Education and Labour Market Earnings in Low-Income Countries: Empirical Evidence for Tanzania

Cornel Joseph
Mkwawa University College of Education, University of Dar es Salaam
E-mail: cjmlacha@gmail.com

Abstract
This paper intends to examine the private returns to education in Tanzania using three different Integrated Labour Force Survey data collected in 2001, 2006 and 2014. The estimation of the rate of returns to education was presented separately by each year data. The estimation was also carried out by comparing males and females sub-samples. Using Ordinary Least Squares (OLS) technique, we find private returns to education increases with the levels of education over the 2001-2014 periods. We observed further the patterns tend to decrease over time, despite rising average levels of schooling attainment. Additionally, females experience a higher rate of return than males. These findings have important policy implications with respect to strengthening the public funding of tertiary education, suggesting that increasing public expenditure on tertiary education is necessary for greater equality and poverty alleviation in Tanzania.

1. Introduction

Education is mostly used as a policy tool for reducing poverty, addressing inequality and improving human capital. The human capital theory assumes that the more educated people are typically more skilled such that they are and can be expected to be more productive to earn more than those with low education. As a result, the existence of a positive relationship between individual's education and income has been established by numerous studies on developed and developing countries (Psacharopoulos, 1994; Psacharopoulos and Patrinos, 2004; Psacharopoulos and Layard, 2012). In the case of Tanzania, previous studies that also covered other developing countries found education contributed to improving individual labour earnings (Soderbom *et al.*, 2006; Quinn and Teal, 2008; Twumasi-Baffour, 2013; Leyaro *et al.*, 2014).

An important issue of research interest, however, is that there is quite a large empirical literature on estimations of Mincerian wage return to schooling in low-income countries only focused on the debate on magnitude of the returns to schooling in the low-income countries. For example, a study by

Söderbom *et al*. (2006) that was based on survey data of the manufacturing sector in Tanzania established an increase of returns to education from 6 per cent to 13 per cent during the period between 1993 and 2001. In contrast, Pissarides (2002) found return to education in Tanzania was 10 per cent when estimated by using household budget survey data of 1991 and 4 per cent when estimated by using enterprise survey data of the same year. In addition, a study by Twumasi-Baffour (2013) that was based on 2004-2006 UHWS data found returns to education in Tanzania was 7.7 per cent, while Leyaro *et al*. (2014) found the returns to education was 14.7 per cent when estimation was based on 2001 ILFS data and 12.6 per cent when based on 2006 ILFS data. Generally, the empirical evidence from studies on Tanzania so far shows that the magnitude of the returns to education varies across studies depending on the nature of data and methodology put to use and also the year of the study.

However, empirical evidence from studies on other countries, however, first, shows that the trend of returns to education decrease over time (Fersterer and Winter-Ebmer, 2003; Buscha and Dickson, 2015; Hendajany *et al*., 2016). Second, available empirical evidence shows the greatest decreases occurs on returns to education in the case of males (Fersterer and Winter-Ebmer, 2003; Hendajany *et al*., 2016). Thus, we re-examine the extent to which convexity of returns to education has been maintained or increased over time in Tanzania. Though empirical evidence consistently reveals otherwise. Estimates from both developed and developing countries reveal that the marginal returns to women's education are consistently higher than that of men at all levels of education (Aslam *et al.,* 2008; Fox and Oviedo, 2008; Twumasi-Baffour, 2013; Leyaro *et al.,* 2014). Nevertheless, within the human capital framework, there is no *a priori* reason why returns to schooling should vary for men and women at equilibrium (Aslam, 2009). There is, therefore, a need for further analysis of separate returns to education for male and female in Tanzania and other developing countries. Thus, like Fox and Oviedo (2008), we explore further whether the returns to education also differ by sex in the case of Tanzania. Our objectives in this exercise are two-fold: one is to find out whether the rapid expansion in the female labour force and in access to education has returns to education in Tanzania.

Second, we seek to establish the effect of geographical location factors on returns to education by using the Integrated Labour Force Survey (ILFS) dataset for Tanzania. As argued elsewhere, returns to education vary by geography location due to location-specific factors such as market potential, labour market structure and access to amenities. In other words, workers with similar jobs and levels of education have different returns due variance in location premia (Pereira and Martins, 2004; Black *et al.,* 2009; Black *et al.,* 2013). The value additions of this study are thus: there are only a few studies based on Tanzania ILFS dataset. This study, therefore, has the potential to fill gaps in the literature on education in the case of Tanzania.

The rest of this paper is organised as follows. Section 2 reviewed theoretical and empirical literature. Section 3 describes the labour market outcomes and education attainments in Tanzania. Section 4 presents the empirical model and methodology. Section 5 provides data analysis and descriptive statistics. Section 6 presents empirical results and discussion, while section 7 draws some conclusions and policy implications.

2. Education and Labour Earnings in Tanzania: Status and Performance

2.1 Education System

The structure of formal education and training system in Tanzania is constituted of 2-7-4-2-3+ structure, that is, two years of pre-primary education; 7 years of compulsory primary education (Standard I-VII); 4 years of the ordinary level of secondary education; 2 years of advanced secondary education (Form 5 and 6); and three or more years of higher education. As a matter of policy, primary education is compulsory for children aged between 7 and 14 years. The ordinary level of secondary education is intended for the 14-17 age group, and the advanced secondary school education level is intended for the 18-20 age group.

Second is the higher education system which is divided into a non-university level and university level studies. On the one hand, non-university education is offered by various institutions, including technical, vocational and professional schools. These institutions are overseen by the National Council for Technical Education (NACTE); and are legally allowed to issue various qualifications, ranging from certificates, diplomas and advanced diplomas to postgraduate diplomas. The qualifications obtained from the

non-university institutions provide an opportunity to study at the university level if the set threshold level of achievement is met. On the other hand, university education is legally offered by universities and university colleges. These institutions offer degree programmes and non-degree programmes, leading to the award of academic degrees or other qualifications among others bachelor's, master and doctorate degrees. The universities in Tanzania also are legally allowed to offer non-degrees qualifications comprised of certificates and diplomas. The universities are authorised to independently award academic degrees under the guide of Tanzania Commission for Universities (TCU).

2.2 Education Performance

Table 1 shows the distributions of individuals aged 15 years and above by highest level of education attained in Tanzania as of 2012. The result shows that there was a decrease in population with no education from 25.2 per cent in 2000/01 to 18.7 per cent in 2011/12. During the same period, there was also a decrease in the proportion of the population with standard 1-4 and standard 5-8 levels of education (Table 1).

Table 1: Distribution of Individuals in Tanzania Aged 15 and Above, by Level of Education, 2000/01, 2007 and 2011/12 (%)

Education Levels Attained	**2000/01**	**2007**	**2011/12**
No Education	25.2	23.6	18.7
Adult education only	2.1	1.1	0.4
Primary 1-4	11.9	10.9	9.0
Primary 5-8*	53.8	54	51.2
Form 1-4	4.6	7.0	15.7
Form 5-6	0.4	0.6	0.7
Diploma/University	0.4	0.6	1.8
Course after primary	0.6	0.8	0.2
Course after form IV	0.7	1.1	0.7
Course after form VI	-	0.2	1.5
Other certificates	0.3	0.2	0.0
Total	100.0	100.0	100.0

Source: NBS (2014).

Beyond the primary school level of education, the population with secondary education also increased considerably. For example, individuals with lower secondary education increased from 4.6 per cent in 2000/01 to 15.7 per cent in 2011/12; and, that higher secondary education level increased from 0.4 per cent to 0.7 per cent. Similarly, during the same period, the population with diploma/university education level increased from 0.4 per cent to 1.8 per cent.

Table 2 presents the disaggregated labour force by sex and the highest level of education achieved. Comparative analysis suggests a decrease in the percentage of male and female workers who had never been to school. Table 2 also reveals the proportion of females with no education decreased by 8.5 percentages from 32.5 per cent in 2000/01 to 24 per cent in 2011/12; and, that of males decreased by 4.0 percentage points from 16.9 per cent in 2000/01 to 13 per cent in 2011/12. This could be attributed by free primary education policy under the Primary Education Development Plan (PEDP) of 2002-2006. However, there were more male than female workers with primary education; and, the gap between males with primary education and females with primary education decreased over time. For instance, in 2000/01 males with standard 1-4 education level were 14.2 per cent and females were 10 per cent. However, in 2011/12 males with standard 1-4 education were 10 per cent and females were 8.1 per cent. Also, noteworthy, there were more males than females with lower and upper secondary school education levels during the period. Also, at university/diploma education level males exceeds females (Table 2). Generally, there is an upward trend in the schooling attainment of both male and female workers between the period 2000/2001 and 2011/2012. This could be attributed by extensive public investment in expanding access to education as a result of Primary Education Development Plan (PEDP) of 2002-2006; Secondary Education Development Plan (SEDP) of 2004-2009 periods; and the development vision 2025. Therefore, it is of interest to establish implications of the rise in the educational status of workers on productivity and earnings in Tanzania.

Table 2: Distribution of Individuals Aged 15 and Above by Level of Education and Sex in Tanzania, 2000/01, 2007 and 2011/12 (%)

	2000/01		2007		2011/12	
Education Attained	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**
No Education	16.9	32.5	16.9	29.5	13	24.0
Adult education only	2.3	1.8	1.2	1.0	0.4	0.4
Primary 1-4	14.2	10	12.6	9.3	10	8.1
Primary 5-8*	57.5	50.6	56.3	51.9	52.4	50.1
Form 1-4	5.7	3.7	8.4	5.8	18	13.5
Form 5-6	0.6	0.2	0.8	0.3	1.0	0.5
Diploma/University	0.7	0.2	0.9	0.3	2.4	1.2
Course after primary	0.8	0.4	1.1	0.5	0.2	0.1
Course after form IV	0.9	0.5	1.3	0.9	0.9	0.6
Course after form VI	-	-	0.2	0.1	0.2	0.1
Other certificates	0.4	0.3	0.3	0.1	1.7	1.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: NBS (2014).

2.3 Labour Market Earnings

Table 3 present the mean incomes of the main groups employed in Tanzania in 2001, 2006 and 2014. The mean income paid to workers in the formal sector in 2001 was Tshs 49,954, and that earned by the self-employed workers was Tshs 36,005. This means that on average, the workers employed in the formal sector had a higher income than the self-employed workers. This finding may not be far from the truth because the former group has reliable and more consistent and assumed income than the latter. Similarly, in 2006 the mean monthly income of formal sector employees was Tshs 97,307, and that of self-employed workers was Tshs 52,711. Moreover, the mean monthly income of the formal sector employees was Tshs308,075 while that of the self-employed workers was Tshs 215,541. This means, on average, the mean income to employees in the formal sector was higher than the mean income earned by the self-employed workers. Over the period, the mean monthly income of the formal sector employees increased from Tshs 49,954 in 2001 to Tshs 308,075 in 2014; and, that of self-employed rose from Tshs36,005 in 2001 to TZS 215,541 in 2014.

Analysis by sex shows that males had a higher income than females for both formal and self-employment sectors.

Table 3: Mean Monthly Income of Formal Sector Employees and Self-employed aged 15+ years in 2001-2014, by Sex (Tshs)

	2001			2006			2014		
	Male	Female	All	Male	Female	ALL	Male	Female	All
Formal sector employees	54,423	38,888	49,954	105,308	77,633	97,307	328,856	265,604	308,075
Self-employment	48,988	21,335	36,005	93,361	52,711	74,960	279,636	144,300	215,541

Source: NBS (2007, 2015).

Table 4 presents the mean monthly incomes of the formal sector employees and self-employed workers by educational level and sex in 2006. Table 4 reveals that individuals with the highest levels of education, that is, secondary school education and above had highest monthly mean income (Tshs. 207,433); and, individuals that had never attended school had the lowest mean monthly income (Tshs. 40,134). Across all educational levels, males had higher monthly mean income than females (Table 4). Among the self-employed, mean earnings are again higher for those with secondary education and above. Notable, however, at the lower end of the scale, there is virtually no difference between the earnings of those who have never attended school and those with incomplete primary school education. If anything, for those with incomplete primary, tend to earn slightly less than those who have never attended any school, both in the case of males and the females. As before, males tend to earn more than females across all educational categories.

Table 4: Mean Monthly Income of Formal Sector Employees and Self-employed Above15+ years in 2006, by Educational Achievement and Sex (Tshs)

Level of Education	Formal Sector employees			Self-employed		
	Males	Females	Total	Males	Females	Total
Never attended	46,081	30,084	40,134	68,135	36,348	48,920
Primary not complete	50,692	26,891	45,777	60,632	31,461	48,394
Primary complete	75,387	45,988	67,462	99,219	59,468	82,060
Secondary and above	224,104	172,444	207,433	148,151	96,744	129,494
Total	106,272	79,032	98,454	94,373	53,163	75,693

Source: NBS (2015).

Table 5 also presents the 2014 Tanzania mean monthly incomes of formal sector employees and self-employed persons aged 15+ years by the level of education and sex. The results show formal sector employees with university level of education had the highest mean monthly income of Tshs 1,000,626 compared to self-employed who earned Tshs 895,717. The lowest mean monthly income was earned by formal sector employees that had never attended school who earned Tshs 97,967, followed by the self-employed who had never attended school but earned Tshs 98,519.

Generally, Table 5 shows the mean monthly income increase with the level of education in all groups of employment type. Across education levels, males had higher mean monthly income than the females. The highest mean income was at the university level of education where Tshs 1,054,784 was earned by males and Tshs 861,721 by females informal sector employment. The largest gender gap in income is in self-employment, where males with university education earned Tshs 983,886 compared to females who earned Tshs 531,455. Despite having the same level of education, it appears females earned less due to social and economic factors that restrained them from engaging in activities that would have improved their incomes.

Table 5: Mean Monthly Incomes of Formal Sector, Self Employed Persons Aged 15+ Years in Tanzania by Level of Education and Sex in 2014 (Tshs)

Education level	Formal sector employees			Self employees		
	Males	Females	All	Males	Females	All
Never Attended	102,745	89,716	97,967	124,507	85,249	98,519
Primary	200,665	122,089	177,563	243,346	138,090	194,929
Secondary	310,248	211,247	280,012	458,707	220,795	347,114
Vocational training	446,979	444,651	445,988	376,648	192,653	312,937
Tertiary non university	704,376	508,895	610,704	464,673	216,005	381,591
University	1,054,784	861,721	1,000,626	983,886	531,455	895,717
Total	328,856	265,604	308,075	279,636	144,300	215,541

Source: NBS (2015).

3. Literature Review

Studies that examine returns to education mostly are based on human capital theory associated with Schultz (1961), Becker (1964) and Mincer (1974). The theory highlights the importance of education toward enhancing the productivity of individual economic activities. The basic argument in human capital theory is that the more educated people are typically more skilled and can be expected to be more productive than those with lower levels of educational attainment such that they earn more. It is on this account that the number of years of schooling is used as one of the key determinants of the level of earnings of workers. The other factors, other than education, included in returns to education studies, are other demographic factors, such as age, sex, marital status, occupation type, and location.

The results from empirical studies on returns to education so far are mixed. The study by Kifle (2007) estimated returns to education in Eritrea and discovered the marginal returns to education increased with the levels of education. Moreover, based on 1992 and 1999 survey data Sackey (2008) estimated by Ordinary Least Squares (OLS) estimation technique found private returns were convex for both males and females' sub-samples. This means that the returns to schooling are lower for individuals with lower education levels.

In India, Agrawal (2011) estimated returns to education in India by using nationally representative survey data. The study established returns to education increased with the level of education and were different for rural and urban residents, and were lower at the bottom quantile than the upper quantile. This result shows that education is not rewarded in a uniform manner in the labour market, and the differences could be due to differences in peoples' ability and/or differences in the quality of education attained. Likewise, Hendajany *et al.* (2016) examined the trend of returns to education from 1993 to 2007 by using India Family Life Survey (IFLS) data. Based on the Mincerian equation, the estimation was carried out separately by sex and age cohort. The findings revealed a decreasing trend of returns to education over time, and a large decrease occurred for males and older individuals.

In Uganda, Kavuma *et al*. (2015) examined the differences in private marginal returns to education between wage-employees and the self-employed in Uganda, using two-wave household panel data. The result showed that marginal returns to an additional year of schooling were convex for wage-employees and concave for the self-employed. Nevertheless, Cuaresma and Ragglz (2016) examined the changes in returns to education at the sub-national level in Uganda using the Uganda National Household Surveys for 2002/2003 and 2005/2006. The result confirmed the convexity returns to education in Uganda, implying that more schooling induces more earnings for a worker. Moreover, the returns to years of secondary and tertiary education decreased over the period, while those of primary education increased under the period of study.

Ackah *et al.* (2014) who estimated the basic Mincerian equation of returns to education in Ghana by using household survey data obtained from Ghana Living Standards Survey (GLSS V) of 2005/06 found the marginal returns to education increased progressively with the level of education. Using all three rounds of the Urban Worker Survey of Ghana for 2004-2006 and ordinary least squares and quantile regression techniques were applied, Twumasi-Baffour (2015) examined the role of education in earnings determination in Ghana. The findings of the study found average marginal returns to education in Ghana was 7.9% and dropped to 6.2% when occupational level variables were introduced. The average returns to an

additional year of education were highest in the private sector, followed by the public sector and then low returns to self-employment. Nonetheless, all levels of education were associated with earnings premiums across quantiles with larger returns to higher levels of education.

In Tanzania, a study by Söderbom *et al.* (2006) that used microdata on manufacturing employees to examine returns to education for the period 1993-2001 found a rise in returns to education in Tanzania during the 1990s. Nevertheless, Söderbom *et al.* (2006) found that the earning were convex. Moreover, a study by Kahyarara (2013), which also covered several other countries[1], examined the extent to which levels of education of a wage employee accounted for wage difference. The study found the existence of a positive correlation between education and wages; and, the marginal return to education was greater in higher levels than the lower levels of education. In another study on Tanzania, Leyaro *et al.* (2014) investigated the determinants of earnings of urban workers by using Integrated Labour Force Survey (ILFS) for 2000/01 and 2006 and the Urban Household Worker Survey (UHWS) for 2004, 2005 and 2006. The study found returns to education to increase with the level and years of education. Based on Quantile Regressions (QR), the result suggested the existence of differential returns to education across the earnings distribution: primary and secondary educations were inequality-reducing, implying were more beneficial to those on lower earnings whereas tertiary education was inequality-increasing.

4. Empirical Model and Methodology

The analysis is based on basic Mincerian model extended and used by Kahyarara (2013) and Falco *et al*. (2014). The model reads as:

The basic Mincerian Model (Mincer, 1974):

$$LnW_i = \beta_0 + \beta_1 S_i + \beta_2 Age_i + \beta_3 Age_i{}^2 + Z_i\alpha + \mu_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

where *ln W* is the log of monthly earnings, *S* is the number of years of schooling of individual I, instead of potential experience (as in the classical

[1] such as Kenya, Uganda, Madagascar, Ghana, Niger, Guinea Conakry, Rwanda, Benin and Togo.

Mincer model), we use age; the primary reason being that, because of drop-out, grade repetition, and so forth, Mincer's traditional calculation of potential experience as age minus years of schooling minus the school starting age makes less sense in the context of Africa. In practice, using age instead of potential experience means that our estimates of the rate of return to education are likely to be biased downward somewhat (Barouni and Broecke, 2014).

The Z_i is a vector of control variables, including, sex, training (dummy variable that takes the value of 1 if an individual reported ever acquiring technical or vocational schooling, on-the-job training, or working as an apprentice for at least a month, and zero otherwise), sectors of employment dummies (for whether individual work for the public, private, self-employment with or without employees and agriculture), workers effort proxied by log weekly working hours, marital status (taking the value of 1 if the respondent is married), institutional aspects proxied by union membership (taking the value of 1 if an individual is a member of a trade union), area of work (three regional dummies indicating whether the respondent works in Dar-es-Salaam, other urban or in rural areas).

Noteworthy, evidence from different parts of the world suggests that different school years (S) impart different skills to workers and bring different returns (Schultz and Mwabu, 1998; Psacharopoulos and Patrinos, 2018). Therefore, it is argued that it is misleading to maintain the existence of constant rates of return to all years of education. On this account equation (1) was requested, first, by converting the continuous years of schooling into a series of dummy variables; and, second, by including additional variables in the estimation model. By this approach, the slope of the earnings function changes with different levels of education if there are significant differences in returns to education for those levels.

Therefore, we estimate returns to education using levels such that S is now a vector of the levels of education presented by three dummy variables: D_{Pr} for primary education (1 to 7 years of schooling), D_{Sec} for secondary education (8 to 13 years of schooling) and D_{Te} for tertiary (greater than 13 years of schooling).

$$lnE_i = \gamma + \alpha_1 D_{Pr} + \alpha_2 D_{Sec} + \alpha_3 D_{Ad} + \alpha_4 D_{Te} + \beta_1 EX + \beta_2 EX^2 + Z_i\beta + \mu_i \ldots\ldots (2)$$

The basic and extended models were estimated separately for three periods: 2001, 2006 and 2014 using Ordinary Least Squares (OLS) method. Estimation by separate data for males and females was also carried out to establish whether there were gender differences in the trend of returns. In addition, estimations were also carried out to establish the effect of geographical locality on returns to education.

It is noted by Card (1999) that OLS estimates may not be efficient either because of sample selectivity bias or endogeneity (omitted variable) bias. The former problem is usually driven by the presence of an unobservable factor that is correlated to earnings such that the OLS estimates of the returns to schooling become biased upwards (Kimenyi *et al.,* 2006). Endogeneity, on the other hand, leads to biased and inconsistent parameter estimates. The problem, which is caused by the existence of a strong correlation between explanatory variables and the disturbance term, is typically attributed to factors such as reverse causation, the correlation between the unobservable factors that determine education level and wages, and/or the presence of measurement errors (Farre*et al.,* 2013). As a result, various methods have been employed to address the endogeneity problem. One of the popular methods used that features in the literature is the use of instrumental variables (IV). The IV technique involves the identification of variable(s) not correlated with the residual but highly correlated with the endogenous variable (Wooldridge, 2003). This method has been utilised by various previous studies; for example, Card (1999), Lou and Li (2008) and Sackey (2008). Even though identification of a valid instrument is not easy. The requirements for a valid instrument are that it should be strongly correlated with educational choice but not correlated with earnings conditional on schooling (Wooldridge, 2003). According to Card (1999), the instruments that could be used in this study are either quarter of birth, change in education law, distance to school, parents' education or family background.

Moreover, the majority of survey data in developing countries miss information on parental characteristics such as education, occupation. Therefore, an alternative strategy is to use the methods used by Klein and Vella (2010) and/or Lewbel (2012) that identify the coefficient of the

endogenous regressor by using the heteroskedasticity of the error terms, even when there are no excluded instruments. Both approaches impose different assumptions for identification (Chau, 2015). While, Klein and Vella (2010) assume that the heteroskedasticity is multiplicative to the whole structural and first-stage error terms, on the other hand, Lewbel (2012) assumes that the heteroskedasticity only applies to the component of the first-stage error term that is uncorrelated to the structural error term.

In this study two-stage, heteroskedasticity-based IV approach successfully used by Lewbel (2012) was used to address the endogeneity problem. To identify the model, the method exploits the conditional second moments of the data, under heteroskedasticity of the error terms of the endogenous regressors. The Lewbel (2012) approach provides generated instruments from the sample data that can be constructed from the error terms of the endogenous regressors, multiplied by at least a subset of the included exogenous variables. Lewbel (2012) exploits a different set of heteroskedasticity restrictions, and it has better properties than the approach in Klein and Vella (2010) which assume that the heteroskedasticity is multiplicative to the whole structural and first-stage error terms. Moreover, unlike the approach of Klein and Vella (2010), the Lewbel (2012) assumes that a product of errors is uncorrelated with its covariates, it has the advantage that it does not impose strong restrictions on how higher moments of errors depend on regressors (Mishra and Smyth, 2015).

Notable, a small number of recent studies that have used the Lewbel (2012) procedure in other contexts found the Lewbel IV results to be more plausible than IV results that rely on external instruments of questionable validity, for example, Emran and Hou (2013).

The Lewbel (2012) IV approach considers the following:

$$W_i = X'\beta_1 + Y_2\gamma_1 + \varepsilon_1, \qquad \varepsilon_1 = \alpha_1 U + V_1 \dots\dots\dots\dots\dots\dots\dots\dots (3)$$

$$S_i = X'\beta_2 + \varepsilon_2\,, \qquad \varepsilon_2 = \alpha_2 U + V_2 \dots\dots\dots\dots\dots\dots\dots\dots (4)$$

whereW_i is earnings and $S_i$is schooling, U is individual's unobserved ability that affects both schooling and productivity;$V_1$and $V_2$are idiosyncratic errors,

X is a vector of observed exogenous variables, andε_1 and ε_2 are unobserved errors.

Some of the structural parameters in equations (3) and (4) are not identifiable without additional information. Therefore, instruments were constructed from the auxiliary equation errorε_2, multiplied by each of the included exogenous variables in the mean-centred form:

$$Z = [\mathrm{X} - \overline{\mathrm{X}}]\varepsilon_2 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(5)$$

Formally, identification of the model would be reached by imposing equality constraints on some coefficients, such as assuming that some elements of$\beta_1$are zero since it means availability of excluded instruments (exclusion restrictions). Parameters will also be identified if the errors$\varepsilon_1$andε_2 are uncorrelated. Lewbel (2012) provides identification conditions that do not require restrictions on β_1 or uncorrelated errors. His method achieves identification by restricting the correlation of $\varepsilon\varepsilon'$ with x, and assuming heteroskedasticity ofε_2. In other words, identification is achieved through the presence of covariates correlated with the conditional variance of ε_2, but not with the conditional covariance between ε_1 and ε_2. More formally, what is required for identification and estimation are the moments:

$$E(X\varepsilon_1) = 0, \qquad E(X\varepsilon_2) = 0, \qquad Cov(Z, \varepsilon_1\varepsilon_2) = 0 \;\; and cov(z, {\varepsilon_2}^2) \neq 0,$$

where some or all of the elements of z can also be elements of x.

As shown by Lewbel (2012), the stated assumptions are satisfied by, but not limited to, models in which error covariances across equations arise due to an unobserved common factor. In our context, measurement error in variables related to schooling or an omitted index of crucial unobserved variables that impact upon both schooling and wages such as learning motivation are plausible examples of such a common factor.

Lewbel (2012) shows that the structural parameters β_1 and γ_1 can be estimated using a two-stage least squares regression (or GMM) of W_i on X and S_i using X and $Z = [\mathrm{X} - \overline{\mathrm{X}}]\varepsilon_2$ as instruments. The assumption that Z is uncorrelated with ε_2 means that $Z = [\mathrm{X} - \overline{\mathrm{X}}]\varepsilon_2$ is a valid instrument for S_i in equation (1) since it is uncorrelated with ε_1, with the strength of the

instrument corresponding to the degree of heteroskedasticity of ε_2 with respect to z (the correlation of the instrument with S_i is proportional to the covariance of $(\mathrm{X} - \overline{\mathrm{X}})\varepsilon_2$ with ε_2. To construct the instruments, the residuals of the first stage OLS estimation equation are used. Note, finally, tests of heteroscedasticity, over identification and weak instruments performed to check the quality of the generated instruments.

5. Data Sources and Descriptions

This study is based on the Integrated Labour Force Survey (ILFS) of Tanzania carried out in 2000/01, 2006 and 2014. The surveys were conducted by the National Bureau of Statistics (NBS), in collaboration with the Ministry of Labour and Employment (MoLE) on behalf of the Government of the United Republic of Tanzania. The data for the households used in the analysis vary from one survey to the another, as is for different surveys: 7,862 households for the 2000/01 survey; 10,502 households for 2006 survey and 14,312households for 2014 survey.

In estimation, monthly earnings is the left-hand variable; and it was obtained by converting the different household earnings reported by the households in various time periods into monthly earnings reported by most households in all the surveys. In this regard, we calculated a monthly wage out of the reported workdays in each month (for those who reported a daily wage) and hours worked per day (for those who reported hourly pay). For individuals who reported daily pay, their earnings were multiplied by the number of days worked in a month; and, in the case of the individuals who reported weekly pay, this was multiplied by the 52 calendar weeks in a year dividing by 12 months of the year.

Education is measured as a continuous variable (number of years spent in school) and as a categorical variable. Table 6 shows that the majority of the households had primary education (79%, 83% and 70% for 2000/01, 2006 and 2014, respectively), followed by secondary education (20%, 16% and 22%, respectively) and tertiary education (1%, 2% and 7%, respectively). Important differences also emerged between males and females when we decomposed the sample by sex (Table 6). Females account for 39 per cent, 38

per cent and 41 per cent of the sample in 2000/01, 2006 and 2014, respectively.

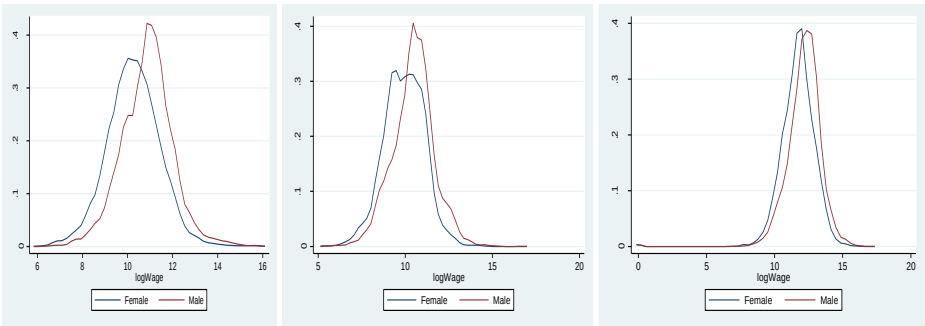
The distribution of the sample by locality presented in Table 6 shows that there were more rural households in 2000/01 and 2006 than in Dar es Salaam and other urban areas. However, in 2014, there were few rural households (Table 6). The distribution of the sample by sector in 2000/01 and 2006 shows that the private sector was the largest sector in terms of employment, followed by non-agricultural informal sector (29.8). In contrast, the non-agricultural informal sector formed the largest sample (44%) in 2014, followed by the private sector (28%) and other sectors, respectively (Table 6).

Table 6: Sample Distribution of Key Variables

	2000/01		**2006**		**2014**	
Locality	Freq.	Per cent	Freq.	Percent	Freq.	Percent
Dar es Salaam	2,504	31.85	2,370	22.57	6,718	46.94
Other Urban	2,463	31.33	4,005	38.14	4,813	33.63
Rural	2,895	36.82	4,127	39.30	2,781	19.43
Total	7,862	100.00	10,502	100.00	14,312	100.00
Education level						
Primary	6,197	78.84	8,701	82.85	10,080	70.43
Secondary	1,530	19.47	1,697	16.16	3,189	22.28
Tertiary	133	1.69	104	0.99	1,043	7.29
Total	7,860	100.00	10,502	100.00	14,312	100.00
Sex						
Male	4,769	60.66	6,486	61.76	8,511	59.47
Female	3,093	39.34	4,016	38.24	5,801	40.53
Total	7,862	100.00	10,502	100.00	14,312	100.00
Sectors of Main Employment						
Public	779	9.91	939	8.94	991	6.94
Parastatals	327	4.16	144	1.37	129	0.90
Agriculture	1,864	23.71	2,842	27.06	2,908	20.38
Private	2,891	36.77	3,816	36.34	3,935	27.57
Informal	2,001	25.45	2,761	26.29	6,308	44.20
Total	7,862	100.00	10,502	100.00	14,271	100.00

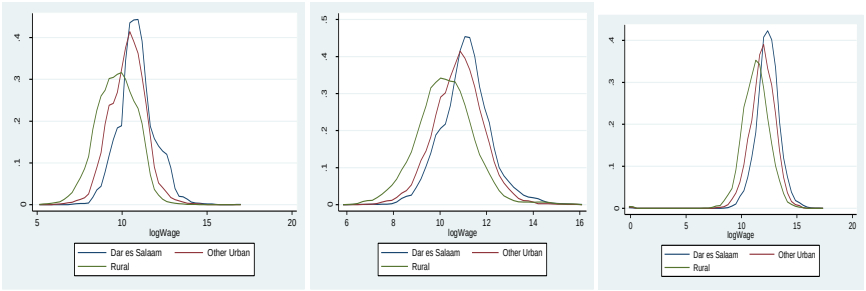
Source: Constructed from 2000/01,2006 and 2014 ILFS.

We present in Figure 1 the distribution of the natural logarithms of monthly earnings for both males and females using a Kennel density distribution for 2000/01, 2006 and 2014, respectively. The results are consistent with earlier observations where the highest-earning was by the males who have a bimodal distribution and the least earning was by females that were also more spread.



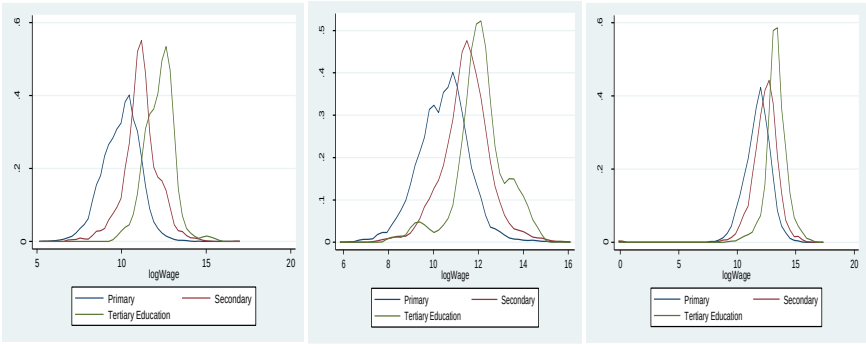
Source: Derived from ILFS 2001, 2006 and 2014, respectively
Figure 1: Distribution of Monthly Earnings by Sex

Moreover, the distribution of monthly earnings by residence (rural/urban) in Figures 2 reveals there is a rural-urban wage gap: individuals living in Dar es Salaam earn a significant higher income than individuals living in other urban and rural areas. According to Kavuma *et al.* (2014), this imbalance could be attributed to higher incomes and volume of economic activities in urban areas that induce higher returns to private firms located in urban areas enabling them to offer higher wages. This could also justify the compensation of the higher cost of living in urban areas compared to rural areas (Harris and Todaro, 1983).



Source: Derived from ILFS 2001, 2006 and 2014
Figure 2: Distribution of Monthly Earnings by Locality

Furthermore, the distribution of monthly earnings by education level attained by individuals in the sample show that average earnings to individuals with tertiary education are more than that of individuals with lower levels of education (Figure 3).



Source: Derived from ILFS.

Figure 3: Distribution of Monthly Earnings by Levels of Education, 2001

6. Empirical Results

6.1 Basic Results

The results of the return to education for the year 2001, 2006 and 2014 are separately presented in Table 7. The estimated coefficients have the expected signs and are all significantly different from zero. The results suggest that almost additional year of schooling significantly increases individual's monthly earnings but in decreasing order: the rate of return to education was 18.4 percent in 2001, 16.0 percent in 2006 and 16.4 percent in 2014. The seeming decrease partly could be due to unprecedented expansion in schooling in the 2000s following the implementation of Primary Education Development Programme (PEDP) and Secondary Education Development Programme (SEDP) started in 2002 and 2004, respectively.

Table 7: Rate of Returns to Education with Basic Mincerian Specification

Variables	2000/01	2006	2014
Education	0.184***	0.160***	0.164***
	(0.004)	(0.004)	(0.003)
Age	0.071***	0.071***	0.084***
	(0.007)	(0.006)	(0.005)
Agesq/100	-0.058***	-0.069***	-0.094***
	(0.009)	(0.008)	(0.007)
Constant	7.167***	7.891***	8.936***

	(0.110)	(0.109)	(0.095)
R-squared	0.275	0.167	0.175
Observations	7,860	10,502	14,312

Notes: Dependent variable is log Monthly Wage, Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

To establish the shape of the schooling-earnings function, a quadratic term for education was included in the regression and results are presented in Table 8. The results carry evidence of convex returns to education in all three years because the coefficients of the quadratic term are positive and statistically significant. The findings are also consistent with the previous results obtained, among others by Leyaro *et al.* (2014) and Twumasi-Baffour (2015). Lemieux (2003) and Colclough *et al.* (2010) argued that abrupt growth in the relative demand for labour that is not matched by a corresponding increase in the relative supply of schooling increases the marginal return to schooling for more educated workers relative to less-educated workers, thus returns to education become convex.

Table 8: Rate of Returns to Education with Concavity in Education

Variables	2000/01	2006	2014
Education	0.153***	0.077***	0.051***
	(0.020)	(0.019)	(0.016)
Educsq/100	0.166*	0.466***	0.586***
	(0.100)	(0.106)	(0.077)
Age	0.071***	0.073***	0.086***
	(0.007)	(0.006)	(0.005)
Agesq/100	-0.060***	-0.073***	-0.097***
	(0.009)	(0.008)	(0.007)
Constant	7.288***	8.197***	9.406***
	(0.135)	(0.131)	(0.115)
R-squared	0.275	0.169	0.178
Observations	7,860	10,502	14,312

Notes: Dependent variable is log Monthly Wage, Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

The results show further that once other control factors that affect earnings are introduced, the average return to education is 9.6 percent in 2001, 8.9 percent in 2006 and 10.8 percent in 2014, respectively (Table 9). Nevertheless, a separate analysis of returns to education for males and females shows that the return decreased over the period 2001-2006, but increases in 2014 (Table 10). Over the same period, the returns to education for males are 9.5 percent, 8.5 percent and 10 percent, while that for females are 9.3 percent, 9.3 percent and 11.6 percent, respectively (Table 10). Notably, females have higher returns to education than males. The higher return to education for females is likely to reflect the higher scarcity of educated females combined with the existence of predominantly 'female' jobs which require educated women.

Table 9: Rate of Returns to Education with Extended Mincerian Model

Variables	2000/01	2006	2014
Education	0.096***	0.089***	0.108***
	(0.004)	(0.004)	(0.003)
Age	0.057***	0.061***	0.066***
	(0.006)	(0.006)	(0.005)
Agesq/100	-0.056***	-0.065***	-0.069***
	(0.008)	(0.008)	(0.007)
TVET	0.193***	0.156***	0.084***
	(0.025)	(0.023)	(0.022)
Sex (male==1)	0.383***	0.464***	0.419***
	(0.022)	(0.021)	(0.019)
Marital (married=1)	0.068***	0.081***	0.076***
	(0.026)	(0.022)	(0.020)
Logwwh	0.104***	0.228***	0.318***
	(0.033)	(0.028)	(0.027)
Agriculture is a reference category			
Public	0.780***	0.896***	0.997***
	(0.039)	(0.042)	(0.042)
Parastatals	1.036***	1.186***	0.996***
	(0.056)	(0.073)	(0.070)
Private	0.196***	0.394***	0.428***
	(0.041)	(0.034)	(0.033)
Informal	0.494***	0.485***	0.451***
	(0.037)	(0.031)	(0.031)
Dar es Salaam is a reference category			
Other urban	-0.344***	-0.136***	-0.367***

Variables	2000/01	2006	2014
	(0.023)	(0.024)	(0.019)
Rural	-0.677***	-0.376***	-0.643***
	(0.029)	(0.029)	(0.031)
Constant	7.483***	7.285***	7.971***
	(0.162)	(0.150)	(0.144)
R-squared	0.455	0.323	0.313
Observations	7,860	10,502	14,312

Notes: Dependent variable is log Monthly Wage, Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Furthermore, the estimated coefficients for potential experience and its square have the expected signs. Unexpectedly, the returns to TVET was higher than general education in 2001 and 2006 but became smaller in 2014 (Table 9). One explanation for TVET having lower returns to education in 2014 could be the entry of some workers into less well paid narrowly-defined occupations. The result in Table 9 also shows the coefficient of a marital status variable is statistically significant for all sample periods. This finding suggests that being married has a significant positive effect on labour earnings. Though analysis by sex based on 2014 sample shows that married males earned significant higher than unmarried males. On the other hand, being married has a negative effect on the wages of female workers. This could be attributed to extra household duties they undertake and childbearing/rearing activities. The estimates also suggest that, on average, residents of other urban and rural areas receive significantly lower earnings than individuals living in Dar es Salaam over the period of analysis (Table 9).

Moreover, the coefficients of the weekly working hours, which is a proxy for workers effort are positive and statistically significant. Notable, the estimated coefficients are increasing over the survey periods: and, the estimated effect on earning is larger for females than that for males, meaning that the contribution of education on labour market earnings is larger for females than males. On average individual working in the formal (public and private) sector and in the informal non-agriculture sector are earning higher compared to those working informally on the agriculture sector. Again, the effect of education on earnings is larger for those working in the

parastatals compared to those working in other sectors of the economy (public, private and informal). Analysis by sex presented in Table 10 shows that compared to males, females tend to earn higher in public sector employment while they tend to earn less in private and non-agricultural informal sectors. This could be attributed to labour market discrimination which is dominant in informal and private sector jobs.

Table 10: Returns to Education by Sex

	2000/01		2006		2014	
Variables	Males	Females	Males	Females	Males	Females
Education	0.095***	0.093***	0.085***	0.093***	0.100***	0.116***
	(0.005)	(0.008)	(0.005)	(0.008)	(0.004)	(0.006)
Age	0.050***	0.064***	0.051***	0.066***	0.067***	0.055***
	(0.009)	(0.011)	(0.008)	(0.010)	(0.007)	(0.007)
Agesq/100	-	-	-	-	-	-
	0.047***	0.067***	0.054***	0.070***	0.073***	0.054***
	(0.011)	(0.016)	(0.010)	(0.013)	(0.009)	(0.009)
TVET	0.151***	0.213***	0.115***	0.221***	0.053*	0.127***
	(0.031)	(0.048)	(0.027)	(0.043)	(0.027)	(0.035)
Marital(married==1)	0.163***	-0.010	0.130***	0.068**	0.243***	-0.063**
	(0.039)	(0.036)	(0.031)	(0.033)	(0.028)	(0.030)
Logwwh	0.006	0.163***	0.176***	0.283***	0.134***	0.442***
	(0.047)	(0.048)	(0.038)	(0.042)	(0.036)	(0.040)
Agriculture is a reference category						
Public	0.696***	1.017***	0.775***	1.122***	0.892***	1.160***
	(0.048)	(0.067)	(0.052)	(0.071)	(0.056)	(0.062)
Parastatals	0.964***	1.290***	1.078***	1.462***	0.988***	1.239***
	(0.065)	(0.113)	(0.085)	(0.132)	(0.072)	(0.178)
Private	0.246***	0.191***	0.387***	0.428***	0.544***	0.321***
	(0.053)	(0.067)	(0.043)	(0.059)	(0.042)	(0.053)
Informal	0.532***	0.506***	0.495***	0.498***	0.574***	0.368***
	(0.050)	(0.057)	(0.041)	(0.047)	(0.042)	(0.049)
Dar es Salaam is a reference category						
Other urban	-	-	-	-	-	-
	0.346***	0.340***	0.132***	0.149***	0.322***	0.413***
	(0.031)	(0.035)	(0.030)	(0.039)	(0.026)	(0.029)
Rural	-	-	-	-	-	-
	0.755***	0.559***	0.408***	0.337***	0.607***	0.670***
	(0.037)	(0.048)	(0.035)	(0.050)	(0.041)	(0.048)

	2000/01		2006		2014	
Variables	Males	Females	Males	Females	Males	Females
Constant	8.396***	7.124***	8.178***	6.889***	9.014***	7.738***
	(0.226)	(0.253)	(0.206)	(0.226)	(0.193)	(0.216)
R-squared	0.433	0.436	0.261	0.314	0.294	0.301
Observations	4,768	3,092	6,486	4,016	8,511	5,801

Notes: Dependent variable is log Monthly Wage, Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

As would be expected, analysis for the overall sample by the level of education shows the returns to education are highest at the tertiary level of education (Table 11). Results, however, show returns to education are highest for secondary and tertiary education than that for primary education, reflecting the scarcity of human capital. The high return to tertiary education suggests that high skills are also in scarce supply, presenting considerable challenges to the government. The results in Table 11 shows the returns to secondary education decreased over 2001-2014 period, implying the existence of abundant secondary education graduates in 2014 compared to 2001.

Table 11: Returns to Education by Levels

Variables	2000/01	2006	2014
Primary education is a reference category			
Secondary	0.508***	0.470***	0.390***
	(0.030)	(0.028)	(0.023)
Tertiary	1.074***	0.829***	1.096***
	(0.072)	(0.104)	(0.035)
Age	0.063***	0.067***	0.072***
	(0.006)	(0.006)	(0.005)
Agesq/100	-0.067***	-0.076***	-0.078***
	(0.008)	(0.008)	(0.007)
TVET	0.212***	0.176***	0.125***
	(0.026)	(0.023)	(0.023)
Sex (male==1)	0.390***	0.467***	0.421***
	(0.022)	(0.021)	(0.019)
Marital (married==1)	0.073***	0.086***	0.076***
	(0.026)	(0.022)	(0.021)
Logwwh	0.104***	0.228***	0.321***

Variables	2000/01	2006	2014
	(0.033)	(0.028)	(0.027)
Agriculture is a reference category			
Public	0.818***	0.940***	0.969***
	(0.039)	(0.043)	(0.044)
Parastatals	1.075***	1.226***	0.985***
	(0.056)	(0.074)	(0.071)
Private	0.213***	0.411***	0.439***
	(0.042)	(0.034)	(0.033)
Informal	0.513***	0.496***	0.462***
	(0.037)	(0.031)	(0.032)
Dar es Salaam is a reference category			
Other urban	-0.351***	-0.146***	-0.375***
	(0.024)	(0.024)	(0.020)
Rural	-0.701***	-0.398***	-0.673***
	(0.029)	(0.029)	(0.031)
Constant	8.047***	7.770***	8.572***
	(0.161)	(0.150)	(0.142)
R-squared	0.449	0.316	0.310
Observations	7,862	10,502	14,312

Notes: Dependent variable is log Monthly Wage, Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 12: Returns to Education by sex and Levels

	2000/01		2006		2014	
Variables	Males	Females	Males	Females	Males	Females
Primary education is a reference category						
Secondary	0.513***	0.456***	0.438***	0.501***	0.349***	0.433***
	(0.038)	(0.050)	(0.034)	(0.049)	(0.028)	(0.039)
Tertiary	1.074***	1.075***	0.926***	0.624***	1.031***	1.145***
	(0.081)	(0.157)	(0.121)	(0.198)	(0.044)	(0.057)
Age	0.057***	0.071***	0.058***	0.074***	0.073***	0.062***
	(0.008)	(0.011)	(0.008)	(0.010)	(0.007)	(0.007)
Agesq/100	-0.060***	-0.080***	-0.065***	-0.084***	-0.082***	-0.066***
	(0.011)	(0.016)	(0.011)	(0.013)	(0.009)	(0.009)
TVET	0.163***	0.244***	0.134***	0.241***	0.091***	0.171***
	(0.031)	(0.048)	(0.027)	(0.043)	(0.028)	(0.037)

	2000/01		2006		2014	
Variables	Males	Females	Males	Females	Males	Females
Marital (married==1)	0.169***	-0.012	0.131***	0.070**	0.240***	-0.061**
	(0.039)	(0.036)	(0.032)	(0.033)	(0.028)	(0.030)
Logwwh	0.004	0.162***	0.174***	0.283***	0.139***	0.445***
	(0.047)	(0.049)	(0.038)	(0.042)	(0.036)	(0.040)
Agriculture is a reference category.						
Public	0.723***	1.076***	0.812***	1.180***	0.872***	1.124***
	(0.048)	(0.067)	(0.053)	(0.072)	(0.059)	(0.064)
Parastatals	0.986***	1.358***	1.109***	1.522***	0.977***	1.236***
	(0.065)	(0.114)	(0.086)	(0.139)	(0.072)	(0.181)
Private	0.256***	0.218***	0.402***	0.451***	0.557***	0.325***
	(0.053)	(0.067)	(0.043)	(0.059)	(0.043)	(0.053)
Informal	0.547***	0.534***	0.509***	0.507***	0.589***	0.370***
	(0.050)	(0.057)	(0.041)	(0.047)	(0.042)	(0.049)
Dar es Salaam is a reference category						
Other urban	-	-	-	-	-	-
	0.349***	0.351***	0.142***	0.159***	0.327***	0.425***
	(0.032)	(0.035)	(0.030)	(0.039)	(0.026)	(0.030)
Rural	-	-	-	-	-	-
	0.780***	0.577***	0.433***	0.356***	0.634***	0.706***
	(0.037)	(0.048)	(0.036)	(0.050)	(0.040)	(0.047)
Constant	8.933***	7.676***	8.631***	7.381***	9.559***	8.384***
	(0.225)	(0.252)	(0.207)	(0.227)	(0.190)	(0.212)
R-squared	0.427	0.429	0.254	0.307	0.292	0.298
Observations	4,769	3,093	6,486	4,016	8,511	5,801

Notes: Dependent variable is log Monthly Wage, Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

6.2 Robustness Test

As is well known by econometricians, OLS estimates of returns to education potentially suffer from endogeneity bias. We attempted to address the endogeneity bias by using Lewbel (2012) approach. The results in Table 13 show that correction of the endogeneity bias does not change wage returns to education significantly.

Table 13: Rate of Returns to Education with Control Function

	2000/01		2006		2014	
Variables	OLS	Lewbel (2012)	OLS	Lewbel (2012)	OLS	Lewbel (2012)
Education	0.096***	0.108***	0.089***	0.123***	0.108***	0.174***
	(0.004)	(0.007)	(0.004)	(0.010)	(0.003)	(0.010)
Age	0.057***	0.055***	0.061***	0.056***	0.066***	0.060***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)
Agesq/100	-0.056***	-0.053***	-0.065***	-0.059***	-0.069***	-0.060***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)
TVET	0.193***	0.177***	0.156***	0.116***	0.084***	0.042*
	(0.025)	(0.026)	(0.023)	(0.025)	(0.022)	(0.023)
Sex (male==1)	0.383***	0.383***	0.464***	0.464***	0.419***	0.402***
	(0.022)	(0.022)	(0.021)	(0.021)	(0.019)	(0.019)
Marital (married==1)	0.068***	0.068***	0.081***	0.080***	0.076***	0.070***
	(0.026)	(0.026)	(0.022)	(0.022)	(0.020)	(0.021)
Logwwh	0.104***	0.108***	0.228***	0.234***	0.318***	0.357***
	(0.033)	(0.033)	(0.028)	(0.028)	(0.027)	(0.028)
Agriculture is a reference category						
Public	0.780***	0.753***	0.896***	0.791***	0.997***	0.666***
	(0.039)	(0.041)	(0.042)	(0.049)	(0.042)	(0.064)
Parastatals	1.036***	0.997***	1.186***	1.116***	0.996***	0.760***
	(0.056)	(0.060)	(0.073)	(0.073)	(0.070)	(0.079)
Private	0.196***	0.191***	0.394***	0.369***	0.428***	0.354***
	(0.041)	(0.041)	(0.034)	(0.035)	(0.033)	(0.035)
Informal	0.494***	0.490***	0.485***	0.476***	0.451***	0.424***
	(0.037)	(0.037)	(0.031)	(0.031)	(0.031)	(0.032)
Dar es Salaam is a reference category						
Other urban	-0.344***	-0.343***	-0.136***	-0.120***	-0.367***	-0.338***
	(0.023)	(0.023)	(0.024)	(0.024)	(0.019)	(0.020)
Rural	-0.677***	-0.666***	-0.376***	-0.345***	-0.643***	-0.568***
	(0.029)	(0.030)	(0.029)	(0.029)	(0.031)	(0.033)
Constant	7.483***	7.407***	7.285***	7.090***	7.971***	7.420***
	(0.162)	(0.167)	(0.150)	(0.157)	(0.144)	(0.167)
R-squared	0.455	0.455	0.323	0.319	0.313	0.295
Observations	7,860	7,860	10,502	10,502	14,312	14,312

Notes: Dependent variable is log Monthly Wage, Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Generally, the control function estimates of the returns to schooling are slightly higher than the OLS estimates, suggesting the OLS estimates exhibit a downward bias. Generally, however, the results are consistent with that obtained by other studies that used IV method after controlling for measurement error and omitted ability bias (Twumasi-Baffour, 2013; Leyaro *et al*., 2014). The findings also are consistent with other studies that used a similar approach in China (Mishra and Smyth, 2015). Also, the estimates show the trends of increasing returns to education over time, 10.8 percent in 2001 compared to 17.4 percent in 2014. This could be a result of the supply of educated individuals growing more than their demand. Thus, it implies that there is a need for the government to improve the quality of education and more employment creation in Tanzania.

7. Conclusion

This study examined the effects of education attainment on labour market earnings in Tanzania by using ILFS of 2000/01, 2006 and 2014. The analysis was based on Mincer earning function. The results revealed the existence of a positive and significant role played by education in earnings determinations. In the case of the dummy variables used for different levels of education, where the primary level of education was used as the reference category, we found returns to education to increase with levels of education. Returns to education were particularly high and strongly increased over the samples period for those with tertiary for both males and females. The increase in the returns to education could provide some rationale for greater investment in schooling by the government in Tanzania. In view of this analysis, we found that more effective policies should be designed to increase access, enrollment and completion at all levels of education.

Moreover, the returns to education were higher for females as compared to that for males. Given the higher returns to education for females, there should be an effort to increase employment for women and decrease unemployment rates. There are rewards to be made in the labour market, especially for educated women. As a result, investment in women's education should continue, and it should be increased, providing more and better quality education. Since increased education and participation of

women in the labour market would positively impact their livelihoods and economic independence and as a result, increase economic empowerment.

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