \quad (3)$$

Earnings differences can be modeled using ordinary least squares regression. However, there is potential for unobserved factors to affect both employment entry and earnings. This introduces correlation between the random errors in the earnings function and in the employment entry model. Following Lee (1983) and Lee and Trost (1984) inverse mills' ratio (IMR) is computed from the multinomial logit estimates and included in the earnings equation as an additional regressor. The modified earnings equation is

$$\ln w_{ij} = \alpha_{0j} + \sum \alpha_k s_{ik} + \alpha_{2j}' X_i + \theta_{ij} \lambda_{ij} + u_{ij}, j = 1,2,\ldots M; u_i \sim N(0, \sigma^2) \quad (4)$$

where w_{ij} is earnings of individual *i* in sector *j*, with s_{ik} the education level, X_i a vector of regressors; $\lambda_j = \phi(H_j)/\Phi(H)$ is IMR, where $H_j = \Phi^{-1}(P_j)$, ϕ the standard normal density, Φ the normal cumulative distribution function and u_{ij} is a random variable. The coefficient on λ_j is the covariance between the errors in the earnings and employment equations.

DATA DESCRIPTION

The data are drawn from a nationally representative household survey conducted by the Central Bureau of Statistics (CBS) in the third quarter of 1994. This is still the most comprehensive household survey available. It contains a wide range of variables for 59,183 individuals in 10, 857 households. The analytic sample was constructed using the following criteria: (1) individuals 15 to 65 years (2) not full-time students (3) having complete record on variables needed for the analysis. The selection criteria resulted in 22, 579 observations. Among these 66% worked in agriculture; 11% in private formal sector; 8% in public sector; 9% in the informal sector, and 6% are unpaid family workers.

The explanatory variables included capture differences across sectors in direct and opportunity costs of employment, offered

wages, and reservation wages. The set of explanatory variables includes individual characteristics; household characteristics; and assets (land ownership, and receipt of non-labor income).

Age (in years) is used as a proxy for working experience. Overall, men are older than women (35 years versus 33 years). Unpaid family workers are the youngest (24 years for men and 28 years for women). In the public sector, average age among men was 37 and 32 years among women. Private sector workers are younger than public sector workers (34 year for men and 29 years for women). In agriculture and informal sectors, men are 35 years old on average while women are 34 years and 33 years old respectively.

Twenty seven percent of men and 41% of women have no education. While there is no major gap in primary education between men and women, the proportion of women who have completed secondary education is about half (7%) that of men. The respective proportions of men and women with no education are lowest in the public sector (6 and 7%) and highest in unpaid family work and agriculture (39 to 45%). Almost 65% of both men and women in unpaid family work have less than full primary education. In agriculture, 73% of the women and 69% of the men fall in this education class. In the public sector, 63% of the men and 69% of the women completed at least some secondary education. These proportions are high compared to 35 and 31% in the private sector and 31 and 22% in the informal sector.

Turning to demographic variables, most (70%) of the workers are married. But the proportion of married men in unpaid family work is relatively small (19%). Also, relatively fewer (44%) of women in private sector are married. Most men (69%) are household heads compared to 19% of women. The statistics also indicate that small children (0 to 6 years), school age children (7 to 14 years) and prime age adults are prevalent in survey households.

With regard to income sources many persons in unpaid work, agriculture and women in informal sector are in households that received transfer income (in cash or in kind). Most (70%) households own land but the proportion is much lower among unpaid family workers. Compared to men, lower proportions of women in formal wage employment and in the informal sector are from households with land.

The survey has earnings data for public sector wage employment, private sector wage employment, and for informal sector employment. The survey lacks earnings data on agricultural workers. Earnings refer to annual earnings from the individual's main occupation.

Poverty is clearly unevenly distributed across employment types. Based on the official poverty line around 45% of men and women are absolutely poor. Poverty is highest among unpaid family workers (men, 58% and women, 46%) and agricultural employment (men, 54% and women, 47%). Public sector workers are the least poor (men, 24% and women, 21%) while the poverty incidence is 29% in private sector and 38% in the informal sector (Table 1).

ESTIMATION RESULTS

Maximum likelihood estimates of employment allocation model

Tables 2 and 3, present maximum likelihood estimates of the multinomial logit model. Wald's test of whether any of the ten pairs of employment categories could be combined are rejected (p-value = 0.001), suggesting that the five way split is an appropriate view of the employment structure. Hausman test (bottom of tables) rejected the null hypothesis (IIA property holds), supporting supporting use of multinomial logit.

Tables 4 reports partial changes in probabilities from a change in a continuous variable and probability difference in case of a discrete change in dummy variable for men and women.

Males with incomplete secondary education have significantly lower chance of agricultural work. In contrast, having some primary education significantly reduced the chance of agricultural work for females. Compared to workers with no education, the chance of agricultural work of males with some primary education is 23% lower and 34% lower for males with some secondary education. The chance of agriculture work of females with some primary education is only 3% lower than that of females with no education.

Educated workers have significantly higher probability of public sector wage work. The probability increases with the level of education. Compared to workers with no formal education, for males, the probability of working in the public sector is 20 to 65% higher. For females, the probability is 4 to 68% higher.

The education effects on probability of private sector employ-ment differ between males and females. Educated females have significantly higher probability of private sector work. In contrast, only males with some secondary education or less have significantly higher probability of private sector work. All levels of education though the man with less than full secondary education increases his chance of being in private sector employment. However, it seems that additional schooling is associated with lower partial effects. For example, a man that has full primary education raises the chance of private sector employment by 8% compared to 5% for a man with some secondary education. Men with full secondary education and above are less likely to be in private sector employment and the absolute partial effect rises with education. For instance, a secondary graduate reduces his chance of private sector work by 0.4%, while a university graduate reduces the chance by %. For women, some secondary education or below raises probability of private sector employment as in the case of men, but the partial effects are not large. However, in contrast to men, full secondary education and above for women raises the probability of private sector work. A woman with full secondary education raises the probability by 1% and by 4% if she has university education.

The informal sector mainly employs men with full primary education or less. However, the partial effect (3.5%) for a man with full primary education is lower than for a man with less than full primary education (4.2%). Secondary education and above reduces the chances of informal sector work. If a man has some secondary some secondary education, the probability of informal sector work falls by 1% while with university education the probability falls by 7%. For women, less than full primary education significantly reduces the chance of informal

Table 1. Summary statistics of variables used in the paper, by sector and gender.

Explanatory variable	Unpaid worker		Agriculture		Public sector		Private sector		Informal sector		Total	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Age; years (std. dev.)	24 (10)	28 (10)	35 (14)	34 (13)	37 (8)	32 (8)	34 (10)	29 (10)	35 (10)	33 (10)	35 (12)	33 (12)
Worker married	19	67	65	71	88	66	75	44	85	64	70	69
Household head	16	4	63	18	88	34	75	25	85	31	69	19
No education	44	42	39	45	6	7	14	23	15	35	27	41
Some primary education	20	21	30	28	16	15	31	29	32	27	29	27
Full primary education	9	15	14	14	15	9	20	17	21	16	16	14
Some secondary education	8	11	8	7	18	18	15	15	12	11	11	9
Full secondary education	17	10	7	5	31	31	16	11	16	10	13	7
Post-secondary education	1	1	1	1	10	17	3	4	2	1	3	2
University education	1	1	0	0	4	3	1	1	1	0	1	0
Absolutely poor*	58	46	54	47	24	21	38	36	29	36	45	44
Small child present	52	74	72	78	74	77	71	76	78	75	72	77
School child present	68	62	73	71	61	64	54	57	57	67	66	69
Prime age adult present	96	91	88	86	81	82	84	86	87	86	87	86
Household has land	36	38	80	83	62	54	61	44	60	50	71	74
Household has transfer income	45	36	45	46	28	34	34	33	29	45	39	44
Average annual income	-	-	-	-	46,908	37,672	35,812	20,428	90,941	40,225	52292	33181
Number of observations	330	961	5583	9286	1284	513	2036	664	1047	875	10280	12299

Source: Computed from survey data. *The poverty line is defined by CBS as Kenya shillings 987.27 in rural areas and Kenya shillings 1489.63 for urban areas.

sector work. But a woman with full primary education raises her chance of entry into the informal sector. On the other hand, a woman with more than primary education reduces her chance of informal sector work. However, the partial effects are small and only the effect for full secondary education is statistically significant. Some demographic factors are also important covariates of employment type allocation. The partial effect of age shows that, the older a man or a woman is the more likely he or she is to be in non-agricultural employment. For a man with average characteristics, age reduces the chance the chance of agricultural employment by 5%, while for a woman, it is 2%. For men, age raises the probability of public sector employment by 3% compared to 2% for private sector work and 1% for informal sector work. The partial effects of age on the probabilities of non-agricultural employment for women are smaller than those of men. The largest effect (1%) is for public sector and informal sector work.

A male household head had higher probability of public sector employment compared to a man that is not a household head. But male household heads had lower chance of agricultural work. He is also likely to be in the informal sector although this is not significant. In addition, household headship is associated with lower chance of private sector employment. For female household head, the chances of working outside agriculture are higher. The most noticeable result is that household headship sectors, this sector provides an outlet for those with the economic responsibility to provide at least subsistence.

A married man was more likely to work outside seems to push women into the informal sector. This may suggest that with smaller chances of entering the other agriculture. The chance of a

Table 2. Maximum likelihood estimates of employment allocation model, men (Unpaid family workers is the omitted category).

Explanatory variable	Agriculture sector	Public sector	Private sector	Informal sector
Age (years)	0.10*** (2.89)	0.52*** (11.36)	0.28*** (7.41)	0.25*** (5.81)
$Age^2/100$	-0.12** (2.54)	-0.62*** (10.64)	-0.36*** (7.30)	-0.32*** (5.79)
Some primary education	0.55**(2.34)	1.93*** (6.79)	1.40*** (5.71)	1.34*** (5.26)
Full primary education	0.86*** (2.90)	2.89*** (8.53)	1.84*** (6.05)	1.80*** (5.72)
Some secondary education	0.64** (2.04)	3.17*** (9.04)	1.65*** (5.16)	1.33*** (3.98)
Full secondary education	-0.06 (0.20)	3.23*** (9.85)	1.07*** (3.57)	0.95*** (3.05)
Post-secondary education	-0.09 (0.15)	4.28*** (7.09)	1.80*** (3.04)	1.26** (2.01)
University education	-0.14 (0.22)	3.91*** (6.57)	1.25** (2.08)	0.70 (1.06)
Household head	1.84*** (7.13)	2.00*** (7.27)	1.80*** (6.94)	2.28*** (8.03)
Worker married	0.34 (1.35)	0.81*** (3.00)	0.64** (2.50)	0.95*** (3.52)
Small child present	0.17 (1.00)	-0.17 (0.91)	(0.33)	0.11 (0.59)
School child present	-0.10 (0.51)	-0.20 (1.01)	-0.39** (2.00)	-0.27 (1.37)
Prime age adult present	0.15 (0.46)	0.12 (0.34)	-0.07 (0.21)	0.22 (0.63)
Received transfer income	-0.09 (0.52)	-0.28 (1.61)	-0.15 (0.89)	-0.37** (2.09)
Household has land	0.77*** (3.25)	-0.21 (0.83)	-0.28 (1.18)	-0.29 (1.20)
Constant	-6.31*** (6.27)	-13.96** (14.52)*	-5.82*** (7.46)	-6.82*** (8.01)
Wald χ^2 (D.F)	2728.17 (112)			
Pseudo R^2	0.21			
Log-likelihood	-10130.65			
Sample size	10280			

Robust z statistics are in parentheses. * Significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are adjusted for clustering on household. The sample evidence is for the null hypothesis of IIA. $\chi^2(84) = -19.46$; $\chi^2(84) = 10.697$ $\chi^2(84) = 61.222$; and $\chi^2(84) = -3.201$ with agriculture, public sector, private sector, and informal sector omitted. Regressions include fourteen dummy variables for regions and area of residence.

married man to be in public employment is 3% higher than for a comparable but unmarried man. A married man is also likely to be in private sector or informal sector. The largest effect (5%) is in informal sector work. On the other hand, a married woman is more likely to work in agriculture although the effect is not significant. However, she is significantly less likely to be either in public sector or private sector employment. In rural areas, such a situation is consistent with labor allocation pattern where the husband works off-farm and the wife takes care of the shamba (farm). Pooling of resources and acquisition of new networks through marriage may aid entry into informal sector employment by the man. Networks can also be important in wage sector employment. The negative effect of marriage on wage employment for women may also reflect employer preferences that may not favor women workers.

Turning to land and non-labor income, men in households that received some transfer income were less likely to be in the informal sector. In contrast, women from such households were more likely to be in the informal sector. Land ownership raised the chance of men and women being in agriculture by 25 and 20%, respectively. For women, land ownership is also associated with lower chances of non-agricultural employment, especially private sector and informal sector work.

Earnings equation estimates with and without selection bias correction

A two-step estimation procedure to control for the potential selection bias is used. A new variable (Inverse Mill's ratio) is generated from the maximum likelihood estimates of employment allocation model, and included in the earnings regression. To identify the employment allocation we follow Schultz (1990) who suggests that household assets and non-labor income are the most suitable. In this paper, dummy variables for land ownership and receipt of transfer income were used. The two variables are expected to influence workers' reservation wages. Additionally, variables for presence of children were included to proxy for child-care costs. Demographic variables have been used in previous studies (Glick and Sahn, 1997; Appleton et al., 1999; Krishnan et al., 1998; Kabubo, 2000).

The results in Tables 5 and 6 show that the Inverse Mills' ratio is only significant for women in public sector employment. The negative sign implies that earnings of a woman with average characteristics in the public sector are lower than earnings of woman drawn randomly into the sector. The insignificant Inverse Mills variable for private and informal sector employment suggests that ordinary least squares (OLS) estimates of the earnings

Table 3. Maximum likelihood estimates of employment allocation model, women (unpaid family workers is the omitted category).

Explanatory variable	Agriculture sector	Public sector	Private sector	Informal sector
Age (years)	0.04* (1.65)	0.46*** (9.89)	0.14*** (4.45)	0.24*** (7.78)
Age squared/100	-0.02 (0.58)	-0.56*** (8.53)	-0.17*** (3.89)	-0.30*** (7.11)
Some primary education	0.52*** (3.91)	2.08*** (7.85)	0.98*** (5.34)	0.53*** (3.32)
Full primary education	0.21 (1.46)	2.01*** (6.54)	0.65*** (3.14)	0.37** (2.02)
Some secondary education	-0.00 (0.03)	2.87*** (10.10)	0.80*** (3.79)	0.13 (0.65)
Full secondary education	0.09 (0.46)	4.01*** (13.57)	0.88*** (3.78)	0.43** (1.99)
Post-secondary education	0.21 (0.60)	5.40*** (13.85)	1.91*** (4.96)	0.39 (0.92)
University education	0.31 (0.55)	4.62*** (7.45)	1.86*** (3.49)	-0.36 (0.44)
Household head	1.55*** (8.21)	2.35*** (10.64)	1.66*** (7.65)	2.15*** (10.62)
Worker married	0.13 (1.13)	-0.31* (1.89)	-1.08*** (7.69)	-0.21 (1.51)
Small child present	0.13 (1.13)	-0.01 (0.05)	0.06 (0.40)	0.09 (0.63)
School child present	0.04 (0.37)	-0.19 (1.31)	-0.17 (1.37)	0.02 (0.20)
Prime age adult present	0.14 (1.04)	0.19 (1.02)	-0.21 (1.12)	0.20 (1.20)
Received transfer income	0.02 (0.17)	-0.08 (0.56)	-0.16 (1.25)	0.23** (1.99)
Household has land	0.97*** (8.17)	-0.11 (0.66)	-0.46*** (3.12)	-0.27* (1.83)
Constant	-5.06*** (7.87)	-13.66*** (14.85)	-3.51*** (5.95)	-5.69*** (10.03)
Wald χ^2 (D.F)		3029.87 (112)		
Pseudo R^2		0.25		
Log-likelihood		-8236.32		
Sample size		12299		

Robust z statistics are in parentheses. Significant at *10; **5 and; ***1%. Standard errors adjusted for clustering on household. Regression included fourteen regional dummies. The sample evidence is for the null hypothesis of IIA. $\chi^2(84)$= -72.39; $\chi^2(84)$= -8.72; $\chi^2(84)$= 20.80; and $\chi^2(84)$= 11.517 with agriculture, public sector, private sector, and informal sector omitted. Regressions include fourteen dummy variables for regions and area of residence.

equation are not significantly biased.

Age has significant and positive effect on the private sector earnings, with and without endogenous sector selection correction; and it is greater for women (12%) than men (8%). The coefficient on the square of age is negative and significant, which indicates decreasing age effect. For women in the informal sector, age has significant and positive effect on earnings; and the effect decreases with age.

For men, being married is associated with significant and positive effect on earnings in the three sectors. In contrast, being a married woman has significant (at 5% level) and positive effect on public sector earnings after correction for endogenous sector selection. Also included in the earnings equations but not reported are fourteen regional dummy variables. The coefficients on some of them are significant, which suggests there are important regional factors that affect earnings.

Earning premium to different levels of education was calculated following the method of Halvorsen and Palmquist (1980). The earning premium for full secondary and university education are highest in private sector for both men and women. Men with university education in the informal sector also earn substantial returns. But results from the sector allocation model suggested that high level of education reduces chances of men and women entering the informal sector. While for women, the monetary reward for primary education is highest in the informal sector, for men the reward is uniform across sectors. On the other hand, for both men and women, secondary education is rewarded most in the private wage sector. In general, reward to university education is high in all sectors.

Men in the private sector have higher monetary reward to education than men in public sector. In contrast, Glick and Sahn (1997) found that earnings premium for less educated men was higher in the public sector while earnings premium for more educated men was higher in the private sector in Conakry, Guinea. In Ethiopia's urban labor market, Krishnan et al. (1998) found higher wage premium to education in the public sector than in private sector for men. For women, the educational earnings premium was higher in the private sector at all education levels. And women in Conakry, Guinea working in public sector had nearly two times the educational earnings premium of men in the same sector.

Low returns to secondary education may explain the negative effect of secondary education on entry into the informal sector, while the relatively higher returns to primary education may explain the positive effect of

Table 4. Marginal effects from employment allocation models of men and women in Kenya.

Explanatory variable	Men				Women			
	Agriculture sector	Public sector	Private sector	Informal sector	Agriculture sector	Public sector	Private sector	Informal sector
Age (years)	-0.052*	0.028***	0.019***	0.007***	-0.018*	0.007***	0.003***	0.011***
Some primary education	-0.227**	0.099***	0.095***	0.042***	-0.029***	0.039***	0.017***	-0.001***
Full primary education	-0.296***	0.195***	0.077***	0.035***	-0.063	0.058***	0.014***	0.005**
Some secondary educ.	-0.336**	0.312***	0.046***	-0.012***	-0.176	0.167***	0.025***	-0.006
Full secondary education	-0.422	0.447***	-0.004***	-0.014***	-0.339	0.361***	0.011***	-0.010**
Post-secondary education	-0.519	0.639***	-0.049***	-0.062***	-0.619	0.688***	0.015***	-0.043
University education	-0.487	0.650***	-0.082**	-0.072**	-0.465	0.510***	0.038***	-0.048
Household head	-0.010***	0.012***	-0.013***	0.043	-0.011***	0.017***	0.003***	0.044***
Worker married	-0.095	0.025***	0.029**	0.047***	0.074	-0.006*	-0.050***	-0.016
Small child present	0.050	-0.022	-0.031	0.003***	0.011	-0.002	-0.002	-0.002
School child present	0.053	-0.001	-0.044**	-0.009	0.012	-0.004	-0.007	0.000
Prime age adult present	0.028	0.001	-0.041	0.012	0.015	0.001	-0.013	0.004
Received transfer income	0.036	-0.011	-0.001	-0.025**	-0.004	-0.002	-0.006	0.013**
Household has land	0.252***	-0.044	-0.134	-0.071	0.196***	-0.017	-0.057***	-0.079*

Significant at *10; ** 5 and; *** 1%.

primary education on entry into the informal sector. The number of cases with university education in the informal sector is very small. Hence, no firm conclusion can be made regarding returns to university education.

An issue with respect to informal sector incomes is that the estimated functions do not control for physical capital. Information on capital use in the informal sector businesses may not be available in household surveys like the one used in this paper. However, many informal sector businesses have only small amounts of capital. Hence the earnings are mostly returns to labor. Also, capital expenditure maybe correlated with education (Glick and Sahn, 1997) if more educated informal sector workers spend more on capital than their less educated counterparts. Since the aim is to estimate the total return to education, capital and other inputs correlated with education may be excluded to avoid underestimating the education effect.

DISCUSSION AND CONCLUSION

Since Kenya attained independence in 1963, education has been an important issue for policy debate and attention. The larger proportion of the labor force in Kenya is found outside formal wage employment. In particular, the numbers engaged in informal sector increased markedly in the 1990s. Therefore focusing on the benefits of education in wage employment only like most previous studies do misses a large proportion of the labour force. The objective of this study was to investigate the importance of education and on employment allocation and earnings motivated by a model of employment allocation that accounts for the broad array of employment types in Kenya.

The results suggest that education is not an obstacle for entry into agricultural employment. Low education levels significantly raise the probability of informal sector entry while higher education levels discourage entry. Instead higher education levels increase chance of entering wage employment. For both males and females, education raises the probability of public sector employment. All education levels raise the chances of females to enter private sector employment. But for males, secondary education and above reduces the probability of private sector employment. Given these results, educational expansion would increase females' access to the wage sector. For males, more education would increase access into public sector. But public sector job opportunities are shrinking as public sector reforms are implemented.

Table 5. Estimates of earnings equations with and without selection correction (male sample).

Explanatory variable	Public sector		Private sector		Informal sector	
	OLS	Selection	OLS	Selection	OLS	Selection
Some primary	0.16 (1.27)	0.10 (0.60)	0.14 (1.62)	0.14 (1.52)	0.38** (2.17)	0.37** (2.04)
Full primary	0.35*** (2.67)	0.25 (1.12)	0.37*** (4.28)	0.38*** (3.97)	0.42** (2.30)	0.41** (2.17)
Some secondary	0.59*** (4.80)	0.46* (1.79)	0.43*** (4.57)	0.43*** (4.23)	0.41** (2.01)	0.41** (2.01)
Full secondary	0.69*** (5.80)	0.52 (1.61)	0.75*** (8.25)	0.76*** (8.14)	0.60*** (3.10)	0.60*** (3.09)
Post-secondary	0.93*** (7.30)	0.72* (1.82)	1.02*** (8.36)	1.02*** (8.30)	0.59** (2.11)	0.60** (2.14)
University	1.39*** (10.30)	1.18*** (2.97)	1.72*** (5.86)	1.72*** (5.86)	2.27***	2.29***
Age (years)	0.05** (2.00)	0.02 (0.54)	0.08*** (4.98)	0.08*** (4.50)	0.05*	0.05
Age squared	-0.00 (1.50)	-0.00 (0.34)	-0.00** (4.47)*	-0.00*** (3.98)	-0.00 (1.14)	-0.00 (1.05)
Married	0.18* (1.84)	0.16* (1.73)	0.26*** (3.95)	0.26*** (3.94)	0.36** (2.36)	0.34** (2.00)
Inverse mills ratio		-0.15 (0.58)		0.03 (0.18)		-0.06 (0.20)
Constant	8.95*** (20.50)	9.73*** (6.64)	8.27*** (29.53)	8.22*** (20.20)	8.87*** (15.86)	8.99*** (10.95)
Sample size	1284	1284	2036	2036	1047	1047
Adj. R^2	0.18	0.18	0.24	0.24	0.13	0.13
Average RORE:						
Full primary	0.06	0.04	0.06	0.07	0.07	0.07
Full secondary	0.10	0.08	0.12	0.12	0.05	0.05
University	0.34	0.31	0.55	0.54	1.44	1.47

The dependent variable is natural logarithm of annual income in Kenya shillings. Robust t-values are within parentheses. Significant at *10; **5 and; ***1%. Standard errors are adjusted for clustering on household. RORE stands for rate of return to education. It is assumed full primary = 7 years; full secondary = 4 years; and university = 3 years. Regressions include fourteen dummy variables for regions and area of residence.

Table 6. Estimates of earnings equations with and without selection correction (Female sample).

Explanatory variable	Public sector		Private sector		Informal sector	
	OLS	Selection	OLS	Selection	OLS	Selection
Some primary	0.16 (0.58)	-0.21 (0.70)	0.05 (0.39)	0.04 (0.37)	0.37*** (2.86)	0.34*** (2.65)
Full primary	0.61* (1.96)	0.22 (0.66)	0.36*** (2.66)	0.35*** (2.62)	0.68*** (4.50)	0.66*** (4.38)
Some secondary	0.80*** (2.84)	0.05 (0.16)	0.42*** (3.29)	0.42*** (3.20)	0.70*** (3.99)	0.66*** (3.69)
Full secondary	1.02*** (3.73)	-0.02 (0.07)	0.84*** (6.23)	0.84*** (6.23)	0.83*** (4.54)	0.79*** (4.16)
Post-secondary	1.28*** (4.73)	-0.12 (0.27)	0.89*** (3.41)	0.89*** (3.42)	0.42 (0.92)	0.29 (0.61)
University	1.85*** (6.21)	0.65 (1.58)	2.29*** (6.01)	2.27*** (5.99)	2.06*** (6.37)	1.90*** (5.30)
Age (years)	0.09** (2.09)	-0.02 (0.39)	0.12*** (6.03)	0.12*** (5.66)	0.09*** (3.54)	0.11*** (3.72)
Age squared	-0.00 (1.44)	0.00 (0.67)	-0.00*** (5.18)	-0.00*** (4.88)	-0.00*** (2.68)	-0.00*** (2.99)
Married	0.05 (0.57)	0.21** (2.03)	0.06 (0.75)	0.07 (0.63)	-0.13 (1.42)	-0.17* (1.77)
Inverse Mills' ratio		-0.72*** (3.96)		-0.02 (0.12)		0.21 (1.04)
Constant	7.74*** (10.01)	11.78*** (9.02)	7.34*** (23.03)	7.37*** (16.43)	7.92*** (16.87)	7.42*** (11.40)
Sample size	513	513	664	664	875	875
Adj. R^2	0.30	0.32	0.33	0.33	0.22	0.22
Average RORE:						
Primary education	0.12	0.04	0.06	0.06	0.14	0.13
Secondary education	0.13	-0.01	0.15	0.16	0.04	0.03
University education	0.43	0.32	1.09	1.06	0.81	0.68

The dependent variable is natural logarithm of annual income in Kenya shillings. Robust t-values within parentheses. Significant at *10; **5 and; ***1%. Standard errors adjusted for clustering on household. [3]RORE stands for rate of return to education. It is assumed full primary=7 years; full secondary = 4 years; and university=3 years. Regressions include fourteen dummy variables for regions and area of residence.

Education impacts positively on incomes in the public sector, the private sector, and the informal sector. The earning premium to secondary education is highest in private wage sector and women have higher returns to education than men. On the other hand, while returns to secondary education in the informal sector are low, returns to primary education especially for women are substantial. The return to education from the earnings function comprises two components. There is the effect of education on access to employment and the return within employment. In the wage sector, the return to education for women may be positive and higher than that of men. However, women require improved access to wage employment to realize the higher returns to education. More broadly, women's education, employment, and earnings are directly linked to poverty reduction. In addition, they empower women to shape family decisions especially spending decisions in a way that enhances welfare for family members especially children.

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