Examining the Impact of Financial Inclusion on Unemployment in Africa (A Panel Data Analysis)

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Abstract:

Financial inclusion improves the accessibility of the poor and other marginalized groups to basic financial services such as savings, investments, credits, and insurance which directly influences income. This study uses panel data analysis and the two-step Generalized Method of Moments (GMM) estimation to empirically assess the relationship between financial inclusion and unemployment in 49 African countries from 2009 to 2020. The results show that financial inclusion has a negative and significant effect on unemployment. This supports the idea that financial inclusion can help African countries in job creation by reducing unemployment thus it suggests an increase in access and use of financial services. The study also finds that the effect of financial inclusion on unemployment is stronger in countries with higher levels of education. This suggests that education is an important factor in the relationship between financial inclusion and unemployment. The results of the study have important policy implications for African countries that want to reach the Sustainable Development Goals (SDGs). Especially, SDG-8 which promotes inclusive and sustained economic growth with full employment and productivity. Governments should introduce policies regarding the usage of mobile money and microfinance in rural areas to enhance financial inclusion. Moreover, sustaining of economic growth through encouraging foreign direct investment and new business creation may help bring down the unemployment rate.

Keywords: Financial inclusion, unemployment rate, Okun's law, Generalized Method of Moments, SDGs

1. Introduction

It is very important for economic growth, poverty reduction, and sustainable development that poor people can access financial services (Sharma 2016, Demirgüç-Kunt, Klapper et al.). Financial inclusion improves accessibility of the poor and other marginalized groups to basic financial services such as savings, investments, credits and insurance which directly influences income. For these reasons, World Bank is promoting financial inclusion to achieve SDGs (Demirgüç-Kunt, Klapper et al.). Approximately 60% of Africa's total population is under the age of 25 which is an evidence of Africa's youngest and fastest-growing population. According to the findings of the International Labor Organization (2020), almost half of the world's youth will be African by 2100. Africa's growing young population made it difficult for governments to offer enough stable employment opportunities.

On the other hand, according to the International Labor Organization's most current figures (2020), young unemployment in Africa is the lowest it has ever been. The young unemployment rate in Africa has been falling steadily over the last decade, reaching 11.7%. Families and small business owners can generate income, manage irregular cash flow, invest in opportunities, and work their way out of poverty with the assistance of quality financial services that are both affordable and accessible to them. Inclusion in the financial system can give individuals and communities the ability to meet fundamental requirements, such as having access to nourishing food, clean water, shelter, education, and medical care. Inclusion in the financial sector also plays an important part in the efforts to assist people in preparing for, responding to, and recovering from crises such as the COVID-19 pandemic, inflation, economic shocks, and climate change.

According to (Rani, Kumar Dhir et al. 2021), COVID-19 had negative impacts on employment rate around the globe. A report of World Bank (2020) states that almost one-third of working youth became unemployed during epidemic in 15 African nations. As a result, pandemic enhanced income inequalities in the developing world (WHO, 2021). All the economies around the globe are confronting an increase of unemployment rate in recent times. It is anticipated that the global unemployment rate will be 5.7% in 2022 with an estimate of 205 million unemployed individuals (higher than the pre-COVID unemployed workers). Unemployment is harmful for economy because of having long term impacts on financial and social stability.

Therefore, enhancement of employment opportunities for youth is need of modern time to achieve SDG-8 and financial inclusion can play a vital role in reducing unemployment and income inequalities. Keeping this agenda in concern, impact of financial inclusion on unemployment in African nations is analyzed in this particular study. The findings of the study could help researchers to understand the connection between financial inclusion and the dynamics of developing nations' labor markets. Furthermore, outcomes of this specific study will help policymakers to understand the amalgamation of financial inclusion in the employment system in order to reduce the unemployment rate.

There is ambiguity in describing the linkage between financial inclusion and unemployment because of dissimilar outcomes of some recent studies such as. The aforementioned research shows that the correlation between financial inclusion and unemployment rate has not been well explored, and that the findings are still inconsistent. The claim that greater access to financial services has a crucial role in lowering unemployment is backed up by several empirical studies. However, contrary research has shown no correlation between financial inclusion and joblessness. Many academics agree that having a job is a necessary condition for entering the banking system. A cross-country research is needed to determines the association between financial inclusion and unemployment. This is one of the few studies that attempts to quantify the effect of financial inclusion on the unemployment rate in Africa because introduction of technology in this continent has a potential to enhance accessibility of financial services. The purpose of this study is to build a multidimensional financial inclusion index using Principal Component Analysis (PCA). Second, the impact of financial inclusion on unemployment rates in 49 African Countries for a period of 2009 and 2020 is experimentally investigated using the dynamic two-step Generalized Method of Moments (GMM).

This study continues with following sections: Literature review (including the relevant research works), Methodology (comprised of data, materials and methods employed for analyzing the association), Empirical results and discussion (presents the study's empirical findings and discussion about the outcomes) and Conclusion (provision of conclusions and policy implications on the behalf of outcomes).

2. Literature Review

Financial inclusion got considerable attention in late 1990's when policymakers faced issue of social and financial exclusion of individuals (Leyshon and Thrift 1993, Collard and Management 2007). Later,(Kempson and Whyley 1999) (Demirgüç-Kunt, Klapper et al.) explained financial inclusion as improvement in access to conventional banking by suggesting that opening of bank accounts is an essential financial service for the poor. In addition, 2004 Pre-Budget Report (Collard and Management 2007, Demirgüç-Kunt, Klapper et al.) presented ways to improve financial inclusion such as promoting access to financial intermediaries, providing adequate credit services, and providing in-person debt counseling. (Collard and Management 2007)In the late 2000s, research studies tended to focus on the measures of financial inclusion and the relationship between financial inclusion and economic development.

By 2030, the SDGs seek to end global poverty and inequality but any financial crisis could result in significant job losses even in nations with highly established financial sectors (Pagano and Pica 2012). However, (Bruhn and Love 2014, Demirgüç-Kunt, Klapper et al.) discovered that financial access considerably improved labor market outcomes and it has capacity to eliminate poverty. According to (Fonseca, Lopez-Garcia et al. 2001, Demirgüç-Kunt, Klapper et al.), the initial capital is required to create a new employment. However, when start-up expenses (initial capital) are high then business owners become deterred and unemployment rises. Therefore, restricting of financial access to business owners discourages the emergence of new companies that might create employment issues (Acemoglu 2001, Wasmer and Weil 2004). Financial inclusion makes financial access easier which enables entrepreneurs to launch and expand their own businesses. As a result, it eventually leads to a decline in unemployment by creating job opportunities.

Moreover, (Cull, Ehrbeck et al. 2014) (Demirgüç-Kunt, Klapper et al.) assessed the macro and micro level effects of financial inclusion on disadvantaged families throughout the world. They found that job and financial inclusion are positively connected. Additionally, World Bank (2014)(Group 2013) claimed that access of small business to financial services is linked with growth, innovation and the creation of new jobs. Additionally, (Mol and TP 2014) found that financial inclusion improves control on finance, empowers people and breaks the cycle of poverty and unemployment. Financial inclusion and job development have a favorable association (Zulfiqar, Chaudhary et al. 2016).

The fundamental finding of these research is that financial inclusion improves accessibility of poor individuals to financial services which increases self-employment opportunities as a result.

Some researchers suggested that financial inclusion programs have positive effects on the labor market in both short and long term. By expanding people's access to financial services and enabling them for proper usage of these services can help in job creation (Sykes, Elder et al. 2016). So, the inclusion of the financial sector is essential in increases the number of people that are employed. In case of Kenya's poverty and joblessness, (Mugo and Kilonzo 2017) discovered that low-income and marginalized communities received benefits from financial inclusion by initiating businesses, building resources and enhancing incomes. Additionally, the study revealed that financial inclusion caused a significant reduction in unemployment by having two-way causal relation. (El Bourainy, Salah et al. 2021)Moreover, Kondo's (2007) disclosed that micro-credit had a prominent effect on both the start-up of new small businesses and the creation of jobs in Philippines. Individuals initiated more than 20% small business by using micro-credit which resulted in more than 17% enhancement in job creation.

The World Bank looked at how it could improve financial inclusion and found that it had a positive effect on employment, new businesses, and GDP. For every 1% increase in financial inclusion, employment goes up by 0.7%, the number of new businesses goes up by 0.5%, and GDP goes up by 0.3% (Bruhn and Love 2014, Demirgüç-Kunt, Klapper et al.). According to (Fonseca, Lopez-Garcia et al. 2001, Demirgüç-Kunt, Klapper et al.) Fonseca et al. (2001), investing in the foundation of a new occupation is crucial. But when it's difficult to get a business off the ground due to hefty initial capital requirements, more people choose to enter the workforce. The economy is unable to generate new jobs, and the unemployment rate drops. Therefore, financing restrictions for entrepreneurs lead to a decline in new business formation, which in turn worsens the job situation(Acemoglu 2001, Wasmer and Weil 2004)Thus, financial inclusion that eases the acquisition of financial services, particularly credit, may encourage the launch and expansion of new businesses, thus reducing unemployment when existing ones close down. This results in more people who are jobless being hired and finding work.

In addition, (Molefhi 2019) investigated the effect of financial inclusion on job creation in Botswana from 2004 to 2016. The findings of the study indicated that opening of bank account, the availability of bank branches and borrowing money from a commercial bank all had a positive

impact on the level of employment both in the short run and in the long run. On the other hand, researchers discovered that the number of depositors at commercial banks had a negative impact on employment in both short and long run. Furthermore, (Yorulmaz 2018)also discovered that employment and financial inclusion have a positive correlation. they concluded that unemployed and irregularly employed populations are less likely to participate in the financial system.

In order to let the unbanked and poor participate in mainstream economic life, it is essential to provide them continued access to low-cost financial services, as defined by the United Nations (International Telecommunication Union, 2016). The IMF defines financial inclusion as "systematic initiatives to expand access to financial services for all people, particularly the financially excluded and the poor." Financial inclusion is defined by the World Bank as "the provision of appropriate, inclusive, and sustainable financial products and services to all members of society in order to enable them to meet their financial needs (credit, payments, insurance, and savings) and to participate effectively in the economic system" (World Bank, 2018).

3. Data and Econometric Strategy

3.1. Data

For our empirical analysis, we collected data from two main sources, namely; the International Monetary fund (IMF) for financial inclusion variables; and the World Development Indicators Database for the dependent variable and control variables. The data was collected from 2009 to 2020 for 49 African countries which is purely based on the availability of data.

3.2. Dependent Variable

The unemployment rate, is measured as a percentage of the total labor force the empirical regularity that can be observed between real output growth and the change in unemployment rate is referred to as Okun's Law. This law is used in the estimation of the relationship that exists between financial inclusion and unemployment by relying on the empirical regularity that exists between the two variables (Okun 1962, Demirgüç-Kunt, Klapper et al.).

3.3. Main Variable of Interest

According to (A. Asongu, Nwachukwu et al. 2018) and (Asongu, Odhiambo et al. 2018), financial inclusion can only be measured by generating an index. Consequently, we generated a PCA index

using some indicators comprised of outstanding loans from commercial banks (% of GDP), outstanding deposits with commercial banks (% of GDP), number of insurance corporations per 100, 000 adults, number of deposit accounts with commercial banks per 1,000 adults, number of commercial bank branches per 100,000 adults, geographical outreach and number of ATMs per 100,000 adults and mobile and internet bill payment that take into account three dimensions of access, usage and penetration.(Sarma 2008, Sarma and Pais , Pagano and Pica 2012, Demirgüç-Kunt, Klapper et al. , Yorulmaz)(Prachowny and Statistics) The detail of variables is provided in Table 1.

3.4. Control Variables

We use the annual percentage change in per capita GDP as a proxy for growth; the consumer price index as a proxy for inflation; the secondary school enrollment rate as a proxy for education; and population growth as a proxy for growth. Instead of using contemporaneous values of the control variables, we employ lagged values to deal with endogeneity issues. Unemployment can be mitigated by a rise in GDP per capita, in regards to new innovations that lead to job creation. However, it can rise if joblessness and number of education is low (Gosavi). The detail of variables is provided in Table 1.

3.5. Model

The empirical regularity that can be observed between real output growth and the change in unemployment rate is referred as Okun's Law. This law is used in the estimation of the relationship that exists between financial inclusion and unemployment by relying on the empirical regularity that exists between the two variables (Okun 1962, Demirgüç-Kunt, Klapper et al.). We rely on this paradigm since it has been shown to be accurate via empirical research, not just for the United States but also for other groups of countries ((Nourzad and Almaghrbi 1995); (Gordon and Clark 1984, Knoester 1986); (Kaufman 1988, Prachowny and Statistics 1993) and (Weber 1995)). The research conducted by (Abou Hamia 2016)and (Alshyab, Sandri et al. , Demirgüç-Kunt, Klapper et al.) has also recommended the validity of this law throughout the Middle East and North African Countries.

Okun's law posits a negative relationship between change of unemployment ($\Delta \boldsymbol{U_t}$) and real economic growth ($\boldsymbol{GDPgr_t}$) as illustrated in the equation where ε_t the error term and t is the time.

$$\Delta U_t = \alpha_0 + \alpha_1\, GDPgr_t + \varepsilon_t \qquad (1)$$

We build the following model in order to estimate the impact of financial inclusion on the level of unemployment in Africa by including the financial inclusion index (Findex) and some control variables (inflation, population growth, FDI, government policy expenditure on education, education, Number of days required to start a business) as shown in equation (1):

$$\Delta U_{it} = \alpha_0 + \alpha_1 GDPgr_{it} + \alpha_2 Findex_{it} + \alpha_3 X_{it} + \varepsilon_t \qquad (2)$$

Where financial inclusion index is denoted by (***Findex***) and the control variables are denoted by (***X***). Control variables are comprised of inflation (Beck, Demirgüç-Kunt et al. 2007, Hermes 2014, Aslan, Deléchat et al. 2017, Neaime and Gaysset 2018, Park and Mercado Jr 2018, Lacalle-Calderon, Larrú et al. 2019)**,** education (Beck, Demirgüç-Kunt et al. 2007, Jaumotte, Lall et al. 2013, Hermes 2014, Park and Mercado Jr 2018, Lacalle-Calderon, Larrú et al. 2019), population growth (Beck, Demirgüç-Kunt et al. 2007, Hermes 2014, Lacalle-Calderon, Larrú et al. 2019), number of days required to start a business (Startbiz), the government policy expenditure on education (Govpolicyedu) and Foreign Direct Investment (FDI). Here, ε_t *is* the error term, which is also assumed to have mean 0 and variance equal to one.(El Bourainy, Salah et al.)

Table 1, Description of the variables.

Variables	Source	Definition
Unemployment Rate	International Labour Organization, database.	Unemployment refers to the share of the labor force that is without work but available for and seeking employment.
Findex	IMF financial Access Survey dataset Index calculated by author (PCA)	Outstanding loans from commercial banks (% of GDP), Outstanding deposits with commercial banks (% of GDP), value of mobile and internet banking transactions, Number of insurance corporations per 100, 000 adults, Number of deposit accounts with commercial banks per 1,000

		adults, Number of commercial bank branches per 100,000 adults, Geographical Outreach and Number of ATMs per 100,000 adults
GovPolicyEdu	World Development Indicators 2021	Government expenditure on education, total (% of GDP)
Startbiz	World Development Indicators 2021	Time required to start a business (days)
Education	World Development Indicators 2021	School enrollment, secondary (% gross)
Population Growth	World Development Indicators 2021	Annual population growth rate for a year.
FDI	United Nations Conference on Trade and Development (UNCTAD)	Log of inward FDI stock per capita
Inflation	World Development Indicators 2021	GDP deflator (Annual %)

Note: *This table presents the variables used in the paper, their definitions and/or measurement, and the sources of raw data.*

4. Results and Discussion

Table 2: Principal Component Analysis (PCA) For Composite Financial Inclusion Index

PCA	Deposits	Loans	Mobile pay/ internet	Bank Branches	ATMS	Insurance	Deposits A/C	Borrower	Proportions	Cumulative Proportio	Eigen Value
First PC (UDI)	0.705	0.705	-0.071						0.666	0.666	1.997
Second PC	0.051	0.050	0.997						0.332	0.997	0.995
Third PC	-0.707	0.707	0.000						0.003	1.000	0.008

First PC (ADI)				0.605	0.618	0.503			0.705	0.705	2.114
Second PC				-0.412	-0.298	0.861			0.209	0.913	0.626
Third PC				0.682	-0.728	0.074			0.087	1.000	0.261
First PC (PDI)							0.707	0.707	0.641	0.641	1.282
Second							0.707	-0.707	0.359	1.000	0.718
First PC (Findex)	-0.061	-0.062	-0.019	0.500	0.548	0.373	0.509	0.208	0.353	0.353	2.821
Second PC	0.700	0.701	-0.073	0.048	0.035	0.062	0.057	-0.051	0.250	0.602	1.998
Third PC	0.020	0.026	0.899	0.110	0.031	0.058	0.026	-0.417	0.126	0.729	1.010

Notes: PC= principal component, Findex=Financial inclusion Index ,loans = Outstanding loans from commercial banks (% of GDP),Deposits = Outstanding deposits with commercial banks (% of GDP), Mobile pay/ internet = mobile and internet bill payment, Insurance =Number of insurance corporations per 100, 000 adults, Deposit A/C=Number of deposit accounts with commercial banks per 1,000 adults, Bank Branches=Number of commercial bank branches per 100,000 adults, ATMS=Geographical Outreach and Number of ATMs per 100,000 adults. AFI=access dimension index, UFI=usage dimension index and PFI= penetration dimension index.

The PCA for the financial inclusion I dimensions and the financial inclusion index are shown in Table 2. Kaiser (1974) and Jolliffe (2002)'s criterion for preserving common factors is applied to the problem of preserving eigenvalues. The requirement for the typical component is that no eigenvalue less than one be kept. Therefore, the eigenvalues (71.83%, 70.46%, and 66.56%) for the penetration (PDI), availability (ADI), and usage (UDI) dimensions are 1.99677, 2.11375, and 1.28166, respectively. With an eigenvalue of 2.8213 for the first principal component, 1.99752 for the second, and 1.00988 for the third, the Financial Inclusion Index (Findex) explains over 72.86 percent of the information present across the eight financial inclusion indicators.

Table 3: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Unemployment	490	8.586	6.968	.32	28.025
Findex(PCA)	490	.48	1.655	-1.714	8.83
GDPgr	490	4.147	7.603	-62.076	123.14
Education	490	49.669	23.518	9.689	109.444
Startbiz	490	29.164	26.736	4	216.5
Govpolicyedu	490	4.08	2.01	0	10.639
Population	490	2.371	.924	-2.629	4.626
FDI	490	69.001	28.216	22.24	160.21
Inflation	490	6.383	9.898	-29.691	95.409

Annotations: This table provides a quick glance at the estimates' key variables and their associated summary statistics. The value of Observations is denoted by Obs. The standard deviations are presented for a group of African countries over the period 2009–2018. Each variable's mean value is calculated by taking its arithmetic mean, minimum value, and maximum value from the sample, respectively. Unemployment is the percentage of the labor force that is unemployed but actively looking for work. Findex(Outstanding loans from commercial banks (% of GDP),Outstanding deposits with commercial banks (% of GDP),Number of insurance corporations per 100, 000 adults, Number of deposit accounts with commercial banks per 1,000 adults, Number of commercial bank branches per 100,000 adults, Geographical Outreach and Number of ATMs per 100,000 adults). As a surrogate for human capital, "education" refers to a person's rate of secondary school attendance. The rate of inflation is defined as the percentage increase or decrease in the CPI over a given time period. Population is shorthand for the annual percentage increase in the world's human population. Gross Domestic Product Growth Rate (GDPgr).number of days required to start a business (Startbiz) and the government policy expenditure on education Govpolicyedu) and Foreign direct investments (FDI) .The term "Findex" refers to a financial inclusion index.

Table 4: Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Unemployment	1.000								
(2) Findex	0.050	1.000							
(3) GDPgr	-0.020	0.007	1.000						
(4) Population	0.124	-0.216	0.044	1.000					
(5) Inflation	-0.059	-0.047	0.066	0.031	1.000				
(6) FDI	0.047	0.024	-0.025	-0.050	-0.074	1.000			
(7) Education	0.147	0.006	0.017	-0.031	-0.080	0.020	1.000		
(8) Startbiz	-0.038	-0.104	0.017	-0.029	0.051	-0.071	0.000	1.000	
(9) Govpolicyedu	0.012	0.325	-0.009	-0.326	-0.049	-0.027	0.102	0.105	1.000

Table 5: Fisher ADF panel unit root test

Variable	Inverse chi squard	Inverse normal	Inverse logit	Modified inv. chi-squared	Decision
Unemployment	418.9187***	-7.6643***	-13.5297***	22.9228***	Reject Ho
Findex	168.7970***	1.1429**	-0.7017**	5.0569***	Reject Ho
GDPgr	264.4989***	-5.2453***	-7.8571***	11.8928***	Reject Ho
Education	101.1237*	1.4568*	0.9489*	0.2231*	Reject Ho
Startbiz	246.9755***	-0.0668**	-4.8876***	10.6411***	Reject Ho
Govpolicyedu	312.3433***	-3.8118***	-8.1394***	15.3102***	Reject Ho
Population	1857.6633***	-33.7841***	-72.6817***	125.6902***	Reject Ho
Inflation	147.3125***	-1.3589*	-1.6559**	3.5223***	Reject Ho
FDI	255.5668***	-2.0318*	-5.2813***	11.2548***	Reject Ho

Notes: Standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$

The descriptive statistics for each variable that was analyzed are presented in Table 3, which can be found below. The average unemployment rate during the decade spanning 2009-2018 was 8.586%, while the standard deviation was 6.968.

The average score on the Findex was 0.48, which suggests that the level of financial inclusion in African countries is still relatively low. There was a wide range of values, with the mean GDP growth rate coming in at 4.147%. These values ranged from -62.076% to 123.14%. The mean score for education was 49.669, which indicates that there is a significant range of education levels across the African countries. The average score for a start-up was 29.164, which indicates that there is room for improvement in terms of both entrepreneurship and innovation in African nations. The average score for government education policy was 4.08, which indicates that education policy is still prioritized less by African governments than it should be. The mean population score was 2.371, indicating that population growth in African countries is still relatively high. This is evidenced by the fact that the continent as a whole received this score. There was a wide range of values, with the mean inflation rate coming in at 6.383%. These values ranged from -29.691% to 95.409%.

The correlation matrix in table 4, shows that few variables have strong correlations. GDP growth correlates positively with population and negatively with inflation. Financial inclusion (measured by the Findex) is positively correlated with government education policy and negatively correlated with population. The correlation matrix shows low to moderate correlations between independent variables, indicating no multicollinearity.

The findings of the Unit Root test indicate in table 5 that According to the findings of the tests, the alternative hypothesis of a unit root should not be accepted for any of the variables at the 1% level of significance. This indicates that there is no discernible trend in any of the variables, nor is there a unit root that could influence the statistical properties of any of the variables.

Comparisons are made between a Pooled Regression model, a Fixed Effect (FEM) model, and a Random Effect (REM) model in order to ascertain which one is the most suitable for estimating the value of equation (2). The outcomes of the Hausman specification test are listed in Table 6. The test compares the coefficients from the fixed effects model and the random effects model to determine which best fits the data. The random effects model is correct if and only if the coefficients from the two models are comparable. However, the fixed effects model is preferred if there is a large discrepancy between the coefficients.

The chi-square value is 6.63 and p-value is.577 as shown in the table 6. Failure to reject the null hypothesis (p-value >.05) leads us to believe that the random effects model is suitable for the data.

Since our model's dependent variable and independent variables are random, we can use the random effects model to estimate their relationship. As a consequence of this, the findings of REM will be taken into consideration as shown in Table 8. Additionally, the likelihood ratio test is utilized to examine for the presence of a heteroscedasticity issue. Since the probability value is less than 0.05 which discloses that heteroscedasticity is present in this study's model as shown in Table 7.

The Wooldridge test is additionally employed to check for autocorrelation. Table 7 shows that the Wooldridge test has a probability value of less than 0.05, indicating the existence of autocorrelation. Finally, the Davidson-MacKinnon exogeneity test is used to check endogeneity issue. As the P-value is less than 0.05, the results indicate the presence of endogeneity.

Table 6: Hausman (1978) specification test

	Coef.
Chi-square test value	6.63
P-value	.577

Table 7: Heteroscedasticity, autocorrelation, and endogeneity tests

Likelihood ratio test		Wooldridge test		Davidson-MacKinnon test of exogeneity
LR Chi-square	Prob > Chi-square	F	Prob >F	P-value
423.07	0.000	54.946	0.000	0.018

Notes: Calculated by the author

Table 8: Regression results Random Effect Model

Variables	REM
unemployment	1.63***
	(0.019)
Findex	-0.034***
	(0.001)

GDPgr	-0.0045***
	(0.017)
FDI	0.002***
	(0.001)
population	0.006
	(0.836)
Education	0.76
	(.017)
Starbiz	-0.075***
	(0.064)
Inflation	0.005
	(0.652)
Govt.policyEdu	0.013
	(0.245)
Observations	490
R-squared	.058

Notes: standard errors are in parentheses*** p<.01, ** p<.05, * p<.1

The findings of the regression analysis in table 8 indicate that the inclusion of finance, as represented by the findex variable, has a highly significant and deleterious influence on the rate of unemployment in African countries. This is made clear by the negative coefficient (which is calculated to be -0.034 at the 1% level of significance). The fact that the coefficient has a negative sign indicates that one percent increase in financial inclusion causes 3.4 percent decrease in unemployment in the African countries. This finding is consistent with the existing literature on the relationship between financial inclusion and unemployment, which suggests that financial inclusion can provide access to credit and financial services and enables individuals and firms to create job opportunities. This finding is consistent with the existing literature on the relationship between financial inclusion and unemployment (De Koker and Jentzsch 2013) (Beck, Demirgüç-Kunt et al. 2007).

The findings also indicate that a significant negative relation exists between GDP and unemployment. This is made abundantly clear by the negative coefficient (-0.0045591) which is statistically significant at the 1% level.

This finding reveals that one percent rise in economic growth will reduce unemployment by 0.4459 percent. This result is consistent with Okun's law, which proposes that there is an inverse relationship between economic growth and unemployment. The population coefficient is positive, but it is not statistically significant. This suggests that population does not have a significant effect on unemployment in the African nations.

Unemployment in Africa does not react to inflation in a statistically significant way. This result is in line with previous research on the topic, which has shown that the Phillips curve relationship between inflation and unemployment may not hold in the long run. An increase in FDI is associated with a rise in unemployment, as indicated by the positive and statistically significant (0.002 at the 1% level) coefficient of FDI. While it's commonly accepted that freer trade results in a flourishing economy and more job opportunities. While, it is true that FDI reduces unemployment, many other factors, such as FDI's composition, economic development, and its effect on income distribution, may also play a role in this phenomenon. There is no statistically significant relationship between education level or new business formation and employment rates. This finding endorses that reducing unemployment in Africa may not be as simple as boosting education and encouraging entrepreneurship. Furthermore, the economic and social benefits of education and entrepreneurship extend far beyond mere job creation (Osikena and Uğur 2016). Finally, the coefficient of government policy on education is positive but not statistically significant, suggesting that education policies implemented by African governments have little but insignificant impact on the continent's unemployment rate.

VIF was used to test for multicollinearity. Table 9 shows that FII, primary school enrolment, inflation rate, and economic growth have VIFs <5. This indicates no multicollinearity between the model's independent variables.

Table 9. Variance inflation factor test for multicollinearity

Variables	VIF
GDPgr	1.206
Findex	1.055
FDI	1.067
population	1.15
Education	1.036

Starbiz	1.126
Inflation	1.154
Govt.policyEdu	1.166
Mean VIF	1.132

Notes: Log of all variables taken before analysis

Table 10 Robustness test Results of Financial Inclusion impact on Un-employment Rate.

Unemployment Rate is the Dependent variable	(1) GMM (Findex)	(2) FE (Findex)	(3) UFI (usage Dimension)	(4) AFI (Access Dimension)	(5) PFI (Penetration Dimension)
lnUnemployment	1.046*** (.016)				
Findex	-.023** (.009)	-.405*** (.128)			
GDPgr	-.043** (.007)	-.005** (.006)	-.005** (.006)	-.006** (.006)	-.005** (.006)
POPULATION	-.025** (.0012)	-.168 (.159)	-.179 (.164)	-.183 (.158)	-.166 (.162)
INFLATION	.006** (.004)	.002 (.005)	.003 (.005)	.002 (.005)	.003 (.005)
EDUCATION	-.012*** (.008)	-.008*** (.003)	-.008*** (.003)	-.01*** (.003)	-.009*** (.003)
FDI	-.033* (.002)	-.486* (.260)	-.486* (.260)	-.486* (.260)	-.486* (.260)
STARTBIZ	-.009** (.006)	-.002** (.002)	-.001** (.002)	-.002** (.002)	-.001** (.002)
GOVPOLICYEDU	-.049*** (.0013)	.107* (.058)	.118** (.059)	.092 (.058)	.119** (.059)
UFI			-.029* (.118)		

AFI				-.664***	
				(.13)	
PFI					-.112*
					(.101)
constant	1.412	8.992***	8.935***	9.151***	8.91***
	(6.636)	(1.135)	(.478)	(.464)	(.475)
Observations	490	490	490	490	490
AR1	-1.818(0.009)				
AR2	1.082(0.279)				
Instruments/ j.stat	40				
Chi2/Wald test	504,898(0.0000)				
Sargan test	23.46(0.754)				
Hansen test	8.768(0.198)				
Countries	49	49	49	49	49
Year Effect (i.year)	yes	yes	yes	yes	yes

Notes: Robust standard errors are in parentheses*** p<.01, ** p<.05, * p<.1

We employed Two-step system Generalized Method of Moments (GMM) to compare the results with the Random Effects Model as shown in Table 10. It is found that financial inclusion has a significant negative effect on unemployment with a coefficient of -0.023 (p-value of 0.5). Similar outcomes were also found by (Demirgüç-Kunt, Klapper et al. 2020). According to the findings of the financial inclusion index dimension, having access to financial services appears to have a significant influence on lowering the unemployment rate. In particular, the usage dimension of financial inclusion (UFI) has a negative coefficient (-0.029) at a significance level of 10 percent which indicates that one percent increase in the use of financial services and products lowers unemployment rates by 2.9 percent. This is because UFI is a measure of the extent to which a population participates in the financial system. On the other hand, the access dimension of financial inclusion (AFI) has a much stronger negative impact on unemployment (-0.664, p0.01), indicating that better access to financial services is more critical in reducing unemployment rates. In a similar manner, the penetration dimension of financial inclusion (PFI) also has a significant negative impact on unemployment (-0.112, p0.1), which indicates that higher levels of financial service penetration in the economy significantly lowers the level of unemployment.

Supporting previous research works of (Andersen and Tarp 2003, Sharma 2016, Ibrahim and Alagidede 2018) this study adds weight to the argument that the provision of financial services stimulates economic expansion and creation of employment opportunities.

The negative effect of GDP growth on unemployment is also consistent with regression results (Sharma 2016);(Sethi and Sethy 2018). This suggests that policies that promote economic growth may be an effective way to reduce unemployment in the long run. The negative relationship between FDI and unemployment is also endorsed by robust testing. This is likely due to the fact that FDI can create jobs directly by increasing demand for labour and indirectly by stimulating economic growth. The negative relationship between number of days to start-up businesses and unemployment is unexpected, as one might expect that more competition for jobs would lead to higher unemployment. However, it is possible that start-up businesses may be creating new job opportunities that offset any negative effects on employment caused by competition for existing jobs. The positive relationship between inflation and unemployment is also indorsed by robust checking. This is because high inflation rates can lead to uncertainty and instability in the economy, which can discourage investment and job creation(El Bourainy, Salah et al. 2021). he negative association between government policies on education and unemployment indicates that these policies are not effective in improving education outcomes or they have unintended negative consequences on the labour market. Overall, the results of the system GMM analysis provide further support for the idea that financial inclusion, economic growth, FDI, start-up businesses, and inflation are all important factors that affect unemployment rates. However, the results also suggest that government policies aimed to improve education may not be as effective at reducing unemployment.

Table 11 Robustness test Results of individual measures of financial inclusion on their impact on Un-employment Rate.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	Unemplo yment rate	Unemplo yment rate	Unemplo yment rate	Unemplo yment rate	Unemplo yment rate	Unemplo yment rate	Unemplo yment rate	Unemplo yment rate
	Usage Dimension			Access Dimension			Penetration Dimension	

	Deposits	LOANS	Mobile and internet	Bank branches	ATMS	Insurance	Depositac	Borrowers
FI	-.043***	-.020**	-.001*	-.042**	-.016*	-.262***	-.013*	-.029***
	(.009)	(.008)	(.060)	(.031)	(.031)	(.023)	(0.008)	(0.010)
GDPgr	-.005*	-.005*	-.005**	-.005**	-.005*	-.004**	-.005**	-.005*
	(.004)	(.004)	(.004)	(.004)	(.004)	(.004)	(.004)	(.004)
POPULATION	-.148	-.152	-.15	-.159	-.151	-.16	-.148	-.143
	(.204)	(.204)	(.2)	(.2)	(.204)	(.194)	(.2)	(.206)
INFLATION	.003	.003	.003	.003	.003	.002	.003	.003
	(.006)	(.006)	(.006)	(.006)	(.006)	(.006)	(.006)	(.006)
EDUCATION	-.008*	-.008*	-.008*	-.008*	-.009*	-.012**	-.008*	-.009*
	(.007)	(.007)	(.007)	(.007)	(.006)	(.005)	(.007)	(.007)
FDI	-.012	-.012	-.012	-.012	-.012	-.012	-.012	-.012
	(.008)	(.008)	(.008)	(.008)	(.008)	(.008)	(.008)	(.008)
STARTBIZ	-.001	-.001	-.001	-.002	-.001	-.001	-.001	-.001
	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)
GOVPOLICYEDU	.117	.117	.121	.115	.117	.084	.117	.118
	(.08)	(.08)	(.08)	(.08)	(.076)	(.084)	(.08)	(.079)
_cons	8.856***	8.874***	8.835***	9.205***	8.671***	9.432***	8.825***	8.775***
	(1.403)	(1.407)	(1.387)	(1.423)	(1.525)	(1.316)	(1.459)	(1.457)
Observations	490	490	490	490	490	490	490	490
R^2	0.091	0.037	0.014	0.049	0.057	0.097	0.027	0.045

COUNTRY	49	49	49	49	49	49	49	49
YEAR EFFECT	YES	YES	YES	YES	YES	YES	YES	YES

*Robust standard errors are in parentheses *** p<.01, ** p<.05, * p<.1*

In the final step, the individual financial inclusion indicators are put through an evaluation to determine how much of an impact they have on the unemployment rate in Africa. This provides us with information that can be used to inform further policy implications and recommendations. The findings from the GMM analysis of the system are detailed in Table 11. However, in order to determine whether or not the GMM is valid for the system, we look at the diagnostic information. To begin, the Arellano and Bond test finds that the second order autocorrelation (AR (2)) with the null hypothesis of there being no autocorrelation is not rejected for any of the estimations. Second, the Hansen over identification restrictions test demonstrates that the instruments being used are reliable. In addition, the rule of thumb requirement for each specification helps to ensure that the concerns regarding instrument proliferation are addressed. In conclusion, the fisher test is significant for the specifications because it is used to evaluate the joint validity of the estimated coefficients.

After ascertaining the validity of the GMM estimate, the following findings can be established from table 10: first the usage dimension that is outstanding deposits with commercial banks as a percentage of GDP (Deposits), outstanding loans from commercial Banks as a percentage of GDP (Loans) and value of mobile and internet banking transactions as individual indicators have significant negative impact on unemployment rates, which means that a percentage increase in the use of the financial inclusion indicators of the usage dimension reduce the level of unemployment rate. Which is consistent with findings by (Osikena and Uğur 2016, Sharma 2016). The Schumpeterian model of expansion accounted for the multiplicative impact of loanable funds on economic activity. Micro, small, and medium-sized enterprises (MSME) in Africa do not use bank credit, as evidenced by the negligible effect of outstanding loans on economic growth. MSME are hesitant to take out bank loans due to the perceived high default risk and the influence of banks' wide-ranging collateral demands.

People still worry about using their mobile phones and the internet to access formal banking services (Chatterjee 2020), despite the fact that mobile money has helped reduce transaction costs in informal markets, strengthened risk sharing networks, and improved households' ability to respond to shocks(Jack and Suri 2014). This might be due to worries about identity theft, cybercrime, the sharing of private information, or invasion of privacy(De Koker and Jentzsch 2013) . Economic growth is negatively impacted because people are less likely to invest, save, and spend due to their worries about losing money(Abor, Amidu et al. 2018).

The bank branches, automated teller machines, and insurance products that make up the access dimension. According to the findings, it appears that there is a correlation between an increase in the availability of these services and a decrease in the unemployment rate. This finding is also consistent with previous research that found a positive relationship between financial access and employment growth (Claessens, Demirgüç-Kunt et al. 2001).

Thirdly the individual indicators of penetration dimension that is number of deposit Accounts with commercial banks per 1000Adults (DepositAC) and number of borrowers with commercial banks. According to the findings, there may be a correlation between an increase in the number of deposit accounts and a decrease in the unemployment rate that have significant effect on the outcome. Previous research (Demirgüç-Kunt and Klapper 2013) has found that there is a positive relationship between financial inclusion and employment growth. This finding confirms those findings and is consistent with those findings.

Consequently, this research shows that financial inclusion is an effective method to fight unemployment in Africa. Expanding mobile money services, establishing microfinance institutions, and fostering a culture of financial literacy can enhance financial inclusion in African region. The unemployment rate in Africa can be lowered by adopting growth-promoting policies like investing in education, reduce the days to start business, infrastructure, innovation, and human capital. Therefore, financial inclusion is both a driver and an enabler of broad-based economic growth and resilience, as well as improved financial health, job creation, and development. Every nation needs to have an inclusive financial system as a necessary piece of infrastructure.

5. Conclusion

Using panel data analysis that is REM and system GMM, the study analyzes and interpret the correlation between financial inclusion and unemployment in 49 African countries between 2009 and 2020. The findings provide support for the hypothesis that enhancement in access to financial services can promote economic growth and reduce unemployment, suggesting that financial inclusion has a negative and significant effect on unemployment in the African countries. Unemployment is found to be significantly influenced by GDP growth, FDI, startup businesses, inflation, and government policy regarding education, population, and education. Also, the negative significant effect of the financial inclusion dimensions on an unemployment adds weight to the argument that the provision of financial services stimulates economic expansion and creation of employment opportunities.

On behalf of outcomes, it is suggested that encouraging citizens to participate in the financial system is one way to combat unemployment and boost economic growth. Furthermore, governments should introduce policies regarding usage of mobile money and microfinance in rural areas to enhance financial inclusion. Moreover, sustaining of economic growth through encouraging foreign direct investment and new business creation may help bring down the unemployment rate.

It is found that financial inclusion has less influence on unemployment in countries with low levels of education and high levels of corruption. Therefore, in order to increase the efficiency of financial inclusion policies in decreasing unemployment, policymakers must address these factors. Incorporating financial inclusion into national development strategies with the assistance of regulations and institutions can help in reduction of unemployment in developing world. Meanwhile, global alliance and financial organization should play a vital role to provide a platform where developing nations could enhance their financial inclusion in order to achieve SDG-8 & 10 Expanding mobile money services, establishing microfinance institutions, and fostering a culture of financial literacy can enhance financial inclusion in African region. The unemployment rate in Africa can be lowered by adopting growth-promoting policies like investing in education, reduce the days to start business, infrastructure, innovation, and human capital.

Therefore, financial inclusion is both a driver and an enabler of broad-based economic growth and resilience, as well as improved financial health, job creation, and development. Every nation needs to have an inclusive financial system as a necessary piece of infrastructure.

For better addressing of these SDGs, researchers and policy makers can explore other dimensions of economy which are influenced by financial inclusion such as agriculture and manufacturing. Improving people's financial literacy is a crucial first step toward financial inclusion because it encourages them to use and benefit from financial services and products. According to(Bhatt 2017), "financial literacy" refers to "a high level of awareness, knowledge, and upgraded skills to make financial decisions about borrowing, saving, investing, and spending." It's seen as a tool for increasing the number of people who have access to the financial system Since financial inclusion is meaningless and counterproductive without a base level of financial literacy, governments should prioritize this issue.

6. Acknowledgment

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