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Employment Mobility and Returns to Technical and Vocational Training: Empirical Evidence for Tanzania

by

Vincent Leyaro and Cornel Joseph

Abstract

This paper examines the employment mobility and returns to technical and vocational training (TVET) relative to general education in Tanzania, using data from the 2014 Integrated Labour Force Survey (ILFS). The results show that TVET training facilitates individual easy transition into employment. As it has been shown, both in descriptive statistics and regression results, that technical, on job training, vocational and apprenticeship training are particularly important in acquiring formal employment. The results further show that, though the returns to general education (GED) and TVET are positive and statistically significant, on average those with TVET trainings are earning relatively less than those with general education, implying lower returns to TVET graduates compared to general education graduates. The descriptive statistics confirm this by showing that, in Tanzania, workers with university degree earns twice of those with technical training and three times those with vocational training. Clearly, two implications stand out here: one, technical and vocational training are very instrumental in addressing the rising youth unemployment; and two, to make it attractive to parents and students governments across the region has to work towards raising the returns to TVET.

JEL Classification: J24, J310

Keywords: employment mobility, returns, TVET, Tanzania

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1. Introduction

Education's critical role in determining and enhancing individuals' labor market outcomes is well documented in the literature. Human capital theory suggests that individuals and firms undertake education and training as an investment to increase their earnings and productivity (Becker, 1964). Empirical literature over years have already shown that improved education and training lead to higher economic growth and development, both in developed and developing countries; which could then trickle down in terms of better labour market outcomes such as higher employment rates and higher earnings (Bhurtel, 2015; Shreeve, Gibb and Ribeiro, 2013; Hanushek *et al.*, 2011; Adams, 2007). Evidence around the world shows that technical and vocational training can enhance employability skills and increase the chance of obtaining a stable job in the private sector. Moreover, well-designed TVET system reduces skills gap and mismatches by tying skills acquisition to current and expected industry demand (Quintini and Manfredi, 2009; Quintini *et al.*, 2007; Cahuc *et al.*, 2013; Zimmermann *et al.*, 2013).

Several studies in Sub Saharan Africa (SSA) have also shown this to be the case, by showing that education and training play an important role in supporting workers finding good and decent jobs (i.e. transition into employment) or acquiring new skills to boost their labour market earnings (Twumasi-Baffour, 2013; Aslam and Rawal, 2013; Hanushek *et al.*, 2011). Besides these, the existing TVET programs in most of these countries are often perceived as an unattractive option that lead to dead-end jobs and an inferior alternative to general education (Garcia and Fares 2008; Zimmermann *et al.* 2013).

Aside this, it is well known that there is a substantial disparity both in the level and the organization of education and training across countries and even within countries. Some countries, give more emphasis to the importance of TVET and apprenticeships towards developing the job related specific skills that help address the youth unemployment problem in specific occupations (Ryan, 2012). Other countries put more emphasis and attached importance to the basic knowledge through general education (GED) programs under the assumption that specific skills may become obsolete quickly and that employability of graduates is maximized by strengthening the foundations of basic

knowledge (Krueger and Kumar, 2004; Ryan, 2012). Consequently, there has been a debate about educational and training reforms in most developing countries on whether the focus should be more given to general education or more to technical and vocational training when it comes to enhance individual labour market outcomes in terms of returns (earning) and employment opportunities (Psacharopoulos, 1987; Hanushek *et al.*, 2011).

Technical and vocational programs have long been praised for their success in easing school-to-work transitions. As they are associated with reducing mass youth unemployment (Tilak, 2002; Müller and Gangl, 2003), higher starting salaries (Mane, 1999; Bishop and Mane, 2004) as well as providing early and effective matches with employer demands (Arum and Shavit, 1995; Heijke *et al.*, 2003; Giret, 2011). Countries such as Germany, Switzerland, Austria, Netherlands, Denmark and Finland that have placed TVET at the core of their education and training system, both in term curriculum review and financing, have ultimately succeed in attaining structural transformation and industrialization, maintaining low youth unemployment rates and attain prosperity. In these countries TVET is the first option for most parents and students and TVET graduates makes more than 50 percent of all graduates with most of TVET graduates earnings relatively higher than those with university degrees. However, it is perceived that these positive results have short-term to medium-term effects, long-term effects may be rather negative (Goldin, 2001; Krueger and Kumar, 2004). Given the strong ties of the skills that technical and vocational training embed to an individual's to a specific context, TVET graduates risk to become obsolete in the future and in times of rapid technological change, this is likely to be problematic.

General education on the other hand, with its focus on broad knowledge and basic skills, facilitates learning in a changing context and reduces the costs of occupational mobility (Verhaest and Baert, 2015). It is argued that GED is more flexible as it allows individuals to change their job easily whereas TVET is mostly suitable for particular type of work (Agrawal, 2013). Since technology is ever-changing, workers require frequent training, and it is through GED that workers could easily adapt to new technologies (Krueger and Kumar, 2002). Because of this, policy makers face a trade-off between contrasting short-term to medium-term effects at the expense of long-term effects (Hanushek *et al.*, 2011). This has made many developing countries including those in SSA in 1970s to 1990s to

put more emphasis towards general education in term of policies, strategies and financing at the expense of TVET. As the result, TVET performance, and its contribution, in most of these countries have suffered significantly. Most TVET graduates are of poor and low quality, irrelevant and incompetent to the labour market needs, which have exacerbated the skills gaps and mismatches problem. Poor and low financing of TVET by both the public and private sectors and low returns TVET graduates are facing have exacerbated the negative bias towards TVET, making TVET unattractive to parents and students, which have led low TVET enrolment and few TVET graduates in these countries.

Empirical studies on various countries have also shown that the effects of general education (GED) relative to technical and vocational education and training (TVET) on labour market outcomes differ substantially. In some countries, returns to TVET at the upper secondary are higher than general education (e.g El-Hamidi (2006) in Egypt, Moenjok and Worswick (2003) in Thailand, Sakellariou (2003) and Riboud *et al* (2007) in Singapore). Thus, suggesting that the TVET tracks perform superior to the academic tracks in terms of wages employment. Despite some evidence that TVET leads to better integration into wage employment in developing countries (Garcia and Fares 2008; Guarcello *et al*, 2008; Eichhorst *et al.*, 2012), the returns to TVET is lower than returns to general education (Riboud, *et al*, 2007; Lassibille and Tan, 2005; Riboud *et al*, 2007). While other studies found no significant differences exist in labor market participation or earnings between TVET and general education graduates (Malamud and Pop-Eleches, 2008).

Furthermore, study by Hanushek, *et al.* (2011) which examined the labour market outcomes comparing GED against TVET over the life-cycle in eighteen countries in Europe and United States found that individuals with general education were less likely to be employed relative to those with TVET at early ages. However, by the age of 50, individuals with GED were more likely to be employed than those with TVET. More recently, Fukunishi and Machikita (2017) found a positive effect for young workers with entry-level vocational education and training over workers with general secondary education on the probability of having a full-time, permanent, or formal job in Ethiopia; which indicates that the labor market outcomes depend heavily on the skills individuals

have learnt through TVET than the knowledge acquired through general education (Aslam and Rawal; 2013).

Besides, other studies, like the one by Fox and Kaul (2018) cast serious doubt on the efficacy and value of training interventions to help youth enter formal wage employment concluding that employment opportunities in low-income countries reflect the pace of economic and structural transformation rather than skills training alone. Arguing that, the case is stronger for the training interventions that speed the transition to self-employment in farming or non-farm household enterprises. Hence, the support for development of transferable character skills and social integration among youth through positive youth development programs should be tested further for employment and earnings impacts, perhaps along with cash transfers to youth or access to finance. For the case of Tanzania for instance, Kahyarara and Teal (2006) found that general education was more rewarding than vocational education since the marginal return to one year of education ranges between 4.8 and 17.5 percent compared to the return to one year of vocational education that ranges between 1.4 and 2.8 percent.

However, the worsening youth job crisis in the midst of high economic growth have more recently, unlike the neglect of the past in 1970s to 1990s, made most countries in SSA and Tanzania for that case to acknowledge and appreciate the critical role TVET can play for ‘structural transformation’ and industrialization; by extension addressing the problem of rising youth unemployment. This is because graduates from TVET training institutions are typically deemed to be ready-made for their occupational choices; such that going through TVET implies a smooth transition to various career choices. Thus the adoption of TVET should in a way imply the reduction of youth unemployment. To attain these, there is as serious need to address the negative perception towards TVET training by parents and students and the low returns to TVET graduates. The main policy relevant question this paper is grappling with is what needs to be done to increase the returns from, and enhance transition into employment due to, TVET such as to increase the attractiveness of TVET among parents and student in most of SSA countries. This therefore entail, for the case of Tanzania, first to establish and estimates employment mobility, and secondly returns to TVET comparing to general education.

It is within this background that there is a pressing need to transform TVET subsector taking into consideration the country focus towards industrialization, at the time that globalization and automation will take most of jobs that will be needed by young people. There is the need not only to transform the TVET subsector but to ensure that TVET becomes the choice that is equivalent or better than university first degree or master degree qualifications. Even though, studies that have examined whether investing in general education (GED) raise employment opportunities and incomes than investing in TVET training are far limited in SSA. The existing one by Kahyarara and Teal (2008) that investigated the returns to vocational education comparing to general education in Tanzania, did not examined employment mobility (i.e. transition into employment), which is a more relevant measure to observe the contribution of TVET training in reducing youth unemployment. Indeed, this is important to low and poor income countries like Tanzania that is struggling with addressing the whole issue of rising youth unemployment and enhancing its human capital to attain structural transformation and by extension industrialization.

Using recent national labour force survey data of 2014, which is complimented by field survey, this study explores whether TVET have better labour market outcomes in terms of transition into employment and returns comparing to general education, with the objective of coming with proposals of how to enhance labour market outcomes of TVET graduates. This paper is structured as follows. The next section reviews the related literature. Section three discusses some TVET reforms, performance and issues in Tanzania. The fourth section describes the empirical model and methodology. Section five presents descriptive statistics and analysis. Section six presents the empirical results and discussion of findings. The final section provides the summary and policy implications of the study.

2. Mobility and Returns to TVET: Theory and Empirics

In 1961, Theodore Schultz published his human capital theory which posits that individual financial returns in the labour market could optimally be determined by the amount of education and training that an individual receives. In this theory, highly educated and trained individuals should earn higher wages (Schultz, 1961). The human

capital theory of the 1960s suggests that education and training are important to the improvement of workers' skills and productivity that enable them to work in better paid jobs (Schultz, 1961; and Becker, 1964). It is in this context that the human capital theory emphasizes the role of education and training in reduction of unemployment.

In essence, the theory portrays that formal education and training is highly instrumental and necessary for improvement of the productive capacity of a population. Becker (1964) argues schooling, as business investment in equipment, is capital and therefore is among the factor that raises a person's earnings, and both increase productivity and competitiveness. It is in this regard that high productivity workers are usually more preferred by employers, assumption being that have higher education or training such that they are more likely to be more productive than the low productivity workers.

In the same context, the self employed workers with higher education and training and hence higher productivity are expected to perform better in businesses than those with no education and training and hence are at the low-side productivity. Hence even within the informal sector, there exist dualities where some people are forced to work at a lower level of productivity, while others work at the upper levels of productivity in which entry is restricted because of the lack of human and financial capital (Fields, 2011). Besides these theories there are mixed evidence.

Conlon (2001) examined the differential in earnings premium between academically and vocationally trained males in the United Kingdom based on cross sectional and longitudinal survey data. The study used alternative estimation techniques including ordinary least squares, instrumental variables and a Heckman selection approach. The results showed that there was a statistically significant differential in the earnings premium between academically and vocationally qualified depending on method of estimation and the data used. The degree holders achieved a 20 percent premium over those in possession of vocational qualifications at an equivalent level of qualification attainment.

Meer (2007) used the National Educational Longitudinal Survey of 1988 to examine the returns to secondary and vocational education in the United States. The study found that

individuals on vocational track earn substantially less than those on the academic track. However, men benefited far more from the technical track while women benefited more from academic track. Malamud and Pop-Eleches (2010), on the other hand examined the relative benefits of general education and vocational training in Romania using census and household survey data. Using a regression discontinuity design, the study confirmed that individuals with vocational training were more likely to be employed, stay in labor force and employed as manual workers and craftsmen than their counterparts with general education. The study showed further that men with vocational training earned significant less than those with general education.

Hanushek *et al.* (2011) examined the labour market outcomes of GED and TVET over the life-cycle in eighteen countries of Europe and United States. The study found that individual with general education were initially 7 percent less likely to be employed relative to those with vocational training, and the gap narrowed by 2 percent for each ten years interval. Hence, by the age of 50, individuals with GED were more likely to be employed than those with TVET. Ahmed and Chattopadhyay (2016) studied the return to general education and vocational training in India using standard Mincerian, extended Mincerian and Heckman two-stage. The result showed that returns to formal VET and On the Job training (OJT) were quite high in the primary level, but there was a gradual decline in these returns when compared with general education at secondary and tertiary level.

Cedefop (2013) investigated the relationship between vocational training and school-to-work transition, using the individual anonymized micro data from the core and ad hoc modules of the 2009 European Union Labor Force Survey. The results indicated that relative to graduates with medium-level academic education, graduates with a vocational training were more likely to have a permanent first job and less likely to find a first job with a qualification mismatch. Moreover, Brunello and Rocco (2017) found that, for lower education, both expected long-term earnings and earnings variability were lower for vocational than for academic education for person born in UK. Though, for higher education, vocational qualifications were associated with both higher long-term expected returns and lower variability of earnings and employment than academic qualifications.

Using national labour force survey dataset, Fukunishi and Machikita (2017) estimated the effects of vocational education on employment outcomes in Ethiopia. The study utilized 2SLS and bivariate probit models. The findings showed a positive effect for young workers with entry-level vocational training over workers with general secondary education on the probability of having a full-time, permanent, or formal job. When the proportion of graduates on the vocational track increased (decreased), lower-secondary graduates were less (more) likely to have a job with a permanent contract for both genders, and a job in the formal sector for males.

In Tanzania, Kahyarara and Teal (2006) compared the returns to vocational training versus academic education in Tanzanian manufacturing firms using the panel data over the period 1992 to 2001. The study found that the rewards for general education were significantly higher than those of vocational training and on the job training, and the results were stable even after controlling for endogeneity of education, firm-worker characteristics and firm fixed effects.

3. Technical and Vocational Education and Training in Tanzania: Reforms, Performance and Issues

3.1 Tanzania Education systems

General Education System

The general education system constitutes the so called 2 – 7 – 4 – 2 – 3+ structure, that is, 2 years of pre-primary education (PPE) for children aged between 4-6 years; the primary education (standard I-VII) that normally takes 7 years; secondary education which has two cycles, commencing with 4 years of ordinary level secondary education (form 1-4), followed by 2 years of advanced level secondary education (form 5- 6); and 3 years and above of university education.

The PPE is basically targets to promote the overall personality development of a child, fostering his or her physical, mental, moral and social characteristics and capabilities (NBS, 2014). It also intended to prepare children for primary school education. The primary school education is universal and compulsory for all children aged 7-13 years. In 2012, pre-primary and primary education accounted for 95 percent and 97 percent of enrolment respectively (NBS, 2014).

Upon completion of 7 years of compulsory primary education, students proceed to a secondary education that completes 13 years of education. General secondary education is divided into two cycles; a first cycle named Ordinary level lasting 4 years, and a second cycle named Advanced Level lasting 2 years. In the case of secondary education selection and enrolment into the ordinary level of education (O-level) is based on good performance in primary school education; and enrollment into advanced level of education (A-level) is based on attainment of credit points in examination taken at the level of certificate of secondary education examination (CSEE), that is, at the end of the O-level. The advanced certificate of secondary education examination (ACSEE) marks the completion of the senior secondary education cycles; and the credits earned are used for the selection of students enrolled in university education.

The university education is offered mainly at three levels: bachelors, masters and PhD. Noteworthy that the university education is the major part of the tertiary education and is provided after A-level secondary school education. The main aim of university level education is to enable its recipients become well-educated, knowledgeable and well-versed in terms of perspectives, skills and contemporary developments in social, economic, cultural, scientific and technological fields.

Technical and Vocational Education and Training System

There is both formal and informal TVET system. The formal TVET system offered through two distinct sub-systems, namely vocational education and training (VET) and technical education and training (TET). VET centres offer artisan programmes in, for example, masonry and bricklaying, carpentry and joinery, welding and fabrication, electrical installation, secretarial duties, air fare and ticketing, tour guiding, and others of similar nature. TVET programmes are offered at the secondary education level. Specifically at the ordinary level students can opt for two year programmes in vocational and crafts training offered at district and regional vocational training institutes. Students who take vocational and crafts training will not be able to proceed to the next level of education and will normally enter the labour market. At the Advanced Level, students can opt for three year technician training courses. TVET at the tertiary education level is

offered in universities, university colleges, and tertiary-based institutions. Students can take a three year professional training courses.

On the other hand, the non formal TVET programmes are offered through different means, including: lifelong learning education programmes; and adult education programmes such as vocational training by distance learning, development colleges, and university departments and institutes.

3.2 TVET Policies, Strategies and Programs Reforms

Efforts towards establishing technical and vocational education and training (TVET) in Tanzania are not a recent phenomenon. From 1940 when the first TVET policy was passed, that is the apprenticeship training law that was based on the 1940s ordinance cap 18, to where we are right now, a lot have happened to TVET in Tanzania with regard to policies, strategies and programs. These changes over time have defined the organizational structural and institutional management of TVET in the country. The inherited colonial apprenticeship training law of 1940 that was adopted after independence served from 1961 to 1974. The law aimed to fill a real need (i.e. to fill the skills gap) because the country had neither the industrial network nor the skilled workers who could train others on the job. Following this, two trade schools were introduced: Ifunda Technical School in Iringa and Moshi Technical School in Kilimanjaro.

It was up until 1974 when the first Vocational Training Act was enacted to replace the colonial apprenticeship training law. The 1974 Act established the National Vocational Training Division (NVTD) in 1975 within the Ministry of Labour and Manpower Development as well as the National Vocational Council (NVC). The main function of NVC was to ensure the existence of adequate supply of properly trained manpower at all levels in industry as well as to secure the greater possible improvement in the quality and efficiency of vocational training in the country. However, following the economic difficulties and debt crisis of late 1970s and early 1980s that were blamed on inward looking policies and strategies pursued, from mid 1980s Tanzania made a major shift from a centrally planned economic policy stance to a market-determined and private-sector-led economy, with privatization and trade liberalization as its major mantra. The reforms meant that TVET has to reform its policies, strategies and programs to

accommodate the new environment of privatization and liberalization, where the private sector and not the public take the lead.

Thus, among major policies that were put in place are Vocational Education and Training Policy of 1993, the Education and Training policy of 1995, Technical Education and Training (TET) policy of 1996 and the Higher Education policy of 1999. To implement the VET policy of 1993 and TET policy of 1996 (the TVET sub sectors), the government established Vocational Education and Training Authority (VETA), a statutory body established by Act No. 1 of 1994 to provide vocational education and training and the National Council for Technical Education (NACTE), a statutory body established by Act No. 9 of 1997 to provide Technical Education and Training (TET).

Notwithstanding a number of positive contribution associated with VET policy of 1993 and TET policy of 1996, and despite the fact that VETA and NACTE were established more than 20 years ago, still there were a lot of challenges and problems facing TVET sub-sector in the country. With the aim of addressing the various issues and challenges facing the TVET sub-sector and to cope with the realities of the 21st century, the government through the Ministry of Education and Vocational Training reviewed the VET policy of 1993 and the TET policy of 1996 and came with new TVET policy of 2012. The TVET Policy of 2012 covers all areas of VET and TET that include both the formal and informal areas. In line with the new TVET policy, the Ministry developed the implementation plan of 2012 and development programme of 2013 with the aim of translating the broad vision and mission as articulated in the TVET policy into concrete and achievable development milestones. Even though, and despite many efforts and commitment by government in terms of policies reforms towards TVET subsector, yet a lot of challenges have remained.

In 2014 the country introduces Education Policy, which focuses on reviving vocational and technical schools. The major feature of 2014 Education Policy is the introduction of flexibility on pathways that an individual can take towards the highest education achievements; to ensure that TVET should not be a dead end. In order for Tanzania to address the growing number of youths demanding better livelihoods through employment but lacking employable skills that are demanded in the labour market; the government in

collaboration with the private sector and other key stakeholders developed a National Skills Development Strategy (NSDS). The NSDS is developed with a vision to develop a skilled and competitive Tanzanian workforce capable of effectively fostering inclusive and sustainable socio-economic growth.

3.3 Co-ordination, Regulation and Financing of TVET in Tanzania

Coordination and Provision of TVET

The Government of Tanzania has a well established Department of Technical and Vocational Education and Training (DTVET) in the Ministry of Education and Vocational Training (MOEVT) that coordinates all matters pertaining to the development of TVET Sector in the country. This department is responsible for developing TVET related guidelines and standards, and conducting research on the provision of TVET programmes. It oversees two quality regulating bodies which are the National Council for Technical Education (NACTE) for Technical Education and Training (TET); and, Vocational Education and Training Authority (VETA) for Vocational Education and Training (VET).

VETA oversees and coordinates the provision of vocational education and training (VET) to all vocational training institutions as regards to their legality and programs while NACTE is responsible for coordinating the provision of technical education and training (TET) in all tertiary education institutions, other than universities and their affiliated colleges, delivering courses at technician, semi-professional and professional levels leading to awards of certificates, diplomas, degrees and other related awards.

Financing of TVET

Financing of VET is mainly funded by the VET Fund, administered by the VETA board. In 1993, the financing of VET changed from direct government funding to cost sharing principle with the employers who are the end users of trained human resource, and the trained graduates who are likely to benefit from increased incomes throughout their working lives. Employers pay 6 percent of the payroll as a Skills and Development Levy (SDL) to the government where a third of this SDL is allocated for VET and other two thirds is allocated to other government expenses, plus the training fees by the trainees. The government is thus relieved from directly financing VET.

TET is financed through cost sharing between providers and clients (students, parents, communities and private institutions). TET providers mainly rely on internally generated funds through consultancy, production, maintenance and international student exchange programmes. However, Tanzania Education Fund managed by Tanzania Education Authority (TEA) partly supports post secondary TVET Institutions, and Tanzania Higher Education Students Loan Board (HESLB) provides interest free loans to students undertaking TVET diploma in education programs and undergraduate TVET programs.

TVET Qualifications Framework

NACTE in collaboration with VETA have established the TVET Qualifications Framework that gives a range of awards and certification conferred to successful students for various fields of TVET. The awards and certification are known as the National Technical Awards (NTA) for the Technical Education and Training (TET) levels and National Vocational Training Award (NVA) for the Vocational Education and Training (VET) levels. On completion of training at various levels graduates qualify with various certification which include: NVA Level 1 qualify for Certificate of Competence I; NVA Level 2 qualify for Certificate of Competence II; NVA Level 3 qualify for Certificate of Competence III; NTA Level 4 qualify for Basic Technician Certificate; NTA Level 5 qualify for Technician Certificate; NTA Level 6 qualify for Ordinary Diploma; NTA Level 7 qualify for Higher Diploma; NTA Level 8 qualify for Bachelor's Degree; NTA Level 9 qualify for Masters Degree; and NTA Level 10 qualify for Doctorate Degree.

4. Empirical Model and Methodology

4.1 Employment Mobility

Analytical Framework

The theory underlying labour mobility has typically been modeled within the standard neoclassical microeconomic framework. Individual labour market outcome is a result of interaction between demand and supply of labour. Labour demand is a function of marginal productivity which can be improved through skills acquisition by education, training and experience according to the theory of human capital, in addition to unobserved skills that contribute to productivity improvement (Twumasi-Baffour, 2013). Supply of labour is constrained by individual rationality of maximizing utility (with

income, market commodities and leisure as arguments in the utility function) and are willing to enter into employment only when the market wage exceeds the reservation wage. However, labour market outcomes depend not only on the willingness of workers to supply their time to work activities, but also on the willingness of firms to hire those workers. The chances of finding employment are determined by individual productivity, reservation wage and the attitude of employers towards employing a given individual (Gray *et al.*, 2002).

Within this framework, the labour market mobility of an individual is determined by the decision pertaining whether or not to supply labour in the labour market and whether the individual is employed or not and in which sector. This depends on a combination of factors which include labour demand (employer preferences for certain characteristics like education, skills, experience, and sex), incentives to actively search for a job and to go for any job offers available. The decision is complex and involves many factors, but the model ignored the interdependence between members of households and their decisions.

As the result, equilibrium is determined in the market through interaction of demand and supply of labour in the labour market. This implies individual labour market mobility involves a decision by an individual to allocate their time between work and leisure and requires a simultaneous decision on the part of an employer to offer that individual a job. This paper concentrates on the supply-side of the labour market by investigating the effect of TVET on individual labour market mobility in particular sectors (formal, informal and agriculture) relative to unemployment.

Estimation Strategy

Two separate models are estimated to assess the effect of general education (GED) relative to technical and vocational education training (TVET) on employment mobility. The first model is logit that assess the individual decision to participate in labour market, while the second model is multinomial logit that examined individual labour market mobility into different segments of labour market (formal, informal and agricultural).

The Binary Logit Model

The binary logit model estimation is given as:

$$\Pr(y = 1/x) = F(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k) + \varepsilon_i \dots \dots \dots (1)$$

where y is the binary choice variable which is equal to 1 if the individual is employed and 0 if unemployed; and, x represents all characteristics that explain the choice decision of an individual.

The F is a logistic function strictly between zero and one for all real numbers of z , that is, $0 < F(Z) < 1$ such that;

$$F(Z) = \frac{\exp(z)}{[1 + \exp(z)]} = \Lambda(z) \dots \dots \dots (2)$$

This follows a cumulative distribution function (cdf) for a standard logistic random variable. The assumption of cumulative distribution function (cdf) leads to derivation of response probabilities that reads as:

$$\begin{aligned} \Pr(y = 1/x) &= \Pr(y^* > 0) = \Pr(\varepsilon > -\beta_0 - \beta_1 X_1 - \cdots - \beta_k X_k) \\ &= 1 - F(-\beta_0 - \beta_1 X_1 - \cdots - \beta_k X_k) \\ &= F(\beta_0 + \beta_1 X_1 + \cdots + \beta_k X_k) \dots \dots \dots (3) \end{aligned}$$

Partial effects of continuous variables are derived as follows:

$$\begin{aligned} \frac{\partial \Pr(y = 1|x)}{\partial x_i} &= g(\beta_0 + x\beta) \beta_i, \dots \dots \dots (4) \\ \text{where } g(z) &\equiv \frac{dF}{dz}(z). \end{aligned}$$

The partial effects of dichotomous variables are the difference in probabilities as the variables moves from 1 to 0.

The Multinomial Logit Model

Considering V_{ij} as the maximum utility attainable for individual i if he/she chooses any participation status j , assuming the indirect utility function can be decomposed into a non-stochastic component (s) and a stochastic component (ε), the multinomial logit model to be estimated is given as:

$$V_{ij} = S_{ji} + \varepsilon_{ji} \dots \dots \dots (5)$$

Specifically, the S_{ji} is a function of observed variables and ε_{ji} is the function of unobserved variables. The probability that individual i will select the j^{th} participation status is given by:

$$P_{ji} = Pr [V_{ji} > V_{ki} \text{ for } k \neq j \dots \dots \dots (6)$$

where k = formal, informal, agricultural workers, non-workers (unemployed).

According to McFadden (1974), if the stochastic components have independent and identical distributions, the difference between the errors ($\varepsilon_{ki} - \varepsilon_{ji}$) has a logistic distribution and the choice model is a multinomial logit model (MLM). The MLM is an extension of a binary logit model that model dependent variable into several unordered categories. The decision to work in a particular sector is assumed not to be sequential or ordered rather it depends on the sector in which an individual finds a job.

In order to estimate the model, a functional form of the non-stochastic component of the indirect utility function S_{ji} must be specified, when approximated in a linear form ($S_{ji} = \beta_j X_i$), this yields an empirical specification of the form:

$$P_{ji} = \frac{\exp(\beta_j x_i)}{\sum_{j=1}^J \exp(\beta_j x_i)}, i = 1, \dots, N; j = 1, 2, 3 \text{ and } 4 \dots \dots \dots (7)$$

where j is an index of employment status (for unemployed, formal workers, informal workers, and agricultural workers, respectively), N is the sample size, x is vector of regressors that explain access to employment and β_j is a vector parameter to be estimated.

It is assumed in the literature that individuals take into account their socio-economic factors that constraints and/or that provides opportunities to enter into any type of occupation. Thus, apart from the education and TVET training, the other factors included in the analysis are gender, marital status, age, household headship, household size, locality and resident (migrant) status.

4.2 Returns to Education and Training

Analytical Framework

Earnings differentials are the commonest measure of the economic value of education and training. A lot of years have passed since Jacob Mincer (1962) used income curves and some assumptions about the payoff to education to estimate the value of education and training associated with different levels of schooling, even though that framework analysis is still useful. In effect, Mincer measured the extra income earned over and above a fixed return to education and training to measure the value of post-schooling training of workers in the labour force with different levels of formal education and training. He concluded that the steeper income curve of workers with secondary education, for example (as compared with those with primary schooling) was due to the greater investment in training made once they began working. Mincer (1962) approach is useful because it addresses the difficulty of separating education and training. It measures the value of training as the discounted additional income workers get because of the learning opportunities that follow from their educational and occupational choices (Carnoy, 1994; Kingombe, 2011).

The so-called Mincerian earnings equations relate the wage rate of an individual to a host of individual characteristics including the level of education attainment status. This can be measured in years of schooling or the type of education and training completed;

$$\ln Wage = \beta_0 + \beta_1 S + \beta_2 EX + \beta_3 EXSQ \dots \dots \dots (8)$$

where $\ln wage$ is the log of real monthly or hourly earnings, EX and $EXSQ$ is the potential labour market experience and its square respectively.

The coefficient of education (β_1) in equation (8), though not without estimation biases, is usually interpreted as the percentage increase in wages due to an additional year of education and training (te Velde, 2005). The method can be extended to a much more detailed breakdown in order to take into account different combinations of formal general schooling, technical training, vocational training and apprenticeships. This would permit assessing the cost and value of each education and training path to be assessed and even the implicit value of on-the-job training associated with that path to be estimated (Carnoy, 1994).

$$\ln Wage = \beta_0 + \beta_1^i GE_i + \beta_2^i TVET_i + \beta_3 EX + \beta_4 EXSQ \dots \dots \dots (9)$$

where GE is a vector of dummy variables identifying the person's highest level of general education attained and $TVET$ is dummy variables showing the level of TVET attained by an individual.

On the basis of human capital theory, the Mincerian framework is used to model the link between education and training and labour market earnings. Thus, private rate of return to education and training is estimated first using extended version of earnings function developed by Mincer (1974):

$$\ln Wage = \beta_0 + \beta_1^i GE_i + \beta_2^i TVET_i + \beta_3 EX + \beta_4 EXSQ + \alpha' X_i + \mu_i \dots \dots \dots (10)$$

where $\ln wage$ is natural logarithms of monthly earnings, GE is the level of general education attained by an individual and $TVET$ is the level of training attained by an individual. For this study GE and $TVET$ presents the series of dummies for different levels of education ((primary, secondary and tertiary) and training (for technical, vocational, on-the-job training and apprenticeship), respectively. This helps to analyse the way different levels of education and training impart different skills of workers, which too impact individuals' earnings.

EX is the potential years of experience in labour force (age –school–6). This is based on the assumption that all individuals start schooling at age six. However, it is possible that some start school at an age earlier than six years. Also, we assume that individuals get

employed immediately after completing school, which is a strong assumption, especially for women and youth who are underrepresented in the labour market. EX^2 is experience square which captures the declining effects of experience as individuals' age increases. The coefficient on levels of education (β_1) represents the marginal returns to education, and the coefficient of (β_2) is returns to TVET, while μ_i is a well behaved stochastic error term.

X_i is a vector of control variables, including, sex, sectors of employment dummies (for whether individual work for the public, private, informal sector and agriculture as a reference category), workers effort proxied by log weekly working hours, marital status (taking the value of 1 if the respondent is married and 0 otherwise), institutional aspects proxied by union membership (taking the value of 1 if individual is a member of trade union and 0 otherwise), area of work (three regional dummies indicating whether the respondent works in Dar-es-Salaam, in other urban areas or in rural areas).

As noted by Card (1999), OLS estimates may not be consistent either because of sample selectivity bias or endogeneity due to omitted variable bias. The former problem is usually driven by presence of an unobservable factor that is correlated to earnings such that the OLS returns to schooling become biased upwards (Kimenyi *et al.*, 2006). Endogeneity, on the other hand, is caused by a correlation between explanatory variables and the disturbance term. It is typically attributed by factors such as reverse causation, the correlation between the unobservable factors that determine education and training level and wages, and/or the presence of measurement errors (Farre *et al.*, 2013). This problem lead to biased and inconsistent parameter estimates. For that reason, we applied the Heckman two step procedure developed by Heckman (1979) to take into account the sample selection bias.

The Heckman two step procedure involves two stages: in the first stage, a participation (selection) equation estimates the probability of having worked, and second stage involves estimation of the earnings (outcome) equation. To correct for any bias associated with selection into employment by estimating a probit equation:

$$EMPNOT_i = \delta' Y_i + \varepsilon_i \dots \dots \dots (11)$$

where $EMPNOT_i$ is a normally distributed latent variable such that $EMPNOT_i = 1$ if $EMPNOT_i^* \geq 0$ and $EMPNOT_i = 0$ if $EMPNOT_i^* < 0$.

Following Heckman (1979), the inverse Mills' ratio is calculated as follows:

$$\lambda_{EMPNOT_i} = \frac{\phi(\delta Y)}{\Phi(\delta Y)} \dots \dots \dots (12)$$

where ϕ represents the normal probability distribution function and Φ represents the normal cumulative distribution function and Y_i is a vector of exogenous variables that might affect an individual's selection into employment such as household headship, household size, regional of residence, marital status, education and training levels, age and residential status.

Thereafter, the estimate of inverse ratio is used as an additional independent variable in the earning equation in second stage.

$$\ln wage_i = X_i' \beta + \theta_i \lambda_i + \varepsilon_i \dots \dots \dots (13)$$

where $\ln wage_i$ is the natural log of monthly earnings, X_i' variables assumed to affect earnings, and error term. The equation also includes the inverse Mills ratio as an additional regressor obtained after the estimation of the first stage. This stage estimation is carried out only for the uncensored observations, that is, only for those who participate in jobs generating earnings.

There is another source of bias when the estimating the heterogeneity of returns to education and training in the population. Most empirical studies overlook the chance that individuals differ from each other by concentrating on population wide estimates of rate of return to general education and TVET, obtained with OLS regression. But in this way it is not taken into account that gains from schooling depend upon several individual's features, such as the family background, innate ability, motivation, the quality and type of school, to mention a couple. Thus, it is possible to use the quantile regression techniques

to analyze heterogeneous patterns of return to education and training across the conditional wage distribution since the impact of an additional year/level of education/level of training may not be the same across the earnings distribution (Buchinsky, 1998).

According to Buchinsky (1998) the normal OLS technique concentrate on estimating the mean of the dependent variable subject to values of the independent variables where variables are included as uncentred regressors while quantile regression is based on the entire sample available and allows estimations of the return to education and training within different quantiles of the earnings distribution. On this account quantile regression technique was used to complement the OLS results.

Noteworthy is that while the OLS captures the effect of education, training and other covariates of an individual on the mean earnings, quantile regression look at the determinants at some other points of the earnings distribution, for example, the bottom or top deciles. Nonetheless, the estimation of the model at different deciles will enables us to trace the entire conditional distribution of earnings, given a set of regressors (Davino *et al.*, 2013). Therefore, the quantile regression method was used to estimate earning functions at five different deciles of earnings distribution (the 10th quantile, the 25th quantile, 50th quantile, 75th quantile and the 90th quantile).

According to Koenker and Bassett (1978) and Koenker (2005), a quantile regression estimation is characterized by a minimization of the following equation;

$$\text{Min}_{\beta \in \mathbb{R}^k} \sum_{i: \varepsilon(y_i \geq x_i \beta)} \theta |y_i - x_i \beta| + \sum_{i: \varepsilon(y_i < x_i \beta)} (1 - \theta) |y_i - x_i \beta| \dots \dots \dots (14)$$

where y_i is the dependent variable, x_i is a k by 1 vector of explanatory variables, β is vector of coefficients and 1 is the quantile to be estimated. Following Bushnisky (1994, 1998), the quantile regression model of the earnings function can be specified as follows:

$$\ln wage_i = x_i' \beta + \mu \theta_i \dots \dots \dots (15)$$

$$\text{Quant}_{\theta}(\ln wage_i / x_i) = x_i' \beta_{\theta}; \text{Quant}_{\theta}(\mu \theta_i | x_i) = 0 \dots \dots \dots (16)$$

where *wage* denotes monthly earnings, *x* is a vector of explanatory variables and *u*_{*θ*} is a random error term. The *i*=1,....., *n*, is the index for individual worker and *n* is the number of workers in the sample. The vector of parameters denoted by β_θ and Quant_θ(ln*wage*_{*i*}|*x*_{*i*}) is the θth conditional quantile of ln*wage* given *x*_{*i*}. Given that, quantile regression parameters minimize the absolute sum of the errors from a particular quantile of the earnings across individuals, the problem is to obtain parameter estimates of the θth quantile regression in equation 4.12, which reads as:

$$\text{Min} \left\{ \sum_{i: \ln w_i \geq x'_i \beta_\theta} \theta |\ln w_i - x'_i \beta_\theta| + \sum_{i: \ln w_i < x'_i \beta_\theta} (1 - \theta) |\ln w_i - x'_i \beta_\theta| \right\} \dots \dots \dots (17)$$

The median regression or least absolute deviation (LAD) is when θ = 0.50. Other quantile regressions are estimated through the weighting of the absolute sum of the errors. On the other hand, if ln*wage*_{*i*} ≥ *x*'_{*i*}β_θ, then the deviation is positive and θ is the weight used. On the other hand, when ln*wage*_{*i*} < *x*'_{*i*}β_θ, the deviation is negative and the weight used is 1-θ.

5. Descriptive Statistics and Analysis

The main source of data for this study is the 2014 Integrated Labour Force Survey (ILFS) for Tanzania, collected by the National Bureau of Statistics (NBS). The key information collected in the survey is of two types: the household and personal characteristics and employment-related information. The household and personal characteristics include information on family size, relationship with household head, region, locality, gender, year of birth, age, migration, educational and training attainment and marital status. The employment-related information include information on employment status: full-time or part-time jobs, job-seeking, informality, earning from main job, earning from wage employment, earnings from business and agriculture jobs respectively, hours of work, underemployment, over-employment, economic sector, ownership type, social security, firm size, and employment contract. This information has important implication on earning determination and transition into employment.

Our sample contains 19,198 individuals where majority are in the informal employment, 6,965 (36 percent); followed by 5,939 (31 percent) in agriculture; 4,287 (22 percent) in formal employment and 2,007 (11 percent) are unemployed. Thus, formal sector is relatively small compared with the informal and agricultural sectors. The size of unemployed population is relatively small due to the large informal and agriculture sectors that absorb the surplus labour, which could as well signal underemployment. The employment status by education and training attained, locality and sex is presented in Table 1.

Table 1: Sample Distribution of Individuals by Sectors of Employment and Education and Training Levels, Sex and Locality, (%)

Variables	Unemployed	Formal	Informal	Agriculture	Total
Level of Education					
Primary and below	1,282(10)*	1,713(13)	5,231(38)	5,235 (39)	13,461(100)
Secondary	584(17)	1,003(29)	1,323(38)	577(17)	3,487(100)
Vocational training	73(7)	641(58)	313(28)	87(8)	1,114(100)
Tertiary non-university	31(6)	389 (75)	64(12)	32(6)	516(100)
Tertiary university	37(6)	541(87)	34(5)	8(1)	620(100)
Locality					
Dar es Salaam	1,550 (18)	2,491(30)	4,142(49)	245(3)	8,428(100)
Other Urban	350 (6)	1,551(25)	2,336(38)	1,933(31)	6,170(100)
Rural	107(2)	245(5)	487(11)	3,761(82)	4,600(100)
Sex					
Female	1,492(16)	1,329(14)	3,556(39)	2,887(31)	9,264(100)
Male	515(5)	2,958(30)	3,409(34)	3,052(31)	9,934(100)

Source: Calculations by the author from 2014 ILFS data.

*values in parentheses indicate the percentage.

As shown in Table 1, the large proportions of people with primary education are working in agriculture and informal sector (about 77 percent), constituting only a small proportional in formal employment (about 13 percent). The large proportions of individuals with secondary education are in both informal sector (about 38 percent) and in formal sector (about 29 percent). The majority of workers with vocational training, tertiary non-university and tertiary university are in formal sector employment (on average account for more than 60 percent), where those in informal and agriculture sector make relatively a small percent, 8 percent for the vocational training, 6 percent for

tertiary non-university and 1 percent for tertiary university for the case of agriculture. When coming to the unemployment category, though it seem that those with primary and secondary education have relatively higher percent, in real sense given the small size sample of those with tertiary education, both non-university and university, unemployment is as well substantial to those with vocational and tertiary education.

The proportion of workers in informal sector is relatively large in Dar es Salaam (by 49 percent) and other urban areas (by 38 percent), which signal that labour is attracted to urban areas because of increasing economic activity (suggesting a vibrant informal sector) rather than because of growing employment demand from the formal sector. Notably the formal sector employment (about 5 percent) is relatively small compared with the informal sector in rural areas (about 11 percent), where the agriculture sector is the largest sector in terms of employment, it employs more than 80 percent of rural society. Comparing to urban areas (about 18 percent for Dar es Salaam and 6 percent for other urban areas) unemployment is relatively small in rural areas (about 2 percent). Even though, there is as well a greater concentration of formal employment in Dar es Salaam and other urban areas than in rural areas, which reflect the fact that in addition to rural-urban migration, most of graduates from colleges and university remain in urban areas given that urban areas are hubs of economic activities and more developed in Tanzania.

A further decomposition of labour market into gender is also shown in Table 1. The distribution pattern shows that more female are in informal employment and agriculture (about 70 percent) where, formal employment makes account only 14 percent. Though male follows nearly the same composition, a significant size of them are in informal sector (about 30 percent) compared to female. In addition, more female are unemployed (about 16 percent) compare to males (about 5 percent).

Table 2 shows that in Tanzania, workers on average received 316,991 TShs , as monthly earnings. Even though, there is a significant heterogeneity when comparison is made across different education and training categories. Workers with tertiary university education on average earns by far more than the rest of other categories (i.e. 1, 206, 426 TShs per month). As they earn 5.5 time more than those with primary education (who earn 220,036 TShs per month) 3.5 times more than those with secondary education

(who earns 395,461 TShs per month); 3 times more than those with vocational training (who earn 138,403 TShs per month) and 2 times more than those with tertiary non-university education (who earn 221,750 TShs per month). This is as well as has been confirmed in Figure 1, which shows incremental returns by level of education and training, where individuals with university education earn higher than the rest. Thus in Tanzania, workers with university degree earn twice of those with technical training and three times those with vocational training.

Table 2: Sample Mean and Median of Monthly Earnings by Education Levels, Locality and Sex

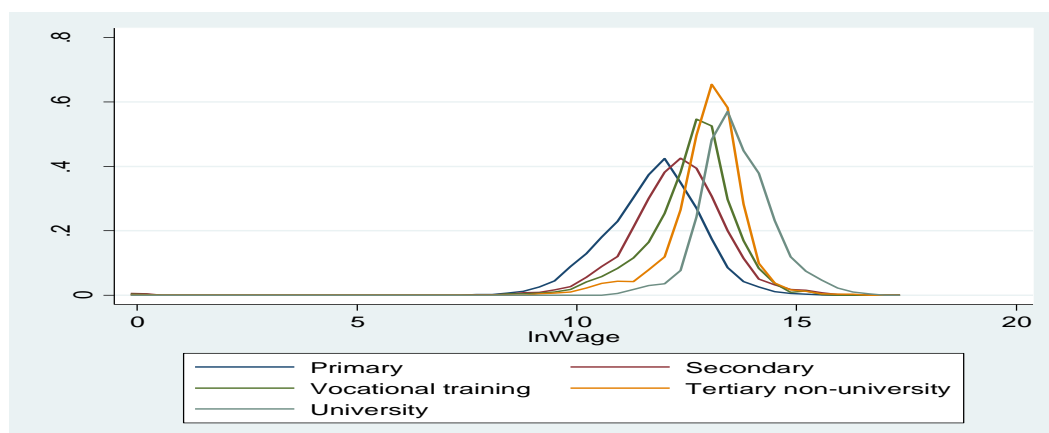
Variables	Mean (TShs)	Median (TShs)
Education and Training Level		
Primary	220,036	138,403
Secondary	395,461	221,750
Vocational training	436,622	350,000
Tertiary non-university	582,828	468,000
Tertiary university	1,206,426	800,000
Locality		
Dar es Salaam	419,649	240,000
Other urban	263,534	150,000
Rural	161,517	80,000
Sex		
Male	375,959	204,000
Female	230,474	129,600
Total	316,991	170,000

Source: Calculations by the author from 2014 ILFS data.

Table 2 also draws attention to differences in labour market earnings by gender and locality. Male workers earned more than their female counterparts. On average, male workers earned TShs 375,959 compared with TShs 230,474 earned by females. Figure 2 also confirm that males on average earn more than females in Tanzania labour market. Disaggregation of monthly labor earnings by locality shows workers in Dar es Salaam on average earned more (419, 649 TShs per month), than those living in other urban (263, 534 TShs per month) and rural areas (161,517 TShs per month).

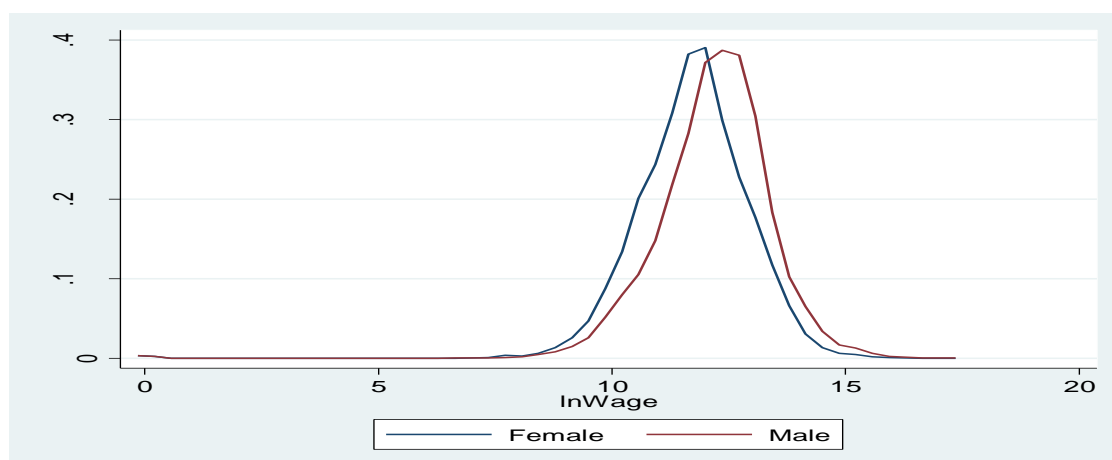
Figure 3 shows the distribution of log of earnings in the three sectors of employment in Tanzania. As expected, there are significant sector heterogeneity in earnings with formally employed workers earning more than informally employed workers and agricultural workers, respectively

Figure 1: Sample Distribution of Monthly Earnings by Education and Training Levels



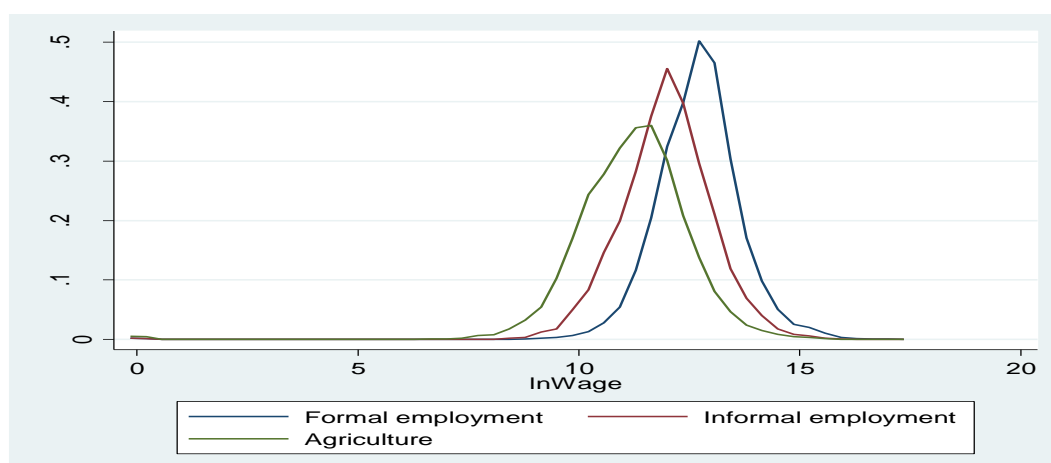
Source: Calculations by the author from 2014 ILFS data.

Figure 2: Sample Distribution of Monthly Earnings by Sex



Source: Calculations by the author from 2014 ILFS data.

Figure 3: Sample Distribution of Monthly Earnings by Employment Categories



Source: Calculations by the author from 2014 ILFS data.

TVET Types and Labour Market Outcomes

Table 3 illustrates the distribution of employment status of Tanzania labour market by type of training based on the 2014 Integrated Labour Force Survey.

Table 3: Sample of Distribution of Individual Employment Status by Type of TVET, (%)

TVET type	Individual Employment Status (%)				Total
	Unemployed	Formal	Informal	Agriculture	
On job training	4	55	30	11	100
Apprenticeship	8	30	50	12	100
Vocational	7	49	31	13	100
Technical	10	54	29	7	100

Source: Calculations by the author from 2014 ILFS data.

Table 3 shows that the big proportional of workers with on job training are in the formal employment, followed by those in the informal and agricultural employments, respectively. Moreover individual with apprenticeship skills were more informally employed, than formally employed. Not only that but they are less likely to be unemployed and working in agriculture. Nevertheless, individual with vocational training were more in formal sector employment followed by informal sector employment. However, individuals with technical education formed a large proportion in formal employment; they had lowest contribution in agricultural sector.

Table 4: Sample Mean and Median of Monthly Earnings by TVET Type

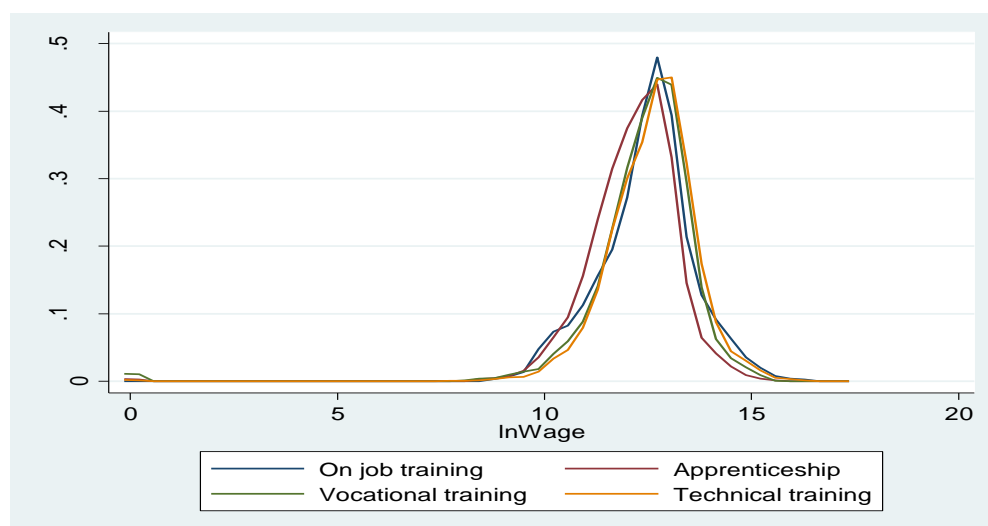
TVET type	Mean	Median
On job training	468122	300000
Apprenticeship	296494	200000
Vocational	396776	300000
Technical	482028	328000

Source: Extracted from 2014 ILFS data

The results reported in the Table 4 indicate that the average monthly earnings for workers with different skills type differ substantial by type of training individual attained. In particular, we find that individual with on job training receive on average 468, 122 TShs per month, while individual with apprenticeship skills earned 296,494 TShs on average per month. On average, workers with technical training earned substantial higher

(482,028 TShs per month), compared to 396,776 TShs per month received by workers with vocational training. Similar patterns have been shown in Figure 4.

Figure 4: Sample Distribution of Monthly Earnings by TVET Types



Source: Calculations by the author from 2014 ILFS data.

6. Results and Discussion

6.1 Employment Mobility

Baseline Model

The results for baseline model is presented in Table 5¹, where the first column corresponds to the baseline model which includes general education, technical and vocational education and training (TVET), while the second column presents further decomposition of the basic equation into several dummies of TVET: on job training, apprenticeship, vocational and technical. However, before focusing into these categories, we first look at the basic control variables.

As shown in Table 5, *Age*, as expected, has a positive and significant influence on individual employment probabilities. A turning point however occurs at a maximum of 41 years, from which we observe a negative relationship between age and the probability of being in employment. This finding shows that this effect is curvilinear: young and old

¹ A prior a Wald test of multiple exclusion restriction was conducted by using likelihood ratio test. The null hypothesis tested is that all slope coefficients in each model were simultaneously equal to zero. The null hypothesis was rejected at the 1 percent test level of significance and the findings suggested the estimation models were correctly specified.

people are least likely to be employed (Baah-Boateng, 2013; Machio, 2016; Forster *et al.*, 2016). *Males* were more likely than *Females* to be employed. This could be explained by the fact that a considerable proportion of females reported being home makers and hence not included in the labor force (Machio, 2016). Similarly in the presence of wage discrimination against women, women will generally earn lower wages hence have low opportunity cost of leisure. This would affect their probability of being in employment. Also males were more likely to be in employment because of society responsibilities that force them to look for jobs (Bridges and Lawson, 2008; Machio, 2016). *Household-Head* were more likely to be in employment than non-household head for overall sex and age cohort sample results. The estimates are consistent with findings from studies on developing countries, for example Wamuthenya (2010) and Dogrul (2012).

We also observe that a *Migrant*, as opposed to a resident individual in a particular district or town is more likely to be employed and in the case of *Marital Status*, we note that the married individuals in the sample were less likely to be in employment. The results further suggest that living in other urban and rural areas as opposed to living in Dar es Salaam, increases the probability of being employed. This confirms the view that unemployment is an urban phenomenon, which is also established by Baah-Boateng (2013). As alluded in the descriptive section, this could be explained by the trend of migration from rural to urban areas, where majority of households particularly youth have been migrating to Dar es Salaam from other parts of the country to look for jobs and as a result leaving unexploited employment opportunities in their regions of origin.

Education and training dummies in Column 1 in Table 5 shows that, individuals who attained secondary education level were less likely to be in employment, as opposed to individuals with primary education. This could be contributed partly by the fact that individual with secondary education tends to stay unemployed while waiting for either a better paid jobs in formal sector or waiting to continue with further studies (Msigwa and Kipsha, 2013). It could also be as a result of skills mismatch between what is demanded in the labour market and what job seekers offer or the type of jobs and remunerations expected by the job seekers. Or, it could be as well that people with primary education are willing, and therefore majority of them are absorbed in the agriculture sector.

Table 5: A Baseline Logit Model for Employment Outcomes, Marginal Effects

Variables	(1) Employed	(2) Employed
Age	0.009*** (0.001)	0.009*** (0.001)
Age square/100	-0.011*** (0.001)	-0.011*** (0.001)
Primary education is a reference category		
Secondary	-0.017*** (0.004)	-0.016*** (0.004)
TVET	0.009*** (0.003)	
On job training		0.009 (0.012)
Apprenticeship		0.010** (0.005)
Vocational		-0.004 (0.012)
Technical		0.009** (0.004)
Tertiary	0.019*** (0.005)	0.020*** (0.005)
Dar es Salaam is a reference category		
Other urban	0.067*** (0.003)	0.067*** (0.003)
Rural	0.083*** (0.003)	0.083*** (0.003)
Household head	0.099*** (0.005)	0.099*** (0.005)
Migrant	0.014*** (0.003)	0.014*** (0.003)
Sex(male=1)	0.029*** (0.003)	0.029*** (0.003)
Household size	0.001 (0.001)	0.001 (0.001)
Marital (married)	-0.014*** (0.003)	-0.014*** (0.003)
Observations	19,198	19,198

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Further, the results show that individual with either TVET or tertiary education levels were more likely to be employed, which is in line with previous studies that found that individuals with TVET qualification have high probability of being employed (Dorsett *et al.*, 2011; Devins *et al.*, 2011; Wolter and Ryan 2011; Conlon and Patrignani, 2013). Even though, for the case of Tanzania, the magnitude of the effect is less than that of tertiary education, as those with tertiary are nearly twice more likely to be employed compared with those with TVET (when technical and vocational is combined).

When further decomposition is done in Column 2 in Table 5, TVET is decomposed into several dummies, individuals with technical and apprenticeship skills are significantly more likely to be in employment and the effect is nearly the same for individual with training, which is larger than for other TVET categories. As seen already, those with tertiary are twice more likely to be employed than those apprenticeship and technical training, so more than the rest categories of TVET.

Multinomial Logit Model Results

The Multinomial Logit Models for employment sectors choice are carried out using 4 broad categories: unemployed as a reference category; formal employment; informal employment; and agriculture and the results are presented in Table 6.^{2 3} We start first presenting the results for control variables, before looking on the education and training variables.

Age and *Age Squared* are used to capture experience and lifecycle effects and the marginal effects show that age increases the likelihood of formal and informal employments. The findings are in line with Nyaga (2010); Wambugu (2011) and Twumasi-Baffour and Turkson (2015) who found a concave relation between age variables and employment status. However, age coefficients for unemployed and agricultural employment are negative suggesting that being young is associated with a higher probability of unemployed or working in agriculture as a last resort compared to adult individuals; the turning point being 46 and 33 years respectively. These findings

² *A priori*, first, the Hausman test and Seeming Unrelated Estimation (SUEST) were used to test the IIA assumption of each model. The results obtained were conflicting: one test rejects the null hypothesis and the other failed to reject the null hypothesis. Long and Freese (2014), however, argues that IIA tests are not useful for assessing violations of the IIA assumption; and, therefore, the MLM should only be used in the case where the alternatives are dissimilar and not just substitutes for one another. The estimations hereafter have been guided by the Long and Freese (2014).

³ Second, likelihood ratio tests of the null hypothesis that there was equality of coefficients between any pair of employment sectors in all models were conducted. The null hypotheses were rejected at the 1% test level of significance. The test results suggest that the labour market is heterogeneous and segmented into formal paid jobs, self-employment, agriculture and not-working is appropriate. In addition, likelihood ratio test was used to test a null hypothesis that all slope coefficients in each model were simultaneously equal to zero. For all models estimated the null hypothesis was rejected at 1% statistical test level of significance. In addition, a Wald test of whether any of the four employment states could be combined was conducted. The Wald test confirms that none of the categories should be combined. They are significant at the 1 percent level. It can be concluded that the outcomes are distinguishable with respect to the variables included in the model.

suggest that this could be due to lack of experience and necessary skills needed in the labour market. On the other hand, the probabilities of formal and informal sectors employment are found to increase with age and begin to decrease as individuals get older towards the age of 40 and 53 years, respectively.

Similarly like Nyaga (2010), we also find that the household size coefficient is negative for both formal and informal employments but positive for agricultural employment; suggesting that household with large household size is more likely to be working in agriculture and less likely be working in formal and informal sectors. Not surprising, the results also suggests that being a *Household-Head* drove households into formal employment and into informal employment and at the same time also show that being a *Household-Head* reduces the probability of working in agriculture and being unemployed. The estimated results are consistent with those obtained by studies on other developing countries, for example Wamuthenya (2010) and Dogrul (2012).

Unlike females, the results show males were more likely to be in formal employment and less likely to be not-working and in the informal employment. Surprisingly, the empirical results suggest that being *Married* is associated with being unemployed and is negatively associated with the probability of working in the formal and informal jobs, while it is positively associated with working in agriculture. The results also show that, being a non-resident (*Migrant*) as opposed to being resident in particular place significantly increases the chances of working in the formal and informal employments; and that migrants are less likely to be working in agriculture and being unemployed.

Furthermore, the estimated equation shows that individual living in *Rural* and *Other Urban* areas are more likely than Dar es Salaam workers to be in agriculture but are less likely to be unemployed or working in formal and informal occupations. These could be attributed to migration of youth from other regions of Tanzania to Dar es Salaam in searching of wage employment. The results is consistent with the fact that agriculture serves as a buffer by absorbing part of the unemployed and the inactive population in the rural areas (Castel *et al.*, 2010). Negative effect of living in the rural areas on the

likelihood of being in formal employment may reflect not only the fact that fewer jobs tend to be available in these areas (Bridges and Lawson, 2008).

Table 6: Multinomial Logit Model for Employment Outcomes, Marginal Effects

Variables	Unemployed	Formal	Informal	Agriculture
Age	-0.012*** (0.001)	0.019*** (0.002)	0.011*** (0.003)	-0.019*** (0.002)
Age square/100	0.013*** (0.002)	-0.024*** (0.003)	-0.018*** (0.003)	0.029*** (0.003)
Primary education is a reference category				
Secondary	0.014*** (0.004)	0.200*** (0.010)	-0.123*** (0.010)	-0.091*** (0.008)
TVET	-0.009*** (0.004)	0.192*** (0.010)	-0.034*** (0.011)	-0.149*** (0.007)
Tertiary	-0.036*** (0.005)	0.670*** (0.011)	-0.453*** (0.010)	-0.182*** (0.007)
Dar es Salaam is a reference category				
Other urban	-0.091*** (0.004)	-0.089*** (0.007)	-0.285*** (0.009)	0.465*** (0.011)
Rural	-0.088*** (0.004)	-0.211*** (0.006)	-0.502*** (0.007)	0.800*** (0.007)
Household head	-0.137*** (0.007)	0.089*** (0.010)	0.096*** (0.012)	-0.047*** (0.009)
Migrant	-0.016*** (0.003)	0.042*** (0.008)	0.087*** (0.009)	-0.114*** (0.007)
Sex (male=1)	-0.035*** (0.005)	0.114*** (0.009)	-0.091*** (0.010)	0.012 (0.008)
Household size	-0.001 (0.001)	-0.005*** (0.002)	-0.008*** (0.002)	0.014*** (0.001)
Marital (married=1)	0.021*** (0.004)	-0.027*** (0.009)	-0.037*** (0.010)	0.044*** (0.008)

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Results for the education and training variables are also presented in Table 6. The estimated results reveal that relative to primary education, individual with secondary education is positively associated with probability of being unemployed, while those with TVET and tertiary education are negatively related with the probability of unemployed. Even though, individual who attained secondary, TVET or tertiary education are more likely to be in formal employment but are less likely to be working on agriculture and in

the informal sectors, relative to those attained primary education. A possible explanation for the observation could be that individuals with a higher level of education and training believe that they can earn wage income in formal employment such that agriculture and informal employment is not their best option (Kadzamira, 2003; and Castel *et al.*, 2010). Another reason could be that higher education and training only prepares an individual for formal employment, rather than informal and agricultural employments. This finding is consistent with other studies like Bocquier *et al.* (2010), Wamuthenya (2010), and Aslam and Rawal (2013).

Further analysis by TVET categories shows that individual with technical, vocational or on job training is more likely to be in formal employment and less likely to be in agriculture and informal jobs (see Appendix Table 1). However, individual received apprenticeship training is more likely to be in both in formal and informal occupations, but is less likely to be working in agriculture or being unemployed.

6.2 Returns to Education and Training

Mincerian Regression Results

Table 7 presents the estimates from the OLS and Heckman procedures on returns to education and training. The first and second columns present un-weighted OLS estimates including a control for TVET categories in Column 2, while the third and forth columns present weighted OLS estimates, including a control for TVET categories in Column 4. Column 5 presents the estimates obtained from Heckman approach (that is, the selectivity corrected model by Heckman two step procedures). Before looking on these variables of interest we start by looking on how the standard control variables behave.

As shown in Table 7, the coefficient of potential labour market experience squared is negatives while that of experience is positive. The negative coefficient of quadratic experience term suggests that marginal returns to job experience decrease with each additional year of experience. The finding is consistent with the findings from previous studies, among others, Siphambe (2000) in Botswana, Duraisamy (2002) in India, and Oklety (2013) in Ghana. Empirical estimates show further that males earns significantly more than females in Tanzanian labour market, even if they have similar characteristics.

This finding is consistent with what was obtained in previous studies (Twumasi-Baffour, 2013; Leyaro et al., 2014). This could be a consequence of women being more likely to work part-time, be discrimination in the labour market, or be segregated in better paying jobs. In terms of marital status, married individuals have relatively better income when compared to non-married individuals. This is evidenced by a positive coefficient of the marital status. This result is consistent with what was obtained by Pirmana (2006), Aslam (2009), and Aslam and Kingdon (2012).

The results also confirm that membership to the union improve earnings potential in the labour market in Tanzania since its coefficient is positive and statistically significant. In addition, the result shows that hour worked per week at the current job is significantly positive determinant of labour market earnings. This finding confirms our prior and also is consistent with the previous empirical results existing in the literatures. The results in Table 7 also show that individuals employed in the other urban areas and in rural areas earn significantly less incomes than those in Dar es Salaam; part of the reasons could be the presence of more labour market opportunities in Dar es Salaam. As well as due to features of cities which make workers more productive and more likely to earn higher wages (Campbell and Ahmed, 2012). There is as well significant heterogeneity across sectors of employment, as shown in Table 7, where an individual working in public, private and in informal sector have large earning relative to be working in agriculture. Even though, workers in the public sector earn significant higher than workers in the private and informal sectors, while at the same those in private sector earns slightly more than those in informal sector.

We now turn to the estimation on the returns to education and training in a model where both the education level and the TVET categories are presented as indicator variables. Controlling for all other explanatory variables, the coefficient estimates of each education level show how many percentage points higher are monthly earnings individual receive compared with those with a primary level of education. Correspondingly, the coefficient estimate for each TVET training category shows the return to TVET compared with those who attained primary education only. The results in Table 7 shows that earnings tends to increase with the level of education suggesting existence of convex returns to education

in Tanzania. The premiums associated with the different levels of education are positive and statistically significant. This implies that on average, attainment of secondary education, relative to primary education leads to higher earnings by 43.3 percent.

These results are consistent with previous studies, for example, Soderbom *et al.* (2006) in Kenya and Tanzania; studies on Tanzania by Leyaro *et al.* (2014); Twumasi-Baffour (2013) in Tanzania and Ghana; and, Kavuma *et al.* (2015) in the case of Uganda. The results actually reflect the high premium attached with higher education in recent times. Duraisamy (2002) argued that the findings reflect a possibility of the decline of the quality of primary education due to the massive expansion of primary education infrastructure and hence a negative trade-off between quality and quantity might be in play. On the other hand it could be attributed with the opening up of the economy where people with better skills are being required and hence higher education gives a better pay-off (Duraisamy, 2002).

The coefficient of training that combines technical and vocational training (TVET) is statistically significant and its effect on labour market earnings seems very high. The significance of the training coefficient in the estimated earning equation shows the importance of training on individual labour market returns. Consequently workers that had attended TVET training were more likely to earn higher income by 10.6 percent compared to those with primary education (in Column 3). However, when we decompose training into its different categories, technical training gives a consistent higher return over other categories (in Column 2), as worker attended technical training gains an earning premium of 14.8 percent, compare to those who attained on job training premium returns of 12.3 percent, those with apprenticeship trainings with premium returns of 7.6 percent and those with the vocational training with returns of 5 percent, though not statistically significant.

Table 7: The Returns to Education and Training Estimates

Variables	Un-weighted		Weighted		Heckman
	OLS	OLS	OLS	OLS	
Experience	0.046*** (0.003)	0.045*** (0.003)	0.045*** (0.004)	0.045*** (0.004)	0.016*** (0.005)
Expersq/100	-0.071*** (0.006)	-0.071*** (0.006)	-0.071*** (0.008)	-0.071*** (0.008)	-0.027*** (0.008)
Primary Education is a reference category					
Secondary	0.434*** (0.024)	0.428*** (0.024)	0.412*** (0.026)	0.402*** (0.026)	0.390*** (0.026)
TVET	0.107*** (0.022)		0.106*** (0.024)		
On job training		0.123** (0.050)		0.121** (0.050)	0.082 (0.051)
Apprenticeship		0.076** (0.030)		0.077** (0.031)	0.020 (0.032)
Vocational		0.049 (0.076)		0.052 (0.077)	0.013 (0.078)
Technical		0.148*** (0.030)		0.147*** (0.032)	0.108*** (0.031)
Tertiary	1.140*** (0.035)	1.137*** (0.035)	1.065*** (0.041)	1.056*** (0.041)	0.998*** (0.040)
Dar es Salaam is a reference category					
Other urban	-0.347*** (0.020)	-0.344*** (0.020)	-0.356*** (0.022)	-0.350*** (0.022)	-0.357*** (0.020)
Rural	-0.585*** (0.032)	-0.584*** (0.032)	-0.632*** (0.041)	-0.628*** (0.041)	-0.493*** (0.034)
Logwwh	0.311*** (0.027)	0.311*** (0.027)	0.278*** (0.030)	0.278*** (0.030)	0.291*** (0.027)
Union	0.337*** (0.036)	0.335*** (0.036)	0.304*** (0.035)	0.300*** (0.035)	0.324*** (0.035)
Marital (married=1)	0.097*** (0.020)	0.098*** (0.020)	0.116*** (0.024)	0.118*** (0.024)	0.151*** (0.022)
Sex (male=1)	0.394*** (0.018)	0.397*** (0.018)	0.368*** (0.021)	0.373*** (0.021)	0.205*** (0.032)
Agriculture is a reference category					
Public	0.815*** (0.051)	0.810*** (0.051)	0.880*** (0.053)	0.873*** (0.053)	0.805*** (0.050)
Private	0.538*** (0.034)	0.538*** (0.034)	0.549*** (0.041)	0.549*** (0.041)	0.534*** (0.033)
Informal	0.519*** (0.032)	0.520*** (0.032)	0.480*** (0.039)	0.482*** (0.039)	0.514*** (0.031)
Constant	9.438*** (0.113)	9.440*** (0.113)	9.621*** (0.123)	9.626*** (0.123)	10.181*** (0.152)
Observations	14,312	14,312	14,312	14,312	14,312
R-squared	0.319	0.319	0.313	0.314	

Dependent variable is log monthly earnings, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

In Column 3, we consider the effects of education and TVET training on earnings after controlling for the selectivity bias. The results show that when a worker's occupation is controlled for, there is still a positive effect of general education and various TVET categories on labour earnings. However, the estimated earnings premium for general education and TVET categories are reduced. Except for technical training, other coefficients of TVET training attended by workers are positive but not statistically significant. This finding suggests that the technical training effect on earnings operate through worker's being in employment.

Comparing the returns to TVET and that of general education, we found that workers who have general education have higher rates of returns to education than those with TVET training qualifications. Even, by comparing the marginal rates of returns to various TVET categories with that of different levels of general education, we find that all levels of general education have higher returns than TVET training in Tanzania. This result is consistent with findings of a study by Kahyarara and Teal (2006) in Tanzania, who find that the returns to vocational and technical education were 0.678 and 0.422, respectively. Also, other studies in other countries found the wage returns to academic qualifications were significantly higher than the returns to TVET qualifications (see for example Blundell *et al.*, 2005; Dearden *et al.*, 2002; Dickerson, 2005). This could be attributed to less developed TVET system in Tanzania where the proliferation of TVET qualifications both in the schooling system and beyond has weakened the signal of what the TVET education is providing and returns are less (Wößmann, 2008; Machin and Vignoles, 2018). This could also be due to lower-ability students tend to sort themselves into these types of education (Woessmann, 2008).

Contrast between weighted and un-weighted estimates

When dealing with survey data, it is crucial to have a representative sample, necessary to avoid biased results. But sometimes it so happens that one may over-sample or under-sample one group, be it accidental or intentional. Solon *et al.* (2015) argued that sample weighting is necessary in order to achieve more precise estimates by correcting for heteroskedasticity, consistent estimates by correcting for endogenous sampling and to identify average partial effects in the presence of un-modeled heterogeneity of effects.

Therefore, it is crucial to interpret what the contrast implies for the estimated results of both weighted and un-weighted regressions. Although the results for both weighted and un-weighted are almost comparable, the un-weighted estimates for returns to general education are larger than weighted estimates. There is therefore an upward bias (though slightly) for un-weighted estimates, since GED were over-sampled compared to TVET, and thus the returns to GED more than offset those of TVET. The weighted regression therefore produces balanced estimates of the returns to education. This highlights the importance of weighting as it corrects for endogenous sampling between GED and TVET so as to attain consistent and unbiased estimates.

Quintile Regression Results

The OLS assume that individuals are homogeneous and give an estimate for an average effect. In reality however, economic returns to education and training vary across individuals because they are not homogeneous but are heterogeneous (Card, 2001; Kingdon and Soderbom, 2008). Therefore, we examine the heterogeneity in returns to education and training to ask whether some workers benefit more from education and training than others and why; and, in relation study its inequality implications by using QR.

As shown in Table 8, highest premiums to secondary and tertiary education levels are largest at the top decile (90 percent) of the conditional earnings distribution. This suggests that over time education reduce inequality of earnings, consistent with increasing levels of education in the population. Thus individuals with more abilities earn more from additional investment in education than those with lower abilities.

In comparisons with TVET, the coefficient of TVET is highest at the lowest deciles than at the upper decile (0.17 for the top 10 percent of the income distribution while it is 0.12 for the top 90 percent of the income distribution). Further, Table 8 indicates, the returns to TVET fall throughout as one moves from bottom to the top of the income distribution. This implies that the return to TVET is highest in low paid jobs than higher paid occupations.

Table 8: Quantile Regression Estimates

VARIABLES	q10	q25	q50	q75	q90
Experience	0.049*** (0.005)	0.052*** (0.003)	0.038*** (0.003)	0.039*** (0.003)	0.043*** (0.004)
Expersq/100	-0.079*** (0.009)	-0.087*** (0.006)	-0.060*** (0.006)	-0.059*** (0.006)	-0.060*** (0.009)
Primary Education is a reference category					
Secondary	0.449*** (0.032)	0.432*** (0.030)	0.375*** (0.024)	0.448*** (0.023)	0.572*** (0.033)
TVET	0.173*** (0.032)	0.139*** (0.027)	0.148*** (0.018)	0.135*** (0.022)	0.120*** (0.029)
Tertiary	1.009*** (0.066)	1.055*** (0.044)	1.025*** (0.034)	1.145*** (0.040)	1.351*** (0.066)
Dar es Salaam is a reference category					
Other urban	-0.333*** (0.029)	-0.357*** (0.023)	-0.329*** (0.017)	-0.320*** (0.022)	-0.297*** (0.030)
Rural	-0.536*** (0.046)	-0.595*** (0.031)	-0.586*** (0.031)	-0.541*** (0.028)	-0.467*** (0.054)
Logwwh	0.369*** (0.036)	0.335*** (0.020)	0.305*** (0.022)	0.248*** (0.028)	0.162*** (0.033)
Union	0.518*** (0.063)	0.406*** (0.040)	0.337*** (0.040)	0.218*** (0.037)	0.090* (0.050)
Marital (married=1)	0.049 (0.032)	0.070*** (0.022)	0.119*** (0.019)	0.122*** (0.022)	0.101*** (0.030)
Sex (male=1)	0.342*** (0.021)	0.393*** (0.020)	0.367*** (0.017)	0.370*** (0.018)	0.399*** (0.029)
Agriculture is a reference category					
Public	1.286*** (0.085)	1.084*** (0.055)	0.795*** (0.054)	0.607*** (0.053)	0.350*** (0.066)
Private	0.879*** (0.055)	0.760*** (0.037)	0.513*** (0.030)	0.295*** (0.033)	0.052 (0.045)
Informal	0.638*** (0.044)	0.584*** (0.033)	0.474*** (0.028)	0.429*** (0.028)	0.380*** (0.050)
Constant	7.937*** (0.149)	8.672*** (0.090)	9.632*** (0.100)	10.438*** (0.117)	11.283*** (0.149)
Observations	14,312	14,312	14,312	14,312	14,312

Notes: Dependent variable is the logarithm of monthly earnings. Bootstrapped standard errors using 100 replications in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Source: Author's calculation based on ILFS data 2014.

7. Summary and Policy Implications

This paper examined the labour market mobility and returns to technical and vocational training in comparison to general education in Tanzania, using data from ILFS of 2014. For a low income and poor country like Tanzania that is struggling to address the twin

problem of rising youth unemployment in the one hand and high level of poverty and inequality in the other hand; skills training through technical and vocational training plays an important role. Even though the rate of transition from college to work place depend on whether that employment is gainful or not; and that by extension mainly depend on the returns to technical and vocation training. The main purpose of this research therefore is two establish these two facts for the case of Tanzania: employment mobility of, and returns to technical and vocation training; with the aim of helping policy makers reaching informed decisions with regards to both.

Consequently, the main findings show that there is strong evidence that TVET increases the chances of finding good jobs and stable employment, as well as reducing the risk of unemployment. The result shows that TVET training facilitate individual to gain entry into lucrative occupations. It has also shown that technical, on job training, vocational and apprenticeship training are particularly important in acquiring formal employment. Even though, the returns to TVET is by larger extent lower compared to general education, as shown both in the descriptive statistics and main regression results. The descriptive statistics confirm this by showing that, in Tanzania, workers with university degree earns twice of those with technical training and three times those with vocational training.

These findings have very clear policy implication for the policy makers in the region and Tanzania is no exception. One, countries in the region need to shift their focus from relying heavily and investing substantially in the general education at the expense of technical and vocational training if they are to address the rising ‘youth job’ crisis and attain ‘structural transformation’. They have to revitalize and placed TVET at the core of their education and training system, both in term curriculum review so as to ensure skills relevancy and competency, and financing so as to increase the spending of TVET subsector relatively to other education subsectors. In these countries TVET need to be made to be the first option for most parents and students so as to increase both TVET enrolment and graduates to be more than 50 percent.

Two, the low returns to technical and vocational training compared to general education can be one of the main factor for the negative perception toward TVET by parents and

students, which affect both number of those enrolled with TVET and by extension the number TVET graduates. Policy makers in these countries, as it is the case for some European countries such as Germany, Switzerland, Austria, Netherlands, Denmark and Finland where returns to TVET is either equivalent or even higher than those with tertiary education, have to ensure most of TVET graduates are earnings either equivalently or relatively higher than those with university degrees. In addition to other reforms, this will make TVET to be attractive and first option to most parents and students.

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Appendix

Appendix A: Construction of Wage Variable

The income (wage) question is often a sensitive one, especially for those in privately-owned enterprises. In many cases getting reliable answers is very difficult. This is due to the fact that many people regard the income question as a way for the government to acquire evidence for taxation purposes. The situation is exacerbated when the agency collecting this information is a government institution. In respect of wages and salaries, too, individuals often regard the information as personal and confidential. Because of the sensitivities, the income questions in the individual questionnaire were deliberately placed at the end after the respondent had supplied all other employment information.

Under this study wages is broadly defined as the compensation in cash or in-kind which accrues to employed persons as a result of their involvement in either waged employment or self-employed jobs or compensation for engaging in agricultural activities over a given reference period. From 2014 ILFS questionnaires, all individuals identified as having worked during the reference week in a waged job or self employment in respect of either the main or secondary activities were asked about income from employment. Respondents in formal wage employment were asked the monthly gross cash income earned from their paid employment during the last month. Gross cash income referred to total income before any deduction of tax, rent, etc. and included any monthly responsibility earnings. If the respondent had just started a job and had not yet been paid,

interviewers were advised to record the respondent's expected gross income. If the respondent was temporarily absent from his/her wage job in the last month and was not paid during the reference week, his/her usual monthly income recorded.

Self-employed respondents were asked the gross income/takings in cash earned from their business or businesses in the last week or month. They were then asked about all expenses incurred in earning that gross income during the same reference period. The net profit was calculated by deducting all expenses incurred from the gross income earned. Income from self-employment was often difficult to calculate as many small enterprises do not keep records. However, interviewers were equipped with techniques for getting estimates of income, even if they were a rough approximation. The individual questionnaire included a further question on income that was posed to individual engaged in agriculture during the past week. These individuals were asked to provide the net income from their agricultural week over the last week or month. Net monthly income (wages) from self-employment is calculated by multiplying the net weekly income by 4 for those who reported their net income in the last week instead of last month. We focus exclusively on monthly earnings from the main job due to the small number of multiple job holders in the sample survey that prevent us to obtain reliable income variables from the secondary job disaggregated for men and women in formal, agriculture and informal employments.

Appendix B: Results

Table 1: Multinomial Logit Model for Employment Outcomes by TVET Types, Marginal Effects

Variables	Unemployed	Formal	Informal	Agriculture
Age	-0.012*** (0.001)	0.019*** (0.002)	0.011*** (0.003)	-0.019*** (0.002)
Age square/100	0.013*** (0.002)	-0.025*** (0.003)	-0.018*** (0.003)	0.029*** (0.003)
Primary Education is a reference category				
Secondary	0.014*** (0.004)	0.185*** (0.010)	-0.108*** (0.010)	-0.091*** (0.008)
On job training	-0.020 (0.013)	0.295*** (0.030)	-0.132*** (0.029)	-0.143*** (0.011)
Apprenticeship	-0.015***	0.104***	0.045***	-0.134***

	(0.006)	(0.014)	(0.015)	(0.008)
Vocational	0.004	0.212***	-0.093***	-0.123***
	(0.016)	(0.030)	(0.030)	(0.013)
Technical	-0.008	0.269***	-0.127***	-0.134***
	(0.006)	(0.016)	(0.015)	(0.010)
Tertiary	-0.036***	0.666***	-0.448***	-0.182***
	(0.005)	(0.012)	(0.010)	(0.007)
Dar es Salaam is a reference category				
Other urban	-0.091***	-0.086***	-0.288***	0.465***
	(0.004)	(0.007)	(0.010)	(0.011)
Rural	-0.088***	-0.211***	-0.501***	0.801***
	(0.004)	(0.006)	(0.007)	(0.007)
Household head	-0.137***	0.088***	0.097***	-0.047***
	(0.007)	(0.010)	(0.012)	(0.009)
Migrant	-0.016***	0.043***	0.087***	-0.114***
	(0.003)	(0.008)	(0.009)	(0.007)
Sex (male=1)	-0.035***	0.119***	-0.096***	0.011
	(0.005)	(0.009)	(0.010)	(0.008)
Household size	-0.001	-0.005***	-0.008***	0.014***
	(0.001)	(0.002)	(0.002)	(0.001)
Marital (married=1)	0.021***	-0.026***	-0.038***	0.044***
	(0.004)	(0.009)	(0.010)	(0.008)

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 2: Quantile Regression Estimates by TVET levels

VARIABLES	q10	q25	q50	q75	q90
Experience	0.049***	0.052***	0.038***	0.039***	0.043***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.005)
Expersq/100	-0.079***	-0.088***	-0.059***	-0.058***	-0.060***
	(0.009)	(0.006)	(0.006)	(0.006)	(0.010)
Primary Education is a reference category					
Secondary	0.445***	0.428***	0.363***	0.446***	0.559***
	(0.031)	(0.028)	(0.023)	(0.024)	(0.039)
On job_tvte	0.010	0.173**	0.176***	0.172***	0.197*
	(0.148)	(0.087)	(0.047)	(0.055)	(0.109)
Apprenticeship	0.183***	0.110***	0.106***	0.096***	0.053
	(0.036)	(0.031)	(0.026)	(0.031)	(0.045)
Vocational	0.138	0.192***	0.183***	0.161***	0.175***
	(0.103)	(0.062)	(0.055)	(0.060)	(0.059)
Technical	0.190***	0.155***	0.171***	0.168***	0.203***
	(0.052)	(0.031)	(0.028)	(0.030)	(0.048)
Tertiary	1.007***	1.058***	1.021***	1.155***	1.355***
	(0.067)	(0.042)	(0.032)	(0.042)	(0.065)
Dar es Salaam is a reference category					

Other urban	-0.333*** (0.026)	-0.354*** (0.023)	-0.332*** (0.020)	-0.316*** (0.022)	-0.296*** (0.033)
Rural	-0.535*** (0.044)	-0.597*** (0.035)	-0.583*** (0.035)	-0.540*** (0.029)	-0.470*** (0.045)
Logwwh	0.370*** (0.044)	0.334*** (0.024)	0.304*** (0.023)	0.249*** (0.028)	0.163*** (0.036)
Union	0.522*** (0.067)	0.405*** (0.037)	0.322*** (0.044)	0.210*** (0.038)	0.063 (0.046)
Marital (married=1)	0.054* (0.032)	0.072*** (0.024)	0.118*** (0.019)	0.123*** (0.020)	0.105*** (0.030)
Sex (male=1)	0.347*** (0.026)	0.389*** (0.024)	0.369*** (0.018)	0.374*** (0.019)	0.402*** (0.032)
Agriculture is a reference category					
Public	1.283*** (0.078)	1.077*** (0.051)	0.807*** (0.051)	0.590*** (0.055)	0.335*** (0.055)
Private	0.883*** (0.049)	0.760*** (0.036)	0.521*** (0.032)	0.297*** (0.033)	0.050 (0.041)
Informal	0.638*** (0.045)	0.586*** (0.033)	0.478*** (0.035)	0.433*** (0.030)	0.387*** (0.042)
Constant	7.926*** (0.195)	8.678*** (0.096)	9.639*** (0.097)	10.432*** (0.125)	11.287*** (0.160)
Observations	14,312	14,312	14,312	14,312	14,312

Dependent variable is log monthly earnings, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Appendix C

Table 3: Comparisons on Returns to TVET in Selected Countries

S/N	Author(s)	Methodology	Findings
1	El-Hamidi (2006) in Egypt	Mincerian earnings regression (1 st stage: ordered logit)	Returns to vocational secondary education graduates earn a wage premium of 35.4 percent, compared to general secondary education graduates (6.1 percent).
2	Moenjak and Worswick (2003) in Thailand	Mincerian earnings regression (1 st stage: probit choice)	Compared to general education at the same level, upper secondary vocational education gives higher earnings returns by 63.9 percent and 49.4 percent for men and women, respectively.
3	Salkeriou (2003) in Singapore	Mincerian earnings equation	Returns to TVET education are 10.3 percent at the secondary level and 12.7 percent at the post-secondary level, compared with the corresponding figures of 9.4 percent and 11.3 percent for general education.
4	Riboud, Savchenko,	Mincerian earnings	Returns to formal vocational training are

	Tan (2007) in Sri Lanka	regression (not controlling for selectivity bias)	17 percent compared with 7.9 percent for general education.
5	Riboud, Savchenko, Tan (2007) in India	Mincerian earnings regression (not controlling for selectivity bias)	Returns to formal vocational training are approximately 8 percent, comparable to returns to general education at 8.4 percent.
6	Kahyarara and Teal (2008) in Tanzania	Mincerian earnings fixed effects regression	The returns for vocational training graduates with primary education are 9.6 percent compared with 8.8 percent for those with secondary education, while the returns for technical education for graduates with lower secondary school are estimated at 10.5 percent.
7	Lassibille and Tan (2005) in Rwanda	Mincerian earnings regression (1st stage: multinomial logit).	Returns to vocational education are 12.5 percent compared to 29 percent returns to general secondary education.
8	Riboud, Savchenko, Tan (2007) in Pakistan	Mincerian earnings regression (not controlling for selectivity bias)	Returns to formal vocational training are 8.1 percent, while returns to general education are 9 percent.