The International Journal of Social Sciences and Humanities Invention 8(03): 6381-6381, 2020
DOI:10.18535/ijsshi/v8i02.03 **ICV 2015: 45.28**
ISSN: 2349-2031

. Review Article

An Econometric Analysis of Entrepreneurship and Unemployment for Sub-Saharan Africa: 2006 -2016

Ayinde, R. A.
ayinderamat@gmail.com

Nile University Of Nigeria

Absract:
High unemployment rate in Sub-Saharan Africa continues to persist with a current rate of 6.14% in 2016, 6.28% in 2017, 6.16% in 2018, 6.17% in 2019 from 6.18% in 2020 (World Bank, 2020). Several factors account for the high unemployment rate including poor infrastructural facilities such as power supply which discourages entrepreneurial activities, poor standard of education resulting in unemployable youths, the corrupt political environment which channels funds for productive activities into private pockets, high population growth rate, neglect of the manufacturing and agricultural sector and insecurity of lives and property. The resultant effects includea high crime rate, high rate of depression due to a long state of hopelessness, loss of skills by the unemployed, low economic growth, high poverty rate, and increased rural-urban migration. Several programs are implemented by the government towards curbing the high unemployment rate which can be categorized into 3 groups: infrastructural development, promotion of entrepreneurial activities, and encouraging foreign investors. Hence this study assesses the impact of entrepreneurship start-ups on reducing unemployment in the sub-Saharan Africa region using a sample of 10 countries for the period 2006-2016. The study applied traditional panel data methodology of pooled OLS, random effect, and fixed effect, and finds a positive relationship between the two variables thus suggesting that if entrepreneurship is well harnessed it can sufficiently reduce unemployment in the region.

Keywords: Entrepreneurship, Unemployment, Sub-Saharan Africa, Fixed Effect.

Introduction:

The trend in global unemployment remains a cause of concern. In 2016, about 197.7 (5.6% unemployment rate) million people globally were unemployed reducing slightly to 192.7 (5.6%) million in 2017, while for 2018 and 2019 estimates are 192.3 (5.5%) million and 193.6 (5.5%) million respectively (ILO, 2019). This indicates the fact that the problem of unemployment will persist into the nearest future. This trend cuts across all regions of the world. Particularly, for the developing countries, it is estimated that 15.6 (5.3%) million are unemployed in 2017, while the high unemployment rate persists in 2018 of 16.1 (5.3%) million and 2019 of 16.6 (5.3%) million persons (ILO, 2017). For Sub-Saharan Africa, the unemployment rate stood at 6.18% in 2019 and 6.17% in 2020. It is expected that there will exist important geographic shifts in the distribution of the global labor force whereby Sub- Saharan Africa and Southern Asia will contribute about 38% of the global

labor force by 2030 which is an increase from between 2017 and 2030, Sub-Saharan Africa will have its labor supply increased by 198 million. Although it is expected that economic growth improvedfrom a low of 1.3% in 2016 to 2.4% in 2017, 3.2% in 2018, and 3.5% in 2019 but a negative growth of -3.0% in 2020 resulting from the COVID-19 Pandemic (IMF, 2020). Thus, economic growth has not been strong and persistent enough to drastically reduce unemployment. The challenges facing the Sub-Saharan African labor market include high unemployment, underemployment, poor quality employment, working poverty, and high informal employment. In SSA, youth unemployment is the order of the day. Today half of the population is under 25 years of age and each year between 2015 and 2035, there will be half a million more 15-year-olds than the year before (Filmer and Fox, 2014). With a large labor force, the unemployment rate is high and thus resulting in high informal employment which serves as a last resort for the unemployed. A large informal employment results in working poverty and vulnerable employment.Solutions to the rising unemployment trend for Sub-Saharan African countries include the application of appropriate economic policies by each country to drive their economies, implementation of coordinated and integrated policies for partnerships within the region, human and capital development, and promotion of youth entrepreneurship. For human capital development, while it is well known that educational attainment shapes employment opportunities, schooling is not able to give many young people the required skills to compete in the global labor market. Also across sub-Saharan Africa, school attendance continues to be underwhelming, with low completion high dropout, and repeat rate. In 2010, 11.4 million pupils repeated a primary grade in SSA which represented more than the contributory share of 26% in 2017. Hence one-third of the global total (Hilson and Osei, 2017). Therefore the need for improvements in basic education and appropriate post-school skills. Youth entrepreneurship is well canvassed for in the developed and developing countries and it is central to the sustainable development goals representing target 4.4 which aims at increasing the skills of youths and adults for employment and entrepreneurship. For efficiency in promoting entrepreneurship, there is a need to align it with other labor market measures such as wage subsidies, skills acquisition, access to finance, and mentoring services. Given the relative importance of entrepreneur development across the world for tackling global unemployment can make on unemployment for Sub-Saharan African countries. this paper thus analysis the relationship between unemployment and entrepreneurship thatexist in the sub-Saharan Africa countries. The rest of the paper is structured as follows: Section2 deals with the review of relevant literature, section 3 relates the methodology applied, section 4 deals with the analysis of results, and section 5 gives the conclusion for the paper.

2. Review Of Relevant Literature:

In this section, a review of the relevant literature for the study is conducted. These studies explore on the one hand the relationship between entrepreneurship and unemployment and on the other the major determinants of entrepreneurship for several countries and regions of the world. Dvoulety 2012, focuses on investigating the dynamic relationship existing between unemployment and entrepreneurship within the Czech regions. Using quarterly data from 2003 through 2014 years and applying panel vector

autoregressive model with an impulse response function. 2 variables were used in the model, that is, an entrepreneurial activity which measures the total amount of registered businesses in the region at the end of the quarter and unemployment rate in percentages. The analysis finds a positive relationship for proactive entrepreneurial policies during periods of higher unemployment.In a similar study by Dvoulety (2018), analysis of the determinants of entrepreneurship was made at the country level using 4 different measures of entrepreneurial and self-employment activity. The main aim is to clarify if the use of different data sources impacts the result obtained. Hence the test that no matter what measures of entrepreneurship or self-employmentchosen at the country level, the results obtained indicate a similar impact. The four measures analyzed include Eurostat 2017, self-employment rate, OECD (2017), self-employment rate, global entrepreneurship monitor (2017) rates established business ownership rate (EBOR), and GEM(2017) totalearly-stage entrepreneurial activity (TEA). All these data sources have been used companies. Also, the education of unemployed women significantly correlates with the number of newly registered enterprises. Unemployment itself correlates positively with the number of established/operating companies.In furtherance, Oseni 2017 examined the impact of the state of entrepreneurship education on the development of Micro, Small, and Medium Enterprises in Nigeria. The focus behind the study remains the fact that how does entrepreneurial education given in Nigeria's institution impacts the development of enterprises as foresighted by the education policymakers. How well does entrepreneurship education help to address unemployment through the creation of Micro, Small, and Medium Enterprises(MSME). Using survey data, the focus of the study is limited to 961 respondents of MSME members of SMEDAN between unemployment and entrepreneurship. Also using the impulse response function, the analysis finds a positive relationship between unemployment and entrepreneurship. Also using the IRF, they find that entrepreneurship responds positively to shock in unemployment after two years. Thus advocating and the bank of the industry for the six geo-political zones of Nigeria. The study employs the Kruskal-Wallis test which is a non-parametric method for testing whether samples originate from the same distribution. It is used for comparing two or more independent samples of equal or different sample sizes. In this study, the Kruskal Wallis test is conducted for 5 independent samples. That is respondents are classified into 5 groups based on their opinion for entrepreneurship education in the nation's education curriculum. The 5 groups include strongly agree, agree, undecided, disagree, strongly disagree respondents. The P-value of the Pearson chi-square result of 0.0021 indicates that the strongly agree sample dominates whose respondents represent about 95.37% of the total sample size. Hence this implies that the impact of entrepreneurship education would be significant if added to the curriculum.Amoros 2016 examines the relationship between entrepreneurship activity and a set of economic variables including GDP, economic growth, unemployment, informality, corruption, perceptions, macroeconomic stability, and labor regulations. The study employs data from nine lati American countries including Argentina, Brazil, Chile, Colombia, Dominican Republic, Ecuador, Mexico, Peru, Uruguay, and Venezuela. Data employed range from 2000 to 2010. In analysis 3 entrepreneurial rate is employed, that is, Entrepreneurial rate, opportunity entrepreneurial rate, and the necessity entrepreneurial rate. The result shows that economic growth is positively related to opportunity-based entrepreneurship. With regards to unemployment negative relationship is observed between TEA and

unemployment as well as opportunity entrepreneurial with the unemployment rate. With regards to necessity entrepreneurship, a positive relationship is observed.In Audretsch 2015, the study examines the relationship between the qualification of the unemployed on regional start-up rates, that is, regional , manufacturing orientation, firm size structure of the region, vacancy rate, net migration rate, sectoral diversity of the regional economy and cultural diversity of the regional workforce. The model was estimated at different start-up rates to distinguish between total start-ups, knowledge-intensive start-ups, and low knowledge start-ups. Using data for 97 regions from Germany for the period 1998-2001 and 2002-2005 (4-year averages). Several results employ pooled regression, random effect estimation, fixed effect estimation, and IV regression. The result from the regression analyses shows that a high percentage of highly skilled extensively for analysis. The analysis focus on eleven European countries, namely Belgium, Denmark, France, Germany, Greece, Hungary, Ireland, Netherlands, Slovenia, Spain, and Sweden for the period 2001 – 2015. The study employed the use of correlation analysis to investigate if the different measures are tightly linked. It finds that all measures have a correlation coefficient to be positive and significant statistically at 5 percent. Also using regression analysis to obtain the relationship between entrepreneurs, unemployment rate, FDI inflows, start-up procedures, economic freedom index and finds that result is robust to the particular measure of entrepreneurship chosen as results obtained was similar to all four measures. In Grazina and Rita 2009, the study examines the relationship between entrepreneurship and unemployment through the prism of demographical factors such as gender, age, education, emigration, ethnic minorities, race, and marital status. With a focus on Lithuanian entrepreneurship depending on the knowledge intensity of the industry. The study estimated an econometrics model of the relationship between startup intensity on total regional unemployment alongside control variables such as disposable regional income growth, research, and development activities for the period 1998 – 2008, a systematic analysis of demographic factors such as emigration, ethnicity, race, presence of an entrepreneur in the household and work experience, influence on the unemployment vis a vis entrepreneurship relationship. Correlation analysis of the focus variables is used and it is found that the education of unemployed men and women significantly correlates positively with the number of established and operatin

unemployed is positively related to knowledge intensity entrepreneurship, a high share of long term unemployment relates negatively with low skilled unemployed has no significant impact on entrepreneurial start-up. This paper in general indicates that the more the knowledge/skills of the unemployed the higher the possibility of entrepreneurship start-up. In terms of long term unemployment relating negatively with entrepreneurship, the result so obtained contradicts results obtained in Dvoulety (2017).Remeikiene and Startiene 2009 analyze the relationship between entrepreneurship and unemployment while factoring in cultural and economical factors using data from Lithuania for the period 1998 – 2007 with cross-correlation analysis. In the analysis, the interdependence between 3 indicators of entrepreneurship level, that is, the number of enterprises established enterprises minus the number of closed enterprises and the number of established enterprises with a ratio of the number of enterprises against indicators GDP at current periods, previous period, per capita GDP, average monthly gross earnings, exports, imports, inflation, and unemployment.

The result shows that a positively significant relationship exists between the number of established enterprises with a ratio of the number of enterprises. Dvoulety and Mares (2016) focus on the interaction between new business activity and the unemployment rate in Visegrad countries. The Visegrad countries include the Czech Republic, Hungary, Poland, and Slovakia. The study period is 1998 – signifies that business environment, administrative procedures, growth of R&D expenditures, growth of R&D expenditures, growth of tertiary-educated population,and GDP per capita are significant determinants of entrepreneurship. Models indicate that a significant negative relationship between entrepreneurial activity and the unemployment rate lagged one year and two years. Although a positive insignificant relationship exists between entrepreneurial activity and the unemploymentrate. The result obtained here relates closely with Audretsch 2015, who finds long-term unemployment and entrepreneurial activity.Rusu and Roman (2017) investigate the impact of economic factors on entrepreneurial activity in 18 European Union countries for the period 2002 – 2015. Countries examined include Belgium, Croatia, Denmark, Finland, France, Greece, Hungary, Ireland, Italy, Latvia, Netherlands, Portugal, Romania, Slovenia, Spain, Sweden, and United Kingdom. 3 models are estimated, in the first model, variables employed include total entrepreneurial activity (TEA) representing the dependent variable with independent variables of GDP, GDP per capita, tax rate, inflation rate, Foreign Direct Investment, access to credit, and unemployment rate. The second model has TEA regressed against the fear of failure rate, entrepreneurial intentions, perceived capabilities, and perceived opportunities. The third model has TEA as the endogenous variable and exogenous variables of cost of

2014. Using regression analysis of Entrepreneurial activity on explanatory variables such as unemployment rate, GDP per capita, amount of expenditures for research and development, the share of a tertiary-educated population, doing business statistics, and business freedom index. With estimation technique of fixed effect estimator. Results obtained

business startup, the time required to start a business, and several procedures needed for establishing a new firm. Using fixed effect regression analysis, the empirical result shows that entrepreneurship is strongly influenced by indicators measuring the perceived abilities of individuals as in model 2. And in model 3, analysis indicates that cost, time, and the number of procedures required for business start-up all have anegative significant relationship on entrepreneurial activities. Given the focus of the paper at hand, the focus of interest lies in model 1, and it is found that a negative relationship exists between entrepreneurial activities and unemployment, although the result is insignificant.Divlanchiev (2014) examines the relationship between entrepreneurship and the unemployment rate for Georgia for a period of 2003 to 2013. The focus of the study is on two hypotheses. First, that higher rate of entrepreneurship decreases the unemployment rate, and second, that higher rate of unemployment results in higher entrepreneurial activity. The regression analyses with regards to entrepreneurial activity as the dependent variable and unemployment rate as the independent variable resulted in a positive insignificant relationship. On the other hand, with unemployment as the dependent variable and entrepreneurship as the independent variable, regression analysis indicates a positive significant relationship between the two variables. This implies that increased entrepreneurship influences the increased

unemployment rate for Georgia.In conclusion from the papers reviewed above, while it is observed by some authors (Dvoulety 2017, Grazina and Rita 2009, and Remeikiene and Startiene 2009) that a positive long-run relationship exists between entrepreneurship and unemployment, other authors (Dilanchiev 2014, Rusu and Roman 2017, Audretsch 2015, and Dvoulety and Mares 2016). The result from the relationship seems inconclusive as authors with long-run consideration for the two relationships find conflicting results. In based entrepreneurship while a positive relationship exists between necessity-based entrepreneurship and the unemployment rate. Hence, it can be said that while analyzing the relationship between entrepreneurship and unemployment, it is necessary to categorize entrepreneurs to obtain.

3. Methodology:

The objective of this study is to test the relationship that exists between entrepreneurship and unemployment in sub - Saharan Africa. The sample contains 11 years in sequence, ranging from 2006 to 2016, for 10 Sub-Saharan African countries. the SSA countries chosen are Congo (Democratic Republic), Ethiopia, Ghana, Kenya, Mauritius, Nigeria, Rwanda, Senegal, South Africa, and Sierra Leone. The countries are chosen based on the availability of data. The data for the indicators used in the analysis are obtained from the World Bank Development Index 2017. For measuring entrepreneurial activity, the study employed as a proxy the New Businesses Registered indicator, which serves as the dependent variable while independent variables are the Unemployment rate, Gross Domestic Product (GDP), tax rate for commercial firms, and start-up procedures to register a business. The model analyzed in this paper follows closely analysis made in Rusu and Roman (2017) as reviewed above. The study model is formulated as:

$$lent_t = \beta_0 + \beta_1 dunemp_t + \beta_2 lgdp_t + \beta_3 tax_t + \beta_4 proc_t + u_t$$

Where

Lent = natural log of entrepreneurial activity

Dvoulety and Mares 2016, despite using lagged values of unemployment in the model, the result obtained a negative relationship just as Audretsch 2015, while Dvoulety 2017 finds a positive long-run relationship for the two variables. In Amoros 2016, separating entrepreneurial rate into two, that is, opportunity base entrepreneurship and necessity-based entrepreneurship. Results show that there is a negative relationship between opportunity-

negative significant relationship on entrepreneurial activities. Given the focus of the paper at hand, the focus of interest lies in model 1, and it is found that a negative relationship exists between entrepreneurial activities and unemployment, although the result is insignificant.Divlanchiev (2014) examines the relationship between entrepreneurship and the unemployment rate for Georgia for a period of 2003 to 2013. The focus of the study is on two hypotheses. First, that higher rate of entrepreneurship decreases the unemployment rate, and second, that higher rate of unemployment results in higher entrepreneurial activity. The regression analyses with regards to entrepreneurial activity as the dependent variable and unemployment rate as the independent variable resulted in a positive insignificant relationship. On the other hand, with unemployment as the dependent variable and entrepreneurship as the independent variable, regression analysis indicates a positive significant relationship between the two

variables. This implies that increased entrepreneurship influences the increased unemployment rate for Georgia.In conclusion from the papers reviewed above, while it is observed by some authors (Dvoulety 2017, Grazina and Rita 2009, and Remeikiene and Startiene 2009) that a positive long-run relationship exists between entrepreneurship and unemployment, other authors (Dilanchiev while Dvoulety 2017 finds a positive long-run relationship for the two variables. In Amoros 2016, separating entrepreneurial rate into two, that is, opportunity base entrepreneurship and necessity-based entrepreneurship. Results show that there is a negative relationship between opportunity-based entrepreneurship while a positive relationship exists between necessity-based entrepreneurship and the unemployment rate. Hence, it can be said that while analyzing the relationship between entrepreneurship and unemployment, it is necessary to categorize entrepreneurs to obtain.

3. Methodology:

The objective of this study is to test the relationship that exists between entrepreneurship and unemployment in sub - Saharan Africa. The sample contains 11 years in sequence, ranging from 2006 to 2016, for 10 Sub-Saharan African countries. the SSA countries chosen are Congo (Democratic Republic), Ethiopia, Ghana, Kenya, Mauritius, Nigeria, Rwanda, Senegal, South Africa, and Sierra Leone. The countries are chosen based on the availability of data. The data for the indicators used in the analysis are obtained from the World Bank Development Index 2017. For measuring entrepreneurial activity, the study employed as a proxy the New Businesses Registered indicator, which serves as the dependent variable while independent variables are the Unemployment rate, Gross Domestic Product (GDP), tax rate for 2014, Rusu and Roman 2017, Audretsch 2015, and Dvoulety and Mares 2016). The result from the relationship seems inconclusive as authors with long-run consideration for the two relationships find conflicting results. In Dvoulety and Mares 2016, despite using lagged values of unemployment in the model, the result obtained a negative relationship just as Audretsch 2015, commercial firms, and start-up procedures to register a business. The model analyzed in this paper follows closely analysis made in Rusu and Roman (2017) as reviewed above. The study model is formulated as:

$$lent_t = \beta_0 + \beta_1 dunemp_t + \beta_2 lgdp_t + \beta_3 tax_t + \beta_4 proc_t + u_t$$

Where

Lent = natural log of entrepreneurial activity

x then $\widehat{\beta_{re}}$ is not consistent.A large value of the Hausman test will result in the rejection of the null hypothesis while a small value, on the contrary, leads to failure to reject.

Also, to apply the estimators above certain diagnostic Test for Panel Data is conducted such as autocorrelation test, heteroskedasticity, and cross-sectional dependence. The results of the empirical analysis are presented in the following section.

4. Results And Analysis:

Table 1 summarises the dependent and independent variables with the main features of the data set which include a measure of central tendency, the mean and measure of variability, the standard deviation, minimum and maximum values of each variable. Data on entrepreneurship vary across economies and over time from 333 units to 376727 units. This variation results from differences in the economic environment of the economies, the ease with business start-up, and government regulatory factors. It shows that business start-up for the countries has an average of 44985

with a standard deviation of 81542, which implies that entrepreneurship has wide variation as supported by the maximum and minimum value of 333 firms and 376,727 firms respectively. GDP has an average of $88 billion and a standard deviation of 14 billion which shows that GDP for the various do not vary much from one another over the years under study as signified by the maximum value and minimum value of $18.9 billion and tax rate as further revealed by the maximum and minimum values of 21.5 and 339.1 respectively. Finally,the procedure has a mean of 8.4 and a standard deviation of 3.2 indicating a relatively stable variable as further reviewed by the minimum and maximum values of 4 and 15 respectively.

Table 1: Descriptive Statistics Of Entrepreneurship Rate And İndependent Variables

Variables	Number of observations	Mean	Standard deviation	Minimum	Maximum
Entrepreneurship	110	44985.4	81541.9	333	376727
GDP	110	8.83e+10	1.40e+11	1.89e+09	5.68e+11
Unemployment	110	8.0	6.2	0.7	26.7
Tax rate	110	66.5	78.8	21.5	339.1
Procedures	110	8.5	3.2	4	15

Given that the variables employed are time series variables, hence a need to check for stationarity of these variables. To do this, I'm Pesaran and Shin test and Fisher ADF unit root test are used. The two test types are used to check the consistency of one test result with the other. The IPS and Fisher ADF test allow for individual unit root test, that is, the unit root test is checked for each cross-section. Result obtained is shown in table 2 which signifies of the 5 variables of focus, 4 are stationary at level while one is stationary at first difference. Entrepreneurship, GDP, tax rate, and procedures are all stationary at level while unemployment is stationary at the first difference and as a result, the first difference of unemployment is employed in the model.

$56.8 billion respectively. The unemployment rate for the countries under study indicates an average of 8 percent and a standard deviation of 6.2 with a maximum and minimum value of 0.7 percent and 26.7 percent respectively signifying unemployment widespread just in similarity with the entrepreneurship spread. The tax rate has a mean and standard deviation of 66. 5 and 78.8 respectively. This indicates a widespread

Table 2: Stationarity Check:

At Level	IPS	P-value	Fisher-ADF	P-value	Decision
lent	1.68764	0.0457	35.3107	0.0185	No unit root
lgdp	-2.90911	0.0018	41.1592	0.0036	No unit root
unemp	-1.05282	0.1462	24.5888	0.1367	Unit root exist
tax	-2.35482	0.0093	41.7351	0.0030	No unit root
proc	-5.53386	0.0000	56.9271	0.0000	No unit root

At First Difference	ADF	P-value	PP	P-value	Decision

unemp	-5.35641	0.0000	-61.4992	0.0000	I(1)

The model identified above is analyzed using traditional panel data methods of estimation, that is, pooled OLS, fixed effect estimator, and random effect estimator. The result obtained is displayed in table 3 and it shows that the result obtained is not consistent across the three models. For instance, unemployment is shown to have a negative relationship with entrepreneurship for pooled OLS while fixed effect estimate and random effect show that a positive relationship exists. A similar result is also obtained for the relationship between tax and entrepreneurship. Under pooled OLS and random effect model a negative relationship exist while a fixed effect estimate shows a positive relationship. Hence the need to choose which estimator fits the data best. Using the Hausman test, also depicted in table 3, shows a value of 27.06 with a p-value of .000, which implies the null hypothesis of equality between random effect model and fixed effect model is invalid but rather fixed effect model will be consistent and efficient for the data under study.

Table 3: Estimates of the model using Pooled OLS, Fixed Effect, and Random EffectEstimators

Estimator	Independent variables	coefficient	Prob.	Constant	F-test	R^2	Hausman test
Pooled OLS	lgdp	.9756371	0.000	-13.94755 (0.0000)	63.30 (0.0000)	0.71	
	dunemp	-0.009491	0.796				
	tax	-.0069518	0.000				
	proc	.0039716	0.909				
Fixed Effect	lgdp	.8685289	0.000	-13.00917 (0.029)	4.14 (0.0039)	0.85	27.06 0.0000
	dunemp	.0068413	0.808				
	tax	.0000898	0.954				
	proc	0.0280546	0.549				
Random Effect	lgdp	.9422658	0.000	-13.65589 (0.000)			
	unemp	.0042418	0.883				
	tax	-.0015329	0.306				
	proc	.0217034	0.608				

To ensure consistent and efficient estimates from the fixed effect estimator, cross-sectional dependence, autocorrelation, and homoscedasticity test is conducted. Using the Pesaran CD (cross-sectional dependence) test to check if cross-sectional dependence exists, that is if the residuals are correlated across entities. Pesaran CD test has a null hypothesis that residuals are not correlated. Using the study data, the Pesaran CD test gives the following result:

Pesaran's test of cross sectional independence = 0.251, Pr = 0.8020

Given a p-value greater than the usually 0.05, then the null hypothesis cannot be rejected. This concludes that there exists no cross-sectional dependence for the study. Furthermore, the Wooldridge test for autocorrelation in Panel data is employed to examine the existence of autocorrelation for the data. Autocorrelation gives a higher R-squared and makes the standard errors of the coefficients smaller than they are resulting in making insignificant estimates significant.The Wooldridge test has a null hypothesis that no first order correlation exists. Using the study data, the Wooldridge test for autocorrelation gives the following result:

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(1, 9) = 1.760
Prob > F = 0.2173

This result indicates that the null hypothesis should not be rejected which confirms that no first-order autocorrelation exists. Finally, the test for the existence of heteroskedasticity is conducted.Homoskedasticity which is best for the model implies that error terms in the model

have constant variance and where this fails then heteroskedasticity exits. In the presence of heteroskedasticity, standard errors of estimates are biased and thus lead to the falsified interpretation of results. The modified wald test for GroupWise heteroskedasticity test is conducted and the following result is obtained:

Modified Wald test for groupwise heteroskedasticity in the fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all I (implies equality of the variance of the error terms)

chi2 (10) = 2798.27

Prob>chi2 = 0.0000 From the result, the null hypothesis states homoskedasticity exist and the p-value of 0.000 signifies that the null hypothesis should be rejected. Hence, the result confirms that heteroskedasticity exists in the model. Given the results from the diagnostic test, there is a need to correct for heteroskedasticity and obtain new estimates. Hence, the fixed-effect model is estimated with a robustified standard error which takes care of heteroskedasticity. The result obtained is shown in table 4.

Table 4: Estimates Of The Model Using Fixed Effect Model With Robust Standard Errors

Independent variables	coefficient	Prob.	Constant	F-test	R^2
lgdp	.8685289	0.056	-12.00917 (0.282)	1.77 (0.1404)	0.8542
dunemp	.0068413	0.618			
tax	-0.000898	0.951			
proc	.0280546	0.654			

The result indicates a positive relationship exists between unemployment and entrepreneurial start-up and also a positive relationship exists between GDP and entrepreneurship for sub-Saharan Africa. While it is seen that rise in taxes results in a fall in entrepreneurship, on the other hand, a rise in start-up procedure is seen to impact entrepreneurship positively. Of the four independent variables, three of these variables have a priori expected relationship with entrepreneurship while only the start-up procedure has a different relationship than the expected a priori relationship. It is seen that when unemployment rises then entrepreneurship rises, although statistically insignificant. An implication of the fact that time series estimations with very few samples often make it difficult to obtainsignificant t-ratios or f-statistics from the model. Data on entrepreneurship is quite scarce hence the available data limits the number of years to 11 and as well as the number of countries to 10.

5. Conclusion:

In this study, the relationship between entrepreneurship development and unemployment in Sub-Saharan Africa Countries is assessed using panel data estimation technique, precisely Fixed Effect methodology. It is found that unemployment impacts entrepreneurship positively for the countries under study hence it can be said that when unemployment rises entrepreneurship rises which implies that entrepreneurship development if well harnessed can help resolve the problems of unemployment in sub-Saharan Africa. A similar result is also obtained in similar studies reviewed such as Dvoulety 2017, Grazina and

Rita (2009), Amoros (2016), and Dilanchiev (2014) for countries of other continents.

References:

1. Amoros, J. E., Borraz F., & Veiga L. (2016). Entrepreneurship and Socioeconomic indicators in Latin American Research Review, Vol. 51, No. 4, Pp. 186-201.
2. Audretsch, D. B., Dohse, D. & Niebuhr, A. (2015). Regional Unemployment Structure and New Firm Formation. Papers in Regional Science, Vol. 94, Supplement 1.
3. Dilanchiev, A. (2014). Relationship between Entrepreneurship and Unemployment, the case of Georgia. Journal of Social Sciences, ISSN 2233-3878, Vol. 3 (2), Pp. 5-9
4. Dvouletý O. (2017). Relationship between Unemployment And Entrepreneurship Dynamics In The Czech Regions: A Panel Var Approach. Acta Universitatis Agriculturae Et Silviculturae Mendelianae Brunensis, Vol. 65, No. 3, Pp 987 – 995.
5. Dvoulety, O. (2018). How to analyse determinants of entrepreneurship and self employment at the country level? A methodological contribution. Journal of Business Venturing Insights, Vol 9, Pp 92 – 99.
6. Dvouletý, O., & Mareš, J. (2016). Relationship between Unemployment and Entrepreneurial Activity: Evidence Found among VisegradCountries. In Innovation Management, Enterpreneurship and Corporate Sustainability (IMECS 2016), 146-156.
7. Filmer, D. and Louise F. (2014). Youth Employment in Sub-Saharan Africa. Africa Development Series. Washington, DC: WorldBank. doi:10.1596/978-1-4648-0107-5
8. Oseni, E. F. (2017). The relevanceof entrepreneurship education to the development of Micro, Small and Medium Enterprises (MSMEs) in Nigeria. Journal of Public Administration, Finance and Law, Issue 11, Pp. 137-144.
9. Rusu, V. D. and Roman, A. (2017). Entrepreneurial Activity in the EU. An empirical Evaluation of Its Determinants. Sustainability 9, 1679.
10. Startiene and Remeikiene (2009a). The influence of Demographical factors on the interaction between entrepreneurship and unemployment. Inzinerine Ekonomika-Engineering Economics{4), Pp.60-70.
11. Startiene and Remeikiene (2009b).Does the interaction between entrepreneurship and unemployment exist?Economics & Management: 2009

United Nations Department of Economic and Social