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Returns to Technical and Vocational Education and Training: Evidence from Zambia

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The study seeks to investigate the returns to technical and vocational education and training (TVET) in Zambia using the 2014 Labour Force Survey (LFS). We adopt the modified Mincerian model and the fixed effects approach. We find that individuals who possessed TVET skills with certification, regardless of their gender or their place of residence, significantly earned more than their counterparts in wage employment without any TVET skills. We also find that males with vocational skills with certification significantly earned more than their female counterparts with the same TVET skills with certification, a sign of labour market discriminatory bias by employers. Moreover, we observe that individuals residing in rural areas with TVET skills with certification significantly earned more than their counterparts in urban areas with the same TVET skills with certification because employers may want to lure TVET graduates to relocate from urban areas to rural areas. However, individuals with TVET skills without certification did not significantly earn more than their colleagues in wage employment without TVET skills. In some cases, individuals with TVET training but without certification were observed to be worse off than their counterparts without TVET training in wage employment. Given the above evidence, it is imperative that the Zambian government significantly increases spending towards vocational training as well as invest in TVET infrastructure in order to improve TVET enrolment rates. This will enhance the employability of Zambians across the country and generate substantial returns to TVET skills. However, there is need for a deliberate policy that will ensure that females with the same vocational skills as their male counterparts earn the same returns. There is also need for deliberate awareness campaigns on the benefits of TVET training in order to reduce the stigma around TVET.

Keywords: Technical and Vocational Education and Training, Vocational Training¹, Fixed Effects, Certification², Wage Employment, Labour Force Survey, Mincerian.

1.0 Introduction

Over the years, successive governments have grappled with how best to alleviate poverty and youth unemployment in Zambia. This, to date, still remains

a developmental challenge. The Labour Force Survey (LFS) of 2014 indicates that males accounted for 53.4% of the total unemployed youths, whereas females accounted for 46.6%. Urban areas have recorded the highest youth unemployment. The promotion of Technical and Vocational Education and Training (TVET) has been viewed by many to be the cornerstone of Zambia's development agenda and a viable option that can be used to not only reduce youth unemployment but also enhance the employability of youths. Despite this, TVET has been perceived in some sections of society to be a route taken by individuals with less ambition. Moreover, despite the potential of TVET as an instrument of economic growth, government expenditure towards the provision of TVET over the years has been dismal and is very small when compared to other African countries (World Bank, 2016) as evidenced in the table below.

Table 1: Country Comparison of TEVET Expenditure as a Share of Total Government Expenditure

| Country | % | Year |
|--------------------------|----------|-------------|
| Central African Republic | 7.4 | 2008 |
| Gambia | 2.6 | 2009 |
| Ghana | 1.1 | 2008 |
| Liberia (recurrent) | 8.5 | 2012 |
| Malawi (recurrent) | 3.4 | 2007 |
| Rwanda (recurrent) | 9.6 | 2012 |
| Sierra Leone (recurrent) | 3.4 | 2007 |
| South Sudan (recurrent) | 1.1 | 2009 |
| Swaziland (recurrent) | 2.4 | 2007 |
| Uganda | 4 | 2004 |
| Zambia | 0.6 | 2013 |

Source; Education Public Expenditure Review in Zambia, World Bank, 2015

There is ample evidence suggesting high returns accruing to TVET graduates relative to graduates with general education³. Empirical evidence from studies such as Moenjak and Worswick (2003), Ahmed (2016), El-Hamidi (2006), Strawinski et al. (2016), and Neuman and Ziderman (1991) all suggest relatively high returns to vocational education. Despite this sufficient evidence in favour of vocational education, TVET enrolment rates have only marginally increased in Zambia in the recent past. This is partly due to the TVET infrastructural deficit

and the stigma associated with TVET graduates. Moreover, access to vocational education in Zambia still remains low and is below that observed for middle income countries which averages between 20% and 30% of those in education (2010-2014 TEVET Sector Plan).

There is no doubt that TVET has the potential to improve and promote positive labour market outcomes. Despite this potential, there is no empirical study in Zambia that has been conducted to shed more light on the returns to vocational skills across gender or between urban and rural TVET graduates. This study therefore attempts to fill this gap. We use the 2014 LFS to establish whether indeed there are returns to vocational education in Zambia.

We use the modified Mincerian ordinary least squares (OLS) and the fixed effects approach in order to allow for causal estimates of returns to vocational skills as well as to control for unobservables such as ability that may bias the estimates. We find that individuals who possessed TVET skills with certification significantly earned more than their counterparts in wage employment without any TVET skills by about 31.6%. This is regardless of their gender or where they resided. Further, we find that males with vocational skills with certification significantly earned more than their female counterparts with the same TVET skills with certification. We also observed that individuals residing in rural areas with TVET skills with certification also significantly earned more than their counterparts in urban areas with the same TVET skills with certification. However, we found that individuals with TVET skills without certification did not significantly earn more than their colleagues in wage employment without TVET skills. In some cases, individuals with TVET training but without certification were observed to be worse off than their counterparts without TVET training.

The rest of the paper is organized as follows. Section 2 discusses the empirical literature and human capital framework. Section 3 presents the data and methodology that was adopted for the study. Section 4 presents the results of the study. These are discussed in section 5. We conclude the paper with section 6.

2.0 Literature Review

Human capital theory is a dominant paradigm of education and training investments. It postulates that education and training are investments that foster greater productivity in individuals, and this becomes a fundamental attribute towards the differentiation in productivity and income earnings of individuals (Brewer et al., 2010; Krafft, 2013). The basic tenets of human capital theory express the view that human resource comprises an asset – similar to other

assets. In this regard, developing the capacity of human resource can sustain the productivity of human resource in the form of capital through investments into human capital. Ultimately the returns on such investments are anticipated through the productivity gains arising out of increased work performance and probable earnings of human capital.

A number of studies have been conducted to ascertain returns to vocational skills and whether a wage differential exists between students who attended vocational education and general education. These have produced mixed results. A study by Mahirda and Wahyuni (2016) used the Indonesian Family Life Survey (IFLS) to conduct a comparative assessment of whether or not a wage differential existed between students who attended general vocational senior secondary education and general high school in Indonesia. The study observed that there was no significant difference in returns to schooling between graduates who attended vocational high school education and workers who attended general high school.

Likewise, Malamud and Pop-Eleches (2008) used a regression discontinuity design to examine the relative earnings impact of the 1973 educational reforms in Romania. These shifted a large proportion of students from vocational education to general education. They observed similar earnings and levels of labour force participation between graduates from vocational schools and their counterparts who attended general schooling. Similarly, Lechner (2000) adopted a machining technique to analyse the impact of the public sector sponsored continuous vocational training and retraining in East Germany using the data from the Germany Socio-Economic Panel (GSOEP, 1990-1996). The study found that there were no positive earnings and employment effects of the programme in the short run.

There is also evidence that contradicts the above empirical findings. For example, a more recent study by Ahmed (2016) in India utilized two rounds of the national sample survey data. The study observed that vocational education and training (VET) occupations were associated with a decent wage premium in the Indian labour market. In other words, there was a significant positive return to vocational educational on earnings.

Further, a study by El-Hamidi (2006) which employed the ordered logit model found that male graduates with vocational training had higher returns compared to their male counterparts with general education in Egypt. This was not the case for women with vocational training. Moenjok and Worswick (2003) investigated the factors influencing the choice between upper secondary vocational and general education and the relative wage differential between the two forms of schooling. They found that for both women and men, graduates

with vocational education significantly earned higher returns than those with upper secondary school education.

Strawinski et al. (2016) carried out a study to assess the returns to vocational education before and after the 1999 educational reforms in Poland. They observed that graduates who attained secondary-vocational education received relatively higher earnings compared to their counterparts with a secondary general education.

Early empirical work on returns to vocational skills also corroborate the above findings. For example, Neuman and Ziderman (1991) utilized the 1983 census in Israel and found that individuals with vocational education employed in a field related to the vocational training they pursued earned more than their counterparts with either general secondary education or individuals with vocational education but employed in a field not related to their vocational training. Prior to this study, Bellew and Mook (1990) analysed the costs and benefits of vocational education in Peru. They observed that monetary returns and occupational profiles of graduates from vocational and general education were almost identical. However, interestingly, the study found that the returns for self-employed graduates with secondary vocational training were significantly lower than the returns of self-employed graduates with secondary general education.

Kahyarara and Teal (2008) investigated the returns to vocational training and academic education in Tanzania. They found interesting results. More specifically, allowing for the effects of firm size, they found that the returns to graduates with vocational education after attaining primary school were much higher than the returns to workers with either primary schooling or O-Level education. The vocational returns were observed to be lower when compared to graduates with A-level education and above. Moreover, it was observed that the returns to vocational/technical training after A-level education could be negative partly due to the combination of the quality of work and the work environment (Kahyarara and Teal, 2008).

The study by Krafft (2018) adopted a different approach. It utilized an Egyptian panel data set and compared the returns to formal vocational secondary education to the returns associated with informal vocational skills acquired through avenues such as internships. The study observed that there were significant returns to formal vocational secondary education for older adults. This was not the case for recent graduates whose returns were found to be limited or almost zero, even when compared to individuals with no formal education. The study, however, found that the returns to vocational skills with respect to craft skills acquired through internships were significantly large even for recent graduates.

The current study differs from the foregoing studies because it not only attempts to investigate the wage differential between vocational training and general education, but also the wage differential between TVET graduates in rural and urban areas as well as the wage differential between males and females with the same level of vocational training.

3.0 Data and Methodology

3.1 Data

The study utilized the Zambia Labour Force Survey⁴ (LFS) of 2014. This is a nation-wide cross sectional household survey designed largely to capture labour force characteristics such as employment status, skills training, education, and literacy levels for the working population aged 15 years and above. A total of 11,520 households in all the ten provinces of Zambia, in both rural and urban areas, were captured in the 2014 LFS at two stages. The first stage involved the selection of 576 enumeration areas using the 2010 census as a sampling frame. The second stage involved the selection of 20 households from each enumeration area. It should be noted that the 2014 LFS did not capture populations designated in institutions such as military camps, refugee camps, prisons or hospitals (Labour Force Survey, 2014). The LFS is, however, still representative. It is nation-wide and captures all employment attributes in all the ten provinces of Zambia. The LFS is a viable tool that can be used to produce national, provincial and district estimates.

In this study, the key dependent variable of interest was the returns to employment. This was measured by the log of monthly wage in kwacha. To be specific, the study's primary objective was to compare returns to individuals with TVET vocational training in wage employment and returns to individuals who are in wage employment but with no TVET skills. Other variables of interest which have been empirically established to influence the size of income or wage were years of schooling and experience.

3.2 Estimation Strategy

The study employed a variant of the standard Mincer equation. This has been widely used in the empirical literature to estimate or explain wage income as a function of years of experience and schooling. This still remains a yardstick for explaining wage determination provided it is adjusted or other covariates affecting the wage or income are accommodated (Lamieux, 2006). The standard traditional Mincer equation is expressed as:

$$\ln W_i = \beta_0 + \beta_1 S_i + \alpha_1 E_i + \alpha_2 E_i^2 + \varepsilon_i \quad (1)$$

Where i represents an individual, W , S , and E denotes the individual's monthly wage, years of schooling, and years of experience respectively. The stochastic error term ε_i represents a catchall term for all missing relevant variables affecting monthly wage. It is assumed to be normally distributed.

We adopt the modified Mincer equation similar to the one adopted by Krafft (2018) to ascertain the determinants of the wage as shown below:

$$\ln W_i = \beta_0 + \beta_1 S_i + \alpha_1 E_i + \alpha_2 E_i^2 + \sum_j^n \theta_j T_{ij} + \gamma_i L_i + \delta_i A_i + \varepsilon_i \quad (2)$$

Where i denotes an individual, j denotes the TVET skill training, T_{ij} is the dummy variable for TVET skills training taking wage employment but with no TVET skills as the base category, L_i is the dummy variable for literacy levels with illiteracy as the base category, and A_i is the dummy variable representing whether an individual resides in an urban area taking rural area as the base category.

Disaggregating the level of education for purposes of determining differences in earnings by education level, equation (2) can be written as follows:

$$\ln W_i = \beta_0 + \beta_1 S_i + \alpha_1 E_i + \alpha_2 E_i^2 + \sum_j^n \phi_j L E_{ij} + \sum_j^n \theta_j T_{ij} + \gamma_i L_i + \delta_i A_i + \varepsilon_i \quad (3)$$

Where LE_{ij} is the level of education j of individual i taking no education as the base category.

The above modified linear Mincer equations are not devoid of problems of estimation. More specifically, the returns to wage employment may be correlated with other factors such as ability, individual self-selection, and wage expectations. These are omitted from equations (2) and (3). The estimates of the returns to TVET education may, therefore, be biased upwards (Patrinos, 2016; Kraft, 2013). Notwithstanding the above limitations of the standard Mincer equation, we also employ the fixed effects approach. This is in order to establish the causal relationship of returns to TVET skills. It should be noted that one attractive statistical feature of the fixed effects model is that it eliminates all unobservable characteristics that are constant across individuals and households. Thus, we estimate the returns to TVET skills for individual i from household z using the following fixed effects model:

$$\ln W_{it} = \beta_0 + \beta_1 S_{it} + \alpha_1 E_{it} + \alpha_2 E_{it}^2 + \sum_j \phi_j LE_{itj} + \sum_j \theta_j T_{itj} + \gamma_i L_{it} + \delta_i A_{it} + \mu_h + \varepsilon_i \quad (4)$$

Where μ_h is the household fixed effects which allows all the omitted unobservable variables that do not change with time across households and individuals to be netted out.

4.0 Results

4.1 Summary Statistics

Table 2 provides descriptive statistics of the variables of interest in this study

Table 2: Descriptive Statistics

| Variable** | Statistic |
|---------------------------------------|-------------------|
| Mean age in years | 20.72 (17.00) |
| Mean years of schooling | 6.43 (4.00) |
| Average Gross monthly wages in Kwacha | 2550.65 (3297.00) |
| Log of wages | 7.29 |
| Level of education (%) | |
| No education | 17.81 |
| Primary | 38.43 |
| Secondary | 24.45 |
| Tertiary | 24.51 |
| TVET skills training (%) | |
| Trained with certification | 27.67 |
| Trained with no certification | 42.90 |
| No skill training | 92,94 |
| Literacy Levels* (%) | 63.18 |
| Region of residence (%) | |
| Rural | 59.16 |
| Sex of respondent (%) | |
| Female | 50.83 |

Source: Authors' computations

*Can read and write in English language

** Standard deviation in parenthesis.

It can be observed from Table 2 that the average age of the sample is 20.7 years and the active working age population have an average of 6.4 years of schooling. Furthermore, the individuals in the sample have a gross average monthly wage of K2,550.65. It can further be observed from Table 2 that about 17.9%, of the individuals in the sample have no education, 38.4% have attended primary education, 24.5% attended secondary education, and 2.5% have tertiary education respectively.

Table 2 also reveals that about 2.8% of the individuals in the sample have TVET skill training with certification. About 4.3% and 92.9% of the sample units have TVET skills with no certification and no skills training at all respectively. Thus, the majority of the individuals in the sample with skills have not attended formal vocational educational training in Zambia. Table 2 also shows that of those sampled, about 63.2% can read and write in any language, suggesting fairly high literacy levels across the country. Moreover, of those sampled, 50.8% were women and 59.2% of the individuals resided in the rural parts of Zambia.

4.2 Return to Vocational Skills and General Education

We attempted to estimate the returns to vocational skills in Zambia. Table 3 provides the estimated results of our modified Mincerian equation (2). We can observe from specification 1 that an additional year of schooling results in a monthly wage increase of about 23.4% on average to all the individuals in the sample, that is both males and females. This finding is statistically significant at the 10% level. It is consistent with our a priori expectations of a positive impact of an additional year of schooling on returns to technical education. Disaggregating the data by gender, we still observe from Table 3, that an additional year of schooling is associated with an average increase of about 21.8% and 26.6% in wages to males and females respectively (see specification 2 and 3). Besides, regardless of whether or not an individual resides in the rural or urban area, an additional year of schooling results in an average increase in returns to technical education of about 24.2% and 23% to individuals residing in rural and urban areas respectively (See specification 4 and 5).

Table 3: OLS Model 2 Estimates of Returns to Vocational Skills and Education

| | (1) | (2) | (3) | (4) | (5) |
|--------------------------------------|-----------|-----------|------------|-----------|-----------|
| Variables | OLS All | OLS Male | OLS Female | OLS Rural | OLS Urban |
| Years of schooling | 0.234*** | 0.218*** | 0.266*** | 0.242*** | 0.230*** |
| | (0.005) | (0.006) | (0.009) | (0.009) | (0.006) |
| Years of experience | 0.041*** | 0.037*** | 0.049*** | 0.032*** | 0.044*** |
| | (0.004) | (0.004) | (0.007) | (0.007) | (0.004) |
| Experience Squared | -0.001*** | -0.000*** | -0.001*** | -0.001*** | -0.001*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| No TVET skill training Base category | | | | | |
| TVET skill with certification | 0.315*** | 0.369*** | 0.135 | 0.484*** | 0.277*** |
| | (0.049) | (0.056) | (0.101) | (0.120) | (0.054) |
| TVET skill no certification | 0.028 | 0.010 | 0.041 | 0.046 | 0.026 |
| | (0.065) | (0.070) | (0.170) | (0.117) | (0.078) |
| Literacy Level | -0.217*** | -0.174** | -0.381*** | -0.318*** | -0.135 |
| | (0.068) | (0.088) | (0.107) | (0.096) | (0.096) |
| Urban | 0.036 | 0.094** | -0.069 | | |
| | (0.031) | (0.037) | (0.058) | | |
| Constant | 4.652*** | 4.773*** | 4.475*** | 4.746*** | 4.624*** |
| | (0.069) | (0.092) | (0.106) | (0.097) | (0.099) |
| Observations | 3,387 | 2,379 | 1,008 | 904 | 2,483 |
| R-squared | 0.476 | 0.439 | 0.561 | 0.537 | 0.433 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' Computations

Table 3 indicates that experience is positively correlated with the rate of return. To be precise, specification 1 suggests that an additional year of experience results in an average increase of 4.1% in the rate of return for all individuals in the sample. The preceding finding is not significantly different when the data is disaggregated into males and females. An additional year of experience leads to an increase in the rate of return of about 3.7% and 4.9% for males and females respectively (see specification 2 and 3). Furthermore, an additional year of experience results in an average rate of return of about 3.2% and 4.4% for individuals residing in rural and urban areas respectively (see specification 4 and 5).

The modified Mincerian equation (2) estimates the association between TVET skill training and the rate of return. In Table 3, we observe that individuals in the sample possessing a TVET skill with certification have an average rate of return of about 31.5% higher than the rate of return for individuals in the sample in wage employment devoid of TVET skills (see specification 1). Similarly, when the data is disaggregated into males and females, specification 2 and 3 suggests that males and females with TVET certificates earn higher rates of return of about 36.9% and 13.5% respectively when compared to their respective counterparts in wage employment with no TVET training. Likewise, individuals with certified TVET skills residing in rural and urban areas earn rates of return of about 48.4% and 27.7% respectively more than their respective counterparts with no TVET training (see Specification 4 and 5).

Furthermore, Table 3 indicates a positive correlation between the rate of return and undergoing TVET skill training. More specifically, specification 1 suggests that individuals who are not certified but have undergone TVET skill training earn a rate of return of about 2.8% more than their counterparts in wage employment lacking TVET skills. In specification 2 and 3, the results suggest that uncertified males and females with TVET training earn respective rates of return of about 1% and 4.1% more than their respective counterparts in wage employment with no TVET training. Additionally, uncertified individuals with TVET training living in rural and urban areas earn respective rates of return of about 4.6% and 2.6% more when compared to their counterparts in rural and urban areas in wage employment who have not undergone TVET training (see specification 4 and 5).

The coefficient of the dummy variable urban in specification 1 suggests that all individuals residing in urban areas earn a higher rate of return of about 3.6% when compared to individuals living in rural areas. Similarly, specification 2 suggests that males residing in urban areas earn a rate of return of about 9.4% more than their counterparts working in rural areas. However, this is not the case for females residing in urban areas. These earn approximately 6.9% less

than their female counterparts residing in rural areas (see specification 3). Specifications 1 through 5 in table 3 shockingly reveal that being literate has a negative impact on the rates of return. This surprising result may be attributed to bias arising from omitted variables such as ability and individual self-selection.

Table 4 provides the estimated results of the modified Mincerian model (3). This disaggregated education into levels. The average rates of return to TVET skills with certification are not significantly different from the average returns observed in Table 3. It can be observed from specification 2 in Table 4 that certified individuals with TVET skills earn an average rate of return of about 31.5% more than their counterparts without TVET training in wage employment. However, we note from specification 2 that individuals without certification who have undergone TVET training earn an average rate of return of about 1.9% less than their counterparts without TVET training.

Table 4: OLS Model 3 Estimated Results of Returns to Vocational Skills

| | (1) | (2) | (3) | (4) | (5) | (6) |
|--|----------------------|----------------------|----------------------|----------------------|---------------------|----------------------|
| Variables | OLS All | OLS Levels All | OLS Male | OLS Female | OLS Rural | OLS Urban |
| No education (Base category) | | | | | | |
| Primary | | -0.237*** (0.090) | -0.246** (0.112) | -0.160 (0.150) | -0.012 (0.121) | -0.456*** (0.128) |
| Secondary | | 0.499*** (0.094) | 0.432*** (0.115) | 0.670*** (0.163) | 0.656*** (0.133) | 0.292** (0.129) |
| Tertiary | | 1.639*** (0.096) | 1.544*** (0.119) | 1.903*** (0.164) | 2.110*** (0.139) | 1.340*** (0.132) |
| Years of experience | 0.041*** (0.004) | 0.034*** (0.004) | 0.031*** (0.004) | 0.040*** (0.007) | 0.029*** (0.007) | 0.037*** (0.004) |
| Experience squared | -0.001*** (0.000) | -0.000*** (0.000) | -0.000*** (0.000) | -0.001*** (0.000) | -0.000** (0.000) | -0.000*** (0.000) |
| No TVET skill training (Base category) | | | | | | |
| TVET skill with certification* | 0.315*** (0.049) | 0.317*** (0.050) | 0.369*** (0.057) | 0.099 (0.105) | 0.589*** (0.118) | 0.262*** (0.056) |
| TVET skill no certification* | 0.028 (0.065) | -0.019 (0.065) | -0.054 (0.070) | 0.040 (0.177) | 0.017 (0.112) | -0.035 (0.079) |

| | | | | | | |
|--------------------|-----------|----------|----------|----------|----------|----------|
| Literacy levels** | -0.217*** | 0.316*** | 0.283*** | 0.264** | 0.219** | 0.391*** |
| | (0.068) | (0.066) | (0.084) | (0.109) | (0.089) | (0.094) |
| Urban | 0.036 | 0.170*** | 0.226*** | 0.076 | | |
| | (0.031) | (0.031) | (0.037) | (0.059) | | |
| Years of schooling | 0.234*** | | | | | |
| | (0.005) | | | | | |
| Constant | 4.652*** | 5.958*** | 6.067*** | 5.800*** | 5.856*** | 6.262*** |
| | (0.069) | (0.081) | (0.101) | (0.139) | (0.110) | (0.114) |
| Observations | 3,387 | 3,492 | 2,447 | 1,045 | 958 | 2,534 |
| R-squared | 0.476 | 0.459 | 0.429 | 0.531 | 0.555 | 0.401 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' Computations

We can also observe from specification 3 and 4 in Table 4 that males and females who have undergone TVET training with certification earn respective average rates of return of about 36.9% and 9.9% more than their male and female colleagues without TVET training in wage employment. Similarly, females with TVET training but without certification earn an average rate of return of about 4% more than their female working counterparts without TVET training (see specification 4). However, this is not the case for males without certification but with TVET training. In particular, we note from specification 3 that males with TVET training without certification earn an average rate of return of about 5.4% less than their male counterparts without any TVET training in wage employment.

Furthermore, we observe from specification 5 and 6 in Table 4 that individuals possessing TVET skills with certification residing in rural and urban areas earn respective average rates of return of about 58.9% and 26.2% more than their colleagues working in rural and urban areas respectively without any TVET training. Similarly, individuals who have undergone TVET training without certification residing in rural areas earn an average rate of return of about 1.7% more than their counterparts in wage employment and without TVET training in rural areas. However, this is not the case for individuals in urban areas who have undergone TVET training without certification. More specifically, individuals in urban areas with TVET skills without certification earn an average rate of return of about 3.5% less than their counterpart in wage employment lacking any TVET skill training. Finally, we note from specification 2 through to 6 that years of experience and literacy levels have a positive impact on the average rates of return.

4.3 Household Fixed Effects Results

In order to establish a causal relationship of returns to TVET skills and to eliminate the bias resulting from the omitted variables such as ability and individual self-selection, we also estimated the fixed effects model. It has, however, been argued by some scholars that although the fixed effects model is able to eliminate bias associated with household characteristics, bias resulting from individual characteristics such as ability and individual self-selection are likely to remain (Kraft, 2013). Table 54 shows the estimated results of the fixed effects model (Equation 4 discussed in the previous section) when education is disaggregated into levels. As can be observed from specification 2 through to 6 in Table 5, the rate of return to individuals with or without TVET skills training when education is disaggregated into levels is not significantly different from the one observed in Table 4. More specifically, the rate of return to certified individuals with TVET skills is about 31.6% more than individuals in wage employment without TVET training (see specification 2). However, specification 2 reveals that uncertified individuals with TVET skills earn a rate of return of about 1.4% lower than their counterparts with no TVET training.

Table 5: Fixed Effects - Estimates of Returns to Vocational Skills

| | (1) | (2) | (3) | (4) | (5) | (6) |
|--|---------------|------------|--------------|----------------|--------------|--------------|
| VARIABLES | Schooling All | Levels All | Levels Males | Levels Females | Levels Rural | Levels Urban |
| No education (Base category) | | | | | | |
| Primary | | -0.186** | -0.221** | -0.153 | 0.017 | -0.387*** |
| | | (0.088) | (0.112) | (0.149) | (0.114) | (0.127) |
| Secondary | | 0.498*** | 0.438*** | 0.680*** | 0.648*** | 0.294** |
| | | (0.092) | (0.115) | (0.163) | (0.125) | (0.128) |
| Tertiary | | 1.606*** | 1.546*** | 1.916*** | 2.087*** | 1.306*** |
| | | (0.095) | (0.118) | (0.165) | (0.133) | (0.131) |
| Years of experience | 0.041*** | 0.036*** | 0.032*** | 0.042*** | 0.027*** | 0.039*** |
| | (0.004) | (0.004) | (0.004) | (0.007) | (0.006) | (0.004) |
| Experience squared | -0.001*** | -0.000*** | -0.000*** | -0.001*** | -0.000** | -0.000*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| No TVET skill training (Base category) | | | | | | |
| TVET skill with certification | 0.318*** | 0.316*** | 0.365*** | 0.096 | 0.595*** | 0.261*** |
| | (0.049) | (0.050) | (0.057) | (0.106) | (0.118) | (0.056) |

| | | | | | | |
|-----------------------------|-----------|----------|----------|----------|----------|----------|
| TVET skill no certification | 0.033 | -0.014 | -0.054 | 0.047 | 0.027 | -0.032 |
| | (0.064) | (0.064) | (0.070) | (0.175) | (0.111) | (0.078) |
| Literacy levels | -0.209*** | 0.290*** | 0.282*** | 0.245** | 0.184** | 0.370*** |
| | (0.066) | (0.064) | (0.084) | (0.109) | (0.083) | (0.091) |
| Urban | 0.041 | 0.174*** | 0.219*** | 0.082 | | |
| | (0.033) | (0.033) | (0.037) | (0.060) | | |
| Years of schooling | 0.223*** | | | | | |
| | (0.005) | | | | | |
| Constant | 4.740*** | 5.956*** | 6.059*** | 5.790*** | 5.882*** | 6.254*** |
| | (0.069) | (0.081) | (0.101) | (0.139) | (0.104) | (0.113) |
| | | | | | | |
| Observations | 3,387 | 3,492 | 2,447 | 1,045 | 958 | 2,534 |

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: Authors' Computations

Furthermore, it can be seen from specification 3 in Table 5 that males possessing TVET skills with certification earn an average rate of return of about 36.5% more than their male counterparts in wage employment with no TVET skill training. specification 3 indicates that males with TVET skill training without certification earn an average rate of return of 5.4% lower than their male counterparts in wage employment with no TVET training.

Specification 4 in Table 5 also indicates that females who have undergone TVET training with certification earn an average rate of return of about 9.6% higher than their female counterpart in wage employment with no TVET skills training. Additionally, in contrast to the case for males, females who have undergone TVET training without certification earn an average rate of return of about 4.7% more than their female counterparts with no TVET training.

In specification 5 and 6, we observe that certified individuals with TVET training residing in rural and urban areas earn average rates of return of about 59.5% and 26.1% more than their respective counterparts in rural and urban areas in wage employment without TVET training respectively. Similarly, individuals residing in rural areas with TVET training without certification earn an average rate of return of about 2.7% more than their counterparts in wage employment but without TVET training. However, this is not the case for urban areas. In particular, individuals who have undergone TVET training without certification earn an average rate of return of about 3.2% less than their counterparts without any TVET training.

The literacy results in Table 5 contrast those observed in Table 2. More specifically, as can be observed from specifications 2 through to 6, being able to read and write has a positive impact on the average rate of return regardless of gender or area of residence. Besides this, it can further be noted from

specification 1 through to 6 that an additional year of experience is positively correlated with the average rates of return.

In both Tables 4 and 5, we observe that the higher the level of education, the higher the average rate of return relative to individuals without formal education.

5.0 Discussion of Results

The OLS results in Table 3 suggest that an additional year of schooling has a significant impact on the average rate of return to technical education regardless of gender or whether the individual resides in a rural or urban area. It is, however, worth noting that females earned relatively more than their male counterparts. More specifically, females earned an average rate of return of about 26.6% compared to males who earned an average rate of return of about 21.8% as a result of an additional year of schooling. Overall, we note that an additional year of schooling has a positive significant impact on returns to both males and females. Furthermore, we note that individuals residing in rural areas earned slightly more than their counterparts in urban areas. To be specific, an additional year of schooling resulted in an increase of about 24.2% and 23% in the average rate of return to individuals working the rural and urban areas respectively. Overall, higher levels of schooling should be encouraged because it has a positive significant impact on the average rate of returns.

Furthermore, the results in Table 3 also suggest that an additional year of experience had a significant impact on the average rate of return for both males and females. This was also the case with individuals residing in rural and urban areas. We observe, however, that females benefitted more than males from an additional year of experience. Moreover, Table 3 results suggest that an additional year of experience significantly benefitted individuals residing in urban areas more relatively to their counterparts in rural areas.

The results in Table 3 suggest that individuals possessing TVET skills with certification significantly earned more than their colleagues in wage employment without any TVET skills. More specifically, individuals with TVET skills with certification significantly earned a rate of return of about 31.5% more than their colleagues in employment without any TVET training. This finding is consistent with empirical evidence by Moenjak and Worswick (2003), Strawinski et al. (2016), Ahmed (2016), Kahyarara and Teal (2007), and Neuman and Ziderman (1991). It therefore supports the growing calls for increased spending on vocational training in Zambia. A closer inspection of the results presented in Table 3 suggests that males with TVET skills with certification significantly earned

more (about 36.9%) than their female counterpart possessing the same skills with certification who earned an insignificant average rate of return of about 13.5%. This finding suggests an imbalance and gender pay gap between males and females with the same qualifications, a sign of labour market discriminatory behavior or bias by employers. This finding is consistent with that observed by El-Hamidi (2006). Table 3 results further revealed that regardless of whether the individual possessing the TVET skills with certification resided in the rural or urban area, they significantly earned more than their counterparts in the respective areas in wage employment without any TVET training. It should be noted, however, that certified individuals with TVET skills residing in rural areas significantly earned more (about 48.4%) as compared to 27.7% which their colleagues in urban areas with the same skills and qualification earned. Therefore, the results seem to suggest that qualified TVET individuals with certification benefitted more from TVET skills if they resided in rural areas relative to their colleagues in urban areas.

Table 3 results further revealed that individuals who underwent TVET training without certification did not significantly earn more than their counterparts in wage employment without TVET training. Therefore, notwithstanding the opportunity cost and cost implications of undergoing TVET training of at least two years, the results suggest that individuals should endeavor to not only undergo TVET training but also acquire certification for them to reap significant relative benefits in terms of income from the TVET training. Furthermore, Table 3 results suggest that high literacy levels significantly negatively affect the average rate of return regardless of gender or whether the individual resides in a rural or urban setting. This finding contradicts logic and empirical evidence regarding the impact of being able to read and write. It is worth noting that all the afore-mentioned results should be interpreted cautiously owing to the limitations associated with the estimated results in Table 3 of the modified Mincerian equation resulting from the omitted variable bias.

The OLS results presented in Table 4 concur with most of the findings presented in Table 3. We noted from Table 4 that individuals possessing TVET skills with certification significantly earned more than their counterparts in wage employment without any TVET training. Furthermore, Table 4 results also indicate that males with TVET training with certification significantly earned more than their female counterparts with the same skills and qualification. This highlighted the gender pay gap between males and females. Moreover, individuals with TVET training with certification residing in rural areas significantly earned more than their counterparts with the same TVET qualification residing in urban areas. This could be due the fact that employers may want to attract TVET graduates to relocate from urban areas to rural areas.

We observed in Table 4 that all individuals possessing TVET skills without certification earned about 1.9% less than their counterparts in wage employment without any TVET training. This suggests that individuals who just possessed TVET training without certification were actually worse off than their colleagues without TVET skills. This finding, however, is not significant at all conventional levels of significance. Uncertified males with TVET skills earned about 5.4% less than their male counterparts in wage employment without any TVET skills. Thus, there was no significant benefit in terms of returns to males who just underwent TVET training without certification when compared to their male colleagues without TVET training. Further, the results in Table 4 suggest that individuals with TVET skills without certification residing in urban areas are not only worse off when compared to their colleagues with the same TVET skills or qualification residing in rural areas; they are also worse off when compared to individuals residing in the same area (urban) in wage employment without any TVET skills. Thus, it does not pay to just undergo TVET training without certification when one resides in urban areas.

Table 4 results indicated that there are significant benefits in terms of returns, the higher the level of education. These findings support efforts aimed at encouraging individuals to attain higher levels of education. Moreover, in contrast to Table 3 results regarding the impact of literacy levels, Table 4 indicated that individuals who were able to read and write significantly earned more than their counterparts who were illiterate. This finding is consistent with logic and empirical findings. It further renders support to policies that advance literacy programmes in both rural and urban areas.

The fixed effects results presented in Table 5 are very similar to the OLS results presented in Table 4. This is with regards to the impact of all the variables on returns. For example, Table 5 revealed that all the individuals with TVET skills with certification earned a significant return of about 31.6% relative to their counterparts in wage employment without TVET training. Furthermore, males possessing TVET skills with certification significantly earned more (about 35.6%) than their female colleagues with the same TVET skills with certification who earned about 9.6%. This finding highlights the gender pay gap between males and females with vocational skills. Besides the above finding, we noted from Table 5 that all individuals with TVET skills without certification earned about 1.4% less than their colleagues in wage employment without any TVET training. This suggests that individuals who just possessed TVET training without certification were actually worse off than their colleagues without TVET skills. As the case was in Table 4, this finding, however, is not significant at all conventional levels of significance. Further, Table 5 indicated that males with TVET skills without certification were worse off when compared to their female

counterparts who possessed the same skills without certification. Similarly, individuals residing in urban areas with TVET skills without certification were worse off than their colleagues with the same skills without certification residing in rural areas. Table 5 revealed that there were significant returns to higher levels of education. And that individuals who were able to read and write significantly earned more than their counterparts who were illiterate.

6.0 Conclusion

This article sought to establish the returns to vocational skills in Zambia using the LFS of 2014. The findings from both the OLS and fixed effects estimations revealed that individuals who possessed TVET skills with certification, regardless of their gender or where they resided, significantly earned more than their counterparts in wage employment without any TVET skills. We further observed that both the OLS results and fixed effects results indicated that males with vocational skills with certification significantly earned more than their female counterparts with the same TVET skills with certification. Moreover, we also observed that individuals residing in rural areas with TVET skills with certification also significantly earned more than their counterparts in urban areas with the same TVET skills with certification.

We, however, observed that individuals with TVET skills without certification did not significantly earn more than their colleagues in wage employment without TVET skills. In some cases, individuals with TVET training but without certification were observed to be worse off than their counterparts without TVET training. This suggests that government and individuals should rethink taking the route of just providing or obtaining TVET skills without certification because of the opportunity cost and direct costs associated with TVET training.

In terms of the returns to schooling and experience, we observed that additional years of schooling and experience had a significant impact on returns. Similarly, high levels of education under both the OLS and fixed effects results were associated with significant returns. Furthermore, fixed effects results suggested that literate individuals significantly earned more than illiterate individuals in the sample, although the preliminary OLS results suggested the opposite.

Given the above evidence, it is imperative that the Zambian government significantly increases spending toward vocational training as well as investing in TVET infrastructure in order to improve TVET enrolment rates. This will enhance the employability of Zambians across the country and generate substantial returns to TVET skills. However, there is need for a deliberate policy that will ensure that females with the same vocational skills as their male counterparts earn the same returns. There is also need for deliberate awareness campaigns on the benefits of vocational training in order to reduce the stigma around TVET.

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Endnotes

¹This is training that prepares graduates for work in a specific craft, trade, or as a technician. This training is designed to allow graduates to acquire specific skills meeting specific industry standards in order competently to carry out a specific task.

²Designated credentials awarded to signal an individual's legitimacy and competence to carry out a specific task.

³These are graduates who only possess a General Certificate of Education (GCE) or O-Level Education (also known as grade 12 certificate). These individuals have no further tertiary training or education.

⁴The Labour Force Survey (LFS) is designed to be conducted every two years by the Central Statistical Office in conjunction with the Ministry of Labour and Social Security and the International Labour Organization.

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