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EXPLORING NEXUS BETWEEN INVESTMENT IN TERTIARY EDUCATION AND LABOUR MARKET OUTCOMES IN BOTSWANA

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Abstract: This study investigates the links between investment in tertiary education and labour market outcomes (particularly unemployment) in Botswana for the period 1990 to 2018. Using Auto Regressive Distributive Lags (ARDL) bounds test to cointegration, the results showed that the relationship between government spending on tertiary education and the unemployment rate is negative as it was expected, and it's significant. The number of people with tertiary education attainment negatively affects the unemployment rate and labour force participation rate has a positive relationship with the unemployment rate. The study therefore calls for intensified monitoring and evaluation of the budgets of the Ministry of Tertiary Education, Research, Science and Technology among other things. This can help channel monetary resources to where they are needed most and be used in productive capacities hence reducing the unemployment rate.

Keywords: Education, Labour market, Unemployment

1. INTRODUCTION

In a lot of developing countries, education is viewed as a key contributor to the development of a country. Investment in education is vital as it is characterized by benefits of higher income for those invested in it, lower unemployment rates, better health, faster technology creation, increase in civic involvement and less widely known, education also creates substantial government fiscal benefits. Because education leads to higher earnings in individuals it also leads to more tax revenue, as a result the revenue can be distributed to other useful means such as creating industries for employment creation (Trostel, 2007).

Because of the importance of education in an economy, the education sector usually receives the largest share of total government expenditure. Botswana has a strong commitment to investing in education as demonstrated

by consistent spending increases and the high budget priority devoted to the sector. Education continues to receive the highest level of funding in the national budget. Public expenditure on education has been steady over the past years averaging, 22 per cent of total budget between 2014/15 and 2018/19. Under the new structure in the current fiscal year, the priority of education remains nearly identical, receiving about 22.2 per cent of resources in the total budget. This demonstrates that, on the aggregate, the government has continued to exceed the international spending benchmark of 20 per cent of the national budget for education as put forth by Education for All. The allocation of the largest share of the budget to education is a long-standing characteristic of expenditure in Botswana (UNICEF, 2018).

There has been a paradigm shift in the way investment in education is viewed as the country transitions from a production based economy to a knowledge based economy. In 2016 the Ministry of Tertiary Education, Research, Science and Technology was established with a mandate to transform Botswana from a resource based to knowledge based economy. Even the current plan NDP 11 stresses on the importance of education to improve the quality of the labour force.

The NDP 11 also acknowledges key challenges in the education sector such as poor transition rates from senior secondary schools to tertiary education and mismatch between skills and labour force needs. Increasing aggregate spending on education aims to address these challenges. However, how effectively the country employs it's spending will determine how far it succeeds in realizing its goals (UNESCO, 2000). This raises a question of whether the expenditure invested in tertiary education has specific plans drawn i.e. further budgets directed towards research to bring solutions to current problems faced by the Botswana labour market such as skills mismatch. Theory postulates that investment in higher education is associated with better chances on the labour market, this therefore gives an expectation that there be improvements in the labour markets (Psacharopoulos & Patrinos, 2002).

Even though Botswana has been spending more on the education sector, returns to public investment in tertiary education in Botswana yields are low as the country is still marred by high levels of unemployment (hovering around 17%) particularly among the youth, females and university graduates. This is a critical challenge for the country. It has been reported, however, that one of the reasons why the returns are low is that it takes time for education to translate into higher productivity because learners and graduating classes need

to go through more educational cycles (Bosupeng, 2015). The contributing power of higher education can also be limited if the skilled workers are left unemployed, which is a recurring case of Botswana (Manafi & Marinescu, 2012).

A study conducted for Africa in 2002 by Boateng shows that increasing unemployment among graduates is an indicator of the mismatch between educational output and labour market needs. The mismatch is a product of particular institutional structures governing higher education processes, thus leading to misutilization of funds provided (Boateng, 2002). In Botswana, there has not been a thorough analysis of how investment in tertiary education affects the labour market. Some studies such as the one by Bosupeng (2015) focused on how investment in education affects economic growth but did not consider economic growth indicators such as employment rate, unemployment rate and labour force participation rate which are equally important. Bosupeng (2015) attempted to establish the link between economic growth and education expenditure in a long run framework in Botswana.

Another study by Basuti & Sinha (2017) investigated the impact of health status and education on labour force participation in Botswana, however they focused on primary education as opposed to tertiary education which is an important attribute in the Botswana labour market. This study therefore aims to fill this gap by determining the links between investment in tertiary education and labour market outcomes (particularly unemployment) in Botswana. It contributes to existing literature as less research has been done in this area.

3. TERTIARY EDUCATION IN BOTSWANA

In Botswana tertiary education is provided by both public and private institutions, these are universities and colleges. The University of Botswana and its affiliated institutions, which include the colleges of education, the nursing institutions and Botswana University of Agriculture and Natural Resources offer courses leading to certificates, diplomas and degrees. The Botswana International University of Science and Technology was established in Palapye by a public-private partnership. The Institute of Development Management (IDM) accepts students from throughout the region (Commonwealth_ Education, 2018).

The Ministry of Tertiary Education, Research, Science and Technology handles tertiary education policy in general, as well as coordinating research, science and technology development while also producing graduates that are

relevant to industry requirements. Since independence tertiary education in Botswana has been neglected, there has never been a ministry focusing on tertiary education before the newly formed one. The development of tertiary education is based on having a skilled nation that is in a position to contribute towards the country's realization of its national development objectives which among them is reducing higher unemployment rates in the labour market.

Botswana's tertiary education system needs to be understood within the relevant context of the process of globalization and the national agenda for transformation as represented by Vision 2036, which provides a series of trends, and pressure for reform (Samboma, 2017). Vision 2036 states that the country will be knowledgeable with relevant quality education that is outcome based emphasizing on technical and vocational skills as well as academic competencies. Lifelong learning and training opportunities will be provided for all with equal emphasis on academic, technical and vocational skills. The business curriculum will be aligned to the needs of the economy and business, science, math and technology will be taught right from primary to tertiary level.

The above shows that Botswana's investment in tertiary education is in line with what the country intends to achieve in the long run.

3. LABOUR MARKET CHARACTERISTICS IN BOTSWANA

In terms of the characteristics of the labour market, Botswana is similar to other Southern Africa's labour markets as it consists of segments such as rural and urban, formal and informal and public and private (Ncube, 2008). According to Republic of Botswana (2009), the structure of the labour force in Botswana has also changed considerably from an agricultural sector-led to a formal sector-led labour market. Specifically, by 2008, 47.2% of the Botswana's labour force had jobs in the formal sector – with the fastest growing sectors being finance, business services, manufacturing, trade, transport and communications, and government (Republic of Botswana, 2009). These changes necessitate research to inform human resources development strategies and prevent skills mismatch. Despite this need for research, Siphambe (2003) has long warned that training institutions run the risk of training graduates that are not appropriate for the labour market because institutions do not conduct tracer studies of their graduates. To date, research in this area remains scarce. In one study investigating the university graduates' transition from higher education to employment, Ama (2008) revealed that on average, graduates made at least thirteen contacts before getting their first employment.

Despite lack of extensive research investigating Botswana's labour market, the existing policies and institutions, such as Education policies, the Botswana Labour Market Observatory and the Botswana Human Resource Development Council, tempt one to assume that the country would have adequately facilitated the employability of tertiary institutions graduates. However, despite the country's investment in education and good education policies, the country's high economic ratings and high literacy rate the high unemployment rates among females, the youth and university graduates in Botswana remain a concern.

4. SELECTED LITERATURE REVIEW

It is widely known that education has been regarded as one of the leading determinants of economic growth since the time of Adam Smith. Over time, many economic growth theories and models have been developed relating education and economic growth. The belief, that education promotes growth has led governments of many developing countries to invest in the education sector (Grimaccia and Lima, 2013). Furthermore there has also been theories that support the link between investment in education and economic growth indicators such as unemployment. One such theory is the Human Capital Theory (HCT). The Human Capital Theory states that a person's education is an investment (involves costs, in terms of direct spending on education and the opportunity costs of student time) in her/his human capital (akin to investment by a firm in physical capital), which makes the individual more productive and accrue him/her a future stream of benefits (superior productivity, higher wages and other non-monetary benefits to the individual and the society) (Becker, 1964).

The theory further states that the overall economic benefits of education can be assessed by estimating the economic value of the investments in education, which measures the degree to which the costs of attaining levels of education translate in the labour market. Skills affect people's lives and economic and social development in many ways. Skills improve labour market outcomes both in terms of employment rates and earnings (Taylor, 2012).

For the most part, the benefits of education are channeled through the labour market. The better educated stand a higher chance of being employed, are generally more productive and are rewarded with higher earnings once employed. Some benefits of education such as improved health might also

not explicitly be related to the labour market, but could enhance the pecuniary benefits associated with labour market participation. These therefore suggest that education, especially tertiary education is worth an investment.

Quite a few empirical studies have tried to examine the relation between investment in education and economic growth indicators such as employment and/or unemployment and sometimes they have even failed to establish a robust relationship between education expenditures and these indicators. Mekdad *et al.* (2014) studied the relationship between public spending on education and unemployment rate in Algeria over the period 1974 to 2012 with the use of endogenous growth model. Their results supported that public spending on education affects employment positively in Algeria. They also found a bilateral causality and long run relationship between per capita GDP and public education expenditure.

Another study by Pirim *et al* (2014) examined not only the relationship between unemployment and education expenditure but also the relationship between unemployment and other explanatory variables such as welfare spending, health spending, income per capita, gross state product, union vs. non-unionized states, graduation rates, political party affiliation, etc. in developing European nations. This study conducted a pooled OLS regression analysis. They found that in the long term, investment in human capital through education as defined by spending on education and health services play a significant role in reducing unemployment rate.

By studying the expenditure in education, human capital and growth in Canada using OLS analysis, Annabi, *et al* (2011) has shown that budget policies do have a powerful effect in employment. Education increases the rate of capital accumulation and reduces the negative effects of the reduction of growth in labor force. Nevertheless, this depends on the efficiency of government investments in education.

A study by Siphambe (2000) on returns to education in Botswana used data from 1994/5 Household Income and Expenditure Survey and a Human Capital model. In his study, education was seen as an investment in oneself during school and later through job training. An OLS approach was used and the variables of interest were income, number of years of schooling, level of education and hours spent on the work. The results indicated that tertiary education increased the chances of finding employment. Furthermore, it was found that education is highly profitable as it leads to one earning higher income in the labour market.

Expressing expenditure for education as a fraction of GDP in Botswana and using OLS methodology Bosupeng (2015) used data from 1960 to 2013 to find payoffs of expenditure in education. He found that it takes time for better education and health to translate into higher productivity if any because graduates and learners have to go through one or more education cycles and improved education and health may pay off several years later. It is plausible that there could not exist a statistically significant relationship between GDP and educational expenditure given that the relationship was expected to hold in a robust data range.

Addressing employability challenges in Botswana, Pheko & Molefhe (2017) carried out a study which used qualitative, exploratory and descriptive approaches and employed an online interview format. The study's main aim was to identify the skills and attributes that graduates perceived as important for employment. The findings were that majority of graduates could not benefit from the available information and data on employment – limiting their chances and perceived need for self-development, hence increased graduate unemployment rates faced by the country.

Last but not least, Basuti & Sinha (2017) did a study on the impact of health status and education on labour force participation in Botswana as already highlighted above. They found out that an increase of primary school enrolment increased the overall participation rate. They also established that an increase in education expenditure increased the total labour force participation rate in the long-run but reduces their participation in the short-run. And then, with regard to health, increases in health expenditure was found to increase the overall labour force participation rate in the long-run.

In light of the above, this study observes that there is need to revisit how public spending on tertiary education is allocated, particularly in terms of how this spending affects labour market outcomes in Botswana.

5. METHODS, DATA AND THE GENERAL MODEL

The model used for this study follows the works of Grimaccia and Lima (2013) which investigated the effects of expenditures on education on unemployment rate using education attainment and labour force participation rate as control variables. For this study the model was modified to also include government spending on tertiary education as a variable. So the model considered Unemployment rate (UR) as a dependent variable and the independent variables as GDP (percentage of GDP spent on tertiary education), EDU

(population with tertiary education from both public and private institutions) and LFPR (Proportion of people eligible to participate in the labour force and are participating by working or looking for a job).

Theory and data availability allowed us to specify the following model:

$$\mathbf{UR = f\ (EXP, EDU, LFPR)} \quad \textit{(equation 1)}$$

The variables included in the model are those previous empirical research and theoretical knowledge have found significant on labour market outcomes in developing nations.

Assuming a linear relationship amongst the variables the empirical model can then be specified as follows:

$$\mathbf{UR}_{t} = \alpha_0 + \alpha_1 \mathbf{EXP}_t + \alpha_2 \mathbf{EDU}t + \alpha_3 \mathbf{LFPR}t + \mathbf{U}t \quad \textit{(equation 2)}$$

$\mathbf{U}_t$ -represents the error term.

EXP - Percentage of GDP spent on tertiary education.

EDU - the total number of students, who have successfully completed their programs from all the recognized tertiary education providers in Botswana.

LFPR- The labour force participation rate is a measure of the proportion of a country's working-age (15 - 64 years) population that engages actively in the labour market.

The econometric technique that was used in this study is Autoregressive Distributed Lag (ARDL) bounds test approach to Cointegration. It was used to analyse the long run relationships of variables under observation. This method was informed by the stationarity integrating order of variables. ARDL is a model in which the dependent variable is a function of its own past lagged values as well as current and past values of the independent variables. The ARDL cointegration approach got its development through Pesaran and Shin (1999). It has three advantages in comparison with other previous and traditional cointegration methods. ARDL does not need that all the variables under study be integrated of the same order and it can be applied when the under-lying variables are integrated of order one, order zero or fractionally integrated. One of the pros of the approach is that it is relatively more efficient in the case of small and finite sample data sizes. Lastly by applying the ARDL technique we obtain unbiased estimates of the long-run model.

ARDL improves Engle Granger and Johansen test which require variables to be integrated of the same order. It yields consistent estimates of the long-

run coefficients that are asymptotically normal irrespective of the level of stationarity (Pesaran & Shin, 1999). The test also addresses any problem of endogeneity in variables. If any relationships are discovered, the long run cointegration model is run followed by the error correction model to deal with short run dynamics of the model.

6. EMPIRICAL RESULTS

This study used time series data from 1990 to 2018. Data for percentage of GDP spent on tertiary education and number of graduates with tertiary education were obtained from Statistics Botswana and UNESCO Institute for Statistics (2019). Labour force participation rates and unemployment rates for Botswana were obtained from World Bank publications (World Bank, 2019).

6.1. The Unit Root Test

The Augmented Dickey Fuller (ADF) test was used to test for unit root in the study. The ADF test is suitable for use when the time series data has unknown mean. It takes into account the possibility of autocorrelation in the error term. It is mainly employed for its simplicity. Stationarity is important to investigate if statistical properties such as mean, variance, autocorrelation etc. are all constant over time.

The results from the unit root test are as follows.

Table 1
ADF Results

Variable	*Intercept*				*Trend and Intercept*			
	Levels		*First Difference*		*Levels*		*First Difference*	
	Stat	*Prob*	*Stat*	*Prob*	*Stat*	*Prob*	*Stat*	*Prob*
EDU	0.6950	0.98	-5.44	0.0002	-2.02	0.55	-5.05	0.0024
EXP*	-3.25	0.0292	-2.54	0.1197	-3.89	0.0304	-2.27	0.4268
LFPR	0.34	0.97	-3.61	0.0125	-0.77	0.68	-3.22	0.10
UR*	-3.82	0.0075	-3.61	0.014	-4.16	0.015	-3.56	0.0570

Compiled by: author

The values displayed in the table are t-statistic values observed for each variable's test for stationarity and their associated probability values. The "*" is placed for variables that are stationary at levels.

From the results above education attainment (EDU) and labour force participation rate (LFPR) are stationary at first difference while expenditure on

education (EXP) and unemployment rate (UR) are stationary at levels. The data series therefore provides evidence for the use of Autoregressive Distributed Lag (ARDL) technique of analysis.

6.2.Autoregressive Distributed Lag (ARDL) Results

As already mentioned in the methodology section, ARDL is more suitable for variables at different order of integration. Results from the bounds test (Table 2) suggest Cointegration amongst the variables. This is so because the obtained F statistic is greater that the critical value of I (0) BOUND at all levels. The implication of the estimation below is that tertiary education attainment, expenditure on tertiary education, labour force participation rate and unemployment, all have equilibrium condition that keep them together in the long-run, that is to say, there exist a long run relationship between the variables.

Table 2
Bounds Test Results

Ho: No long run relationship

Test Statistic	*Value*	*k*
F-Statistic	5.716155	3

Critical Value Bounds

Significance	*I(0) Bound*	*I(1) Bound*
10%	2.72	3.77
5%	3.23	4.35
2.5%	3.69	4.89
1%	4.29	5.61

6.2.1. Long-run Estimates using the ARDL Approach

Table 3 reveals the long-run estimates between tertiary education attainment, expenditure on tertiary education, labour force participation rate and unemployment in Botswana. In the long run all the dependent variables prove to have a negative effect on the unemployment rate except for labour force participation rate. Tertiary education attainment and expenditure on tertiary education jointly affect unemployment rate negatively. However, amongst the two, the variable expenditure on tertiary education is statistically significant in determining the unemployment rate. This can be evidenced by the probability value which is less than 5%.

Table 3
Long Run Coefficients

Variable	*Coefficient*	*t-Statistic*	*Prob*
LEDU -0.080102	0.111133	-0.720779	0.4790
LEXP -0.003207	0.040952	-0.078306	0.0283
LLFPR 0.341213	1.644873	-0.207441	0.8377
C 5.163100	6.329078	0.815774	0.0323

Compiled by: author

6.2.2. Error Correction Estimates

The existence of a long run relationship between variables leads to estimation of an Error Correction Model (ECM) to obtain the short run dynamics of the variables. Table 4 presents the short-run dynamic estimates among variables of interest.The coefficient of the error correction term indicates how fast the variables adjust towards equilibrium when a shock is introduced.

Table 4
Error Correction Estimates Results

Variable	*Coefficient*	*t-Statistic*	*Prob*
C -0.023864	0.033711	-0.707905	0.00881
D(LUR(-1)) 2.550882	1.824561	1.398080	0.00279
D(EDU(-1)) -3.653706	3.887306	-0.942227	0.01868
D(EDU(-2)) 7.017306	5.858606	1.198633	0.29862
D(EXP01(-1)) -3.775306	7.930064	0.468138	0.02387
D(LLFPR(-1)) 0.051755	0.815864	0.063436	0.03765
ECM (-1) -0.750495	1.806649	-1.190322	0.02194

R^2 = 0.717879 F Statistic =6.097684 DW Statistic =1.980865
Adjusted R^2 =0.683839 Probability = 0.041253
Compiled by: author

The ECM coefficient is significant. It suggests that 75% of variations in the disequilibrium in the previous year will be corrected in the following year and it demonstrates the relevance of tertiary education attainment, expenditure on tertiary education and labour force participation rate in explaining dynamics of unemployment rate in Botswana. Results from the ECM show that in the short run expenditures on tertiary education are negatively related to unemployment and its significant at 5% level and this suggests that as more increases in expenditures are made towards tertiary education the level of unemployment

rate is bound to decrease. Tertiary education attainment was found to influence unemployment rate negatively, that is as the total number of people with tertiary education attainment increase the unemployment rate decreases. These results are consistent with the study by Nwachuku (2017) who recommended that reasonable amount of budgets should be given to higher education expenditures as this improves skills of people hence decrease unemployment rate. This is also consistent with economic theories and previous studies. Lastly, Labour Force Participation Rate proved to have a positive relationship with unemployment rate, meaning that an increase in the number of population ready to participate in the labour market will increase the unemployment rate. This may be attributable to different factors such as mismatch between what the labour market actually need (demand) and what the population provides (supply). Furthermore, LFPR series can decrease because of discouraged worker effect during periods of a rise in unemployment (Liu, 2014).

6.2.3. Diagnostic Tests

The estimated ARDL model was tested for heteroscedasticity, serial correlation and stability and normality among others. R^2 of 71.7% suggested that 71.7% of variations in the model were explained by the regressors jointly, ceteris paribus. The probability value of the F -test was below 5% level of significance, this implies that education attainment, expenditure on education and labour force participation rate determine unemployment rate in Botswana.

Considering autocorrelation between the variables, the Durbin Watson Statistic (DW) was acceptable towards concluding that there was no autocorrelation between the independent variables. Results from the Breusch-Godfrey serial correlation LM test showed that the model allowed us to reject the hypothesis that there is serial correlation as the probability value observed was higher than probability significance value of 5%. The model had no problem of heteroscedasticity as shown by the result of the Breusch-Pagan-Godfrey test. This meant that modeling errors were uncorrelated and uniform. This also meant that variances and covariances were not underestimated. The results further showed that the variables were normally distributed at 5% level. This meant that data was well modeled in the assumption of normality.

7. CONCLUSIONS AND POLICY RECOMMENDATIONS

This study aimed at finding the links between investment in tertiary education in Botswana and labour market outcomes, specifically unemployment rate. A

model adopted from Grimaccia and Lima (2013) was used to find empirical relationships between unemployment rate, percentage of government expenditure on tertiary education, total number of people with tertiary education attainment and labour force participation rate. ARDL approach was used for the study because of the way variables were integrated. Time series data for 1990-2018 was used.

The results indicated that government expenditure and tertiary education attainment have a significant negative impact on the unemployment rate in the long run. Labour force participation rate on the other hand had a positive impact on the unemployment rate. This showed that government efforts such as increasing expenditures towards education can be beneficial in the long run as it translates to people being equipped with the right skills to either be employed or self-employment. From the results education attainment and labour force participation are significant in the short run but insignificant in the long run. The explanation could be that eventually labour markets get saturated with more graduates hence increase the LFPR at a rate higher than the labour market absorption rate.

The high unemployment rate in Botswana is still a concern and the efforts to reduce this should be put in place at a more intensified level. This study therefore calls for review in tertiary education policy. There are a lot of graduates with qualifications that are not demanded in the labour market, the Ministry of Tertiary Education, Research, Science and Technology could raise awareness about such qualifications. This could help curb issues of demand and supply mismatch hence reducing unemployment. The study indicates that expenditure on tertiary education has a long run impact on unemployment rate, government budgets may be allocated such that the budgets to tertiary educations include areas such as research and development as their main focus, and this is where the gaps within the Botswana labour market can be identified.

There should be intensified monitoring and evaluation on the budgets of the Ministry of Tertiary Education, Research, Science and Technology. This could help channel monetary resources to where they are needed most and be used in productive capacities hence reducing the unemployment rate. The private sector and the government should open up more industries where a large number of people available for work (the labour force) can be absorbed hence the unemployment rate may be reduced.

There are other factors within tertiary education attainment that could affect the unemployment rate for example wages of people with tertiary

education attainment and inflation as Okun' s law predicts. Such variables however are not easy to capture in a model and data on such variables is not easily accessible. Future research could extend this by including more dynamics in the tertiary education environment and different methodologies such as including the variables left out in the model used for this research.

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