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EFFECT OF MACROECONOMIC FACTORS ON ENTREPRENEURSHIP ACTIVITIES IN NIGERIA

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Abstract

The effect of macroeconomic factors on entrepreneurship activities in Nigeria using quarterly data from 2006 to 2020. The data were obtained from World Development Indicator (WDI, 2021), National Bureau of Statistics (NBS) fact sheet and Global Data Lab and the data include entrepreneurship, interest rate, access to broadband infrastructure, human capital, gross domestic product per capita, trade openness, consumer price index, research and development expenditure and unemployment rate. System generalized method of moments (GMM) was the appropriate methodology for the study because of its ability to overcome the problem of endogeneity. The study results revealed that entrepreneurship lag one (previous), interest rate, access to broadband infrastructure, human capital, GDP per capita, inflation and research and development are statistically significant in determining entrepreneurship in Nigeria but entrepreneurship lag one, access to broadband infrastructure, human capital and inflation exert a positive significant effect on entrepreneurship while interest rate, GDP per capita and research and development exert a negative significant effect on entrepreneurship. Therefore, the study recommended that more investment in both internet and human capital are very essential for the growth of entrepreneurship activities in Nigeria. Since entrepreneurship business are yardstick for economic growth, more government expenditure should go into research and development.

Keywords: Macroeconomic Factors, Entrepreneurship Activities, GMM

JEL Classification: E24, E31, E40, L00, L10

1. Introduction

One of the key factors influencing the changes in the economic environment is entrepreneurship (Thai and Turkina, 2014). An entrepreneur is someone who spots business venture startup chances that others have not seen and attempts to take advantage of those opportunities. A skilled businessperson can shape and create chances where others see none, little, or see them too early or too late. The role of the entrepreneur is to alter or revolutionize the production pattern so that the invention is utilized, or wider, to alter technological methods that are still underutilized for producing new goods for mass consumption, or the production of old goods in a new way, by opening new sources of input supply or a new production channel, or by setting up a new industry. Due to entrepreneurship, the economy is more successful since resources are used effectively (Njegomir and Radović, 2018).

Entrepreneurs are crucial to an economy because they may propel the nation's economic development. By creating new goods and services, they promote job creation, which eventually promotes economic development.

Entrepreneurship generates lots of new chances and jobs. Numerous entry-level positions produced by entrepreneurship are crucial for transforming non-skilled workers into proficient ones. Additionally, it trains and sends skilled personnel to big enterprises. The expansion of entrepreneurship is largely responsible for the rise in a nation's overall employment rate. Therefore, entrepreneurship plays a significant role in establishing new job opportunities, which has helped to raise people's standards of life in society. If the job base is substantial and diverse, society will grow. It affects social transformation and encourages amenities like greater investment in education, improved sanitation, fewer slums, and a higher rate of homeownership. As a result, entrepreneurship helps the organization achieve a higher standard of community life. Before introducing a new product to the market, an entrepreneur must conduct market research and test it.

The macroeconomic climate of the nation in which an enterprise works determines whether it will be successful. Entrepreneurship performance has historically been influenced by many economic factors, such as economic growth, inflation, unemployment, interest rates, and trade openness (Șipoș-Gug and Badulescu, 2015). These macroeconomic variables have an impact on the nation's entrepreneurship activity and provide a clear indication of how the economy is doing. The success of the entrepreneurship business will be impacted by macroeconomic factor instability, which also has a multiplier effect on GDP. In order to thrive over the long term, entrepreneurs must keep up with the numerous macroeconomic component changes (Abang *et al.*, 2018). Thus, the study is set to investigate the effect macroeconomic factors and entrepreneurship activities in Nigeria using quarterly data from 2006 to 2020. The paper analyses five organized sections: Introduction, literature review, methodology, data analysis and interpretation, conclusion and policy recommendations.

2. Literature Review

2.1 Theoretical Review

2.1.1 Innovation Theory of Profit

According to Schumpeter's (1982) theory, an entrepreneur can generate financial gains through introducing successful innovations. An entrepreneur's primary duty is to introduce innovations, and for his efforts, he is rewarded with profit in the form of money. According to Schumpeter, innovation is any novel strategy used by a businessperson to lower manufacturing costs or boost demand for their goods.

Thus, innovation can be divided into two groups, which are all the actions that lower the overall cost of production, such as introducing new production techniques, new technology, inventive approaches, or industry restructuring. The second category comprises any activities that boost demand for a product, such as the introduction of new goods or commodities, the emergence or opening of new markets, the discovery of new raw material sources, or the development of new product varieties or designs.

Therefore, if an entrepreneur's innovation is successful in lowering production costs generally or raising demand for his product, he or she will profit. Because the competitors copy the idea, the profits made are frequently temporary because the innovation is still new or unproven. Prior to this, the business owner had a monopoly on the market

because he was the only one who could innovate, which led to more earnings. But over time, as others copied the idea, the revenues started to dry up.

2.1.2 Resource-Based Entrepreneurship (RBE) Theory

The RBE theory of entrepreneurship argues that access to resources by founders is an important predictor of opportunity-based entrepreneurship and new venture growth as opined by the proponent Penrose and Penrose in 1959. This theory stresses the importance of financial, social and human. Thus, access to resources enhances the individual's ability to detect and act upon discovered opportunities. Financial, social and human capital represents three concepts under the RBE theory. Financial suggests that people with financial capital are more able to acquire resources to effectively exploit entrepreneurial opportunities and set up a firm to do so. Social means that an individual may have the ability to recognize that a given entrepreneurial opportunity exist but might lack the social connections to transform the opportunity into a business start-up. It is thought that access to a larger social network might help overcome this problem. Human capital has the underlying two factors which are education and experience. The knowledge gained from education and experience represents a resource that is used by individuals to discover and understand differences in opportunity identification (Penrose and Penrose, 1959).

2.1.3 Opportunity-based Entrepreneurship (OBE) Theory

Howard Stevenson and Peter Drucker serve as the foundation for this philosophy. A comprehensive conceptual foundation for entrepreneurship research is offered by an OBE methodology. Entrepreneurs take advantage of the opportunities that change (in technology, market preferences, etc.) creates rather than bringing about change (Drucker, 1985). He continues by saying that an entrepreneur always looks for change, reacts to it, and uses it as an opportunity. According to Drucker's opportunity construct, businesspeople tend to be more interested in the opportunities presented by change than the issues. Resourcefulness is added to Drucker's OBE construct by Stevenson (1990). This is based on analysis of the distinctions between administrative management and entrepreneurial management. He concludes that the pursuit of opportunity without consideration for currently controlled resources is the core of entrepreneurial management.

2.2 Empirical Review

Different empirical findings have been made about the connection between macroeconomic factors and entrepreneurial activity in both developed and developing nations. For instead, using secondary data from the World Bank, Dutse and Aliyu (2017) looked into the connection between macroeconomic factors and entrepreneurship in Nigeria. The study showed that majority of Nigeria's macroeconomic factors had little bearing on the growth of entrepreneurship. The study recommended that policymakers focus on both the magnitude of macroeconomic indicators and their relationship to entrepreneurship in the nation.

In the same manner, Panel regression was employed by Sipoş-Gug and Badulescu (2015) to examine the relationship between macroeconomic factors and entrepreneurial density. The findings showed a positive relationship between gross domestic product and entrepreneurial activity, and in the case of the European Union, there was indications that

the relationship might be quadratic rather than linear as had previously been assumed. The study also found a slight but positive correlation between entrepreneurship and inflation. According to the study, these relationships may offer a way to better understand how economic changes affect the supply and demand of entrepreneurs.

Thai and Turkina (2014) examined the macro-level factors influencing the national rates of formal versus informal entrepreneurship based on the eclectic theory of entrepreneurship. The study identified a number of higher-order, empirically tested variables, including economic opportunity, good governance, macro-level resources and skills, performance-based cultures, and cultures that foster social interaction. The results validated a theory outlining the distinct motivations behind formal and informal entrepreneurship.

The relationship between macroeconomic policy and entrepreneurship performance in West Africa is well-explained by Olowu *et al.*, (2019). The study discovers that the effectiveness of regional entrepreneurs is significantly influenced by macroeconomic policy. They also discover that entrepreneurial performance tends to be stronger in nations with more stable macroeconomic policies. The performance of entrepreneurship in West Africa is positively impacted by trade and monetary policy in particular. The conclusions suggested that in order to encourage entrepreneurship and economic growth in the region, officials in the region should concentrate on developing stable macroeconomic policies.

Furthermore, Tleuberdinova *et al.*, (2021) focused on the relationship between macro-economic factors and tourism entrepreneurship in Kazakhstan, the study note that the country has experienced economic growth in recent years, which has led to an increase in tourism. However, the study also highlight that the country's tourism industry is still in its early stages of development, and there are challenges to be addressed such as a lack of infrastructure and a shortage of skilled workers. The study also mentions that previous studies on Kazakhstan's tourism industry have primarily focused on the supply side, and there is a lack of research on the demand side. Therefore, they aim to fill this gap with their study.

The academic literature on entrepreneurship performance and economic environmental factors is reviewed by Abang *et al.*, (2018). The results showed that entrepreneurial performance in Nigeria is significantly influenced by economic environmental factors. The study further recommended that in order to improve the performance of their businesses, entrepreneurs should learn how to adapt to and deal with these environmental factors (interest rate, inflation rate, exchange rate, and government tax revenue), and the government should establish stable and favorable fiscal and monetary policies to do so in Nigeria.

In the same manner, the impact of socioeconomic factors on entrepreneurial activity in Pakistan's SMEs sector was examined by Abdelwahed and Soomro (2021). The study showed that socioeconomic and cultural factors—including conventions, assumptions, religious views, and other social values—have a favorable and significant influence on entrepreneurial actions. Additionally, the performance of businesses was positively and significantly impacted by entrepreneurial activities. According to the report, the government and decision-makers should lower the interest rate to let entrepreneurs to borrow money on a flexible basis. Lower taxes could allow individuals with low incomes to

access capital for their entrepreneurial endeavors in Pakistan's SMEs sector. Khader *et al.*, (2014) study various factors that affect how easy it is to conduct business within a country's borders. The findings suggested that lending rates, access to internet and a country's GDP per capita are all major factors affecting easy way of conducting business.

Salman et al., (2009) examined the relationship between macroeconomic factors and the failure of small and medium-sized manufacturing firms in Sweden and find that there is a positive relationship between the failure rate of small and medium-sized manufacturing firms and macroeconomic factors such as GDP growth, inflation, and interest rates. Additionally, they discover that the failure rate of these businesses is favorably correlated with market rivalry and adversely correlated with export volume. These results indicate that small and medium-sized manufacturing companies in Sweden may be more vulnerable to failure during economic downturns, inflation, and high loan rates. According to Njegomir and Radovi (2018), insufficient employment is a major driving force behind entrepreneurship with a self-employment goal, whereas favorable GDP and per capita income are motivating factors for entrepreneurship aimed at the development of innovations and economic and social progress.

According to Dvorsk *et al.* (2020), the business climate in East European nations is significantly influenced by variables including GDP, inflation, and foreign direct investment. Because they are able to draw more investment and offer more chances for business growth, nations with higher GDP levels and lower inflation rates typically have more hospitable business environments. Additionally, foreign direct investment may promote economic expansion and employment creation, improving the business climate. Mohammadi and Rostami (2021), macroeconomic factors that can have an immediate and long-term impact on entrepreneurial activities include tax rates, unemployment rates, the cost of starting a business, inflation, financing availability, and the lack of foreign investment in innovative industries.

In a cross-section empirical analysis by Kim *et al.*, (2022) examined the relationship between entrepreneurship and economic growth in a cross-sectional analysis using a new measure of entrepreneurship, the GEM (Global Entrepreneurship Monitor) index, which allows for a more comprehensive understanding of the relationship. The study finds out that opportunity-driven entrepreneurship is positively linked with growth. Intuitively, big scientific advances in the manufacturing sector create a lot of opportunities for innovative entrepreneurs, whereas other entrepreneurs gradually adapt to the slower pace of technological progress in the services sector.

Sherly (2020) investigated the economic, political, institutional, and societal factors that encourage entrepreneurial activity. The result shows that the general state of macroeconomic activity, the availability of financing, the level of human capital, fiscal policies implemented, and the type of economic system are the most important determinants of entrepreneurship. In addition, the result shows a non-linear, U-shaped relation between taxation and the level of entrepreneurship.

Karabulut and Şen (2018) analyze macroeconomic indicators that affect the performance of international financial centers. According to the findings, the savings ratio, the ratio of the domestic credit volume to the GDP provided by

the financial sector, the credit ratio given to the private sector and the trade volume inflation rate and portfolio investments have a negative effect on the performance of financial centers. Therefore, macroeconomic stability and certainty are the most important conditions for the success of a finance centers.

3. Methodology

The theoretical framework for this research work is based on resources-based entrepreneurship (RBE) theory of Penrose and Penrose (1959) that opined that access to resources by founders is an important predictor of RBE and new venture growth. Access to resources enhances the individual's ability to detect and act upon discovered opportunities. The theory stresses the importance of financial, social and human capital as the three main factors under the theory. Financial suggests that people with financial capital are more able to acquire resources to effectively exploit entrepreneurial opportunities, and set up a firm to do so. Most of the time, the best way to get finance is to borrow from bank and this attract interest rate which will affect entrepreneurial ability negatively. Therefore, entrepreneurship is a function of interest rate which is the opportunity cost of borrowing another person's income.

$$entre = f(intr) \quad (1)$$

Social means that an individual may have the ability to recognize that a given entrepreneurial opportunity exist, but might lack the social connections to transform the opportunity into a business start-up. It is thought that access to a larger social network might help overcome this problem. Access to larger social network requires a strong connection to internet which is proxy by access to broadband infrastructure and it is expected to have a positive influence on entrepreneurial ability.

$$entre = f(abi) \quad (2)$$

Human capital has the underlying two factors which are education and experience. The knowledge gained from education and experience represents a resource that is used by individuals to discover and understand differences in opportunity identification. The study will make used of human capital index because human capital effectively and efficiently significant in fostering and maintaining high levels of productivity in entrepreneurial businesses.

$$entre = f(hdi) \quad (3)$$

Putting the three equations together will produce a relationship where entrepreneurship will be a function of interest rate, access to broadband infrastructure and human development index.

$$entre = f(int, abi \ \& \ hdi) \quad (4)$$

Other explanatory variables like GDP growth rate, trade openness, consumer price index, research and development expenditure and unemployment will be included in the model based on the work of Salman *et al.*, (2009); Khader *et al.*, (2014); Thai *et al.*, (2014); Șipoș-Gug and Badulescu, (2015); Dutse and Aliyu, (2017); Njegomir and Radović, (2018); Karabulut and Şen, (2018) & Mohammadi and Rostami, (2021).

$$entre = f(intr, abi, \ hdi, gpdpc, \ open, cpi, rd \ \& \ unemp) \quad (5)$$

Where *entre* is entrepreneurship, *intr* is interest rate, *abi* is access to broadband infrastructure, *hdi* is human capital, *gdppc* is gross domestic product per capita, *open* is trade openness, *cpi* is consumer price index, *rd* is research and development expenditure and *unemp* is unemployment rate.

System generalized method of moments (GMM) is the appropriate methodology for the study because of its ability to overcome the problem of endogeneity. GMM regression considers the lag of the dependent variable among the independent variables. GMM is a statistical method that combines observed economic data with the information in population moment conditions to produce estimates of the unknown parameter of the economic model.

Hence, the GMM linear regression model can be specified as follows:

$$entre_t = \beta_0 + \beta_1 entre_{t-1} + \beta_2 intr_t + \beta_3 abi_t + \beta_4 hdi_t + \beta_5 gpdpc_t + \beta_6 open_t + \beta_7 cpui_t + \beta_8 rd_t + \beta_9 unemp_t + \varepsilon \quad (6)$$

- β_0 is the expected value of entrepreneurship when all the explanatory variables have zero effect.
- β_1 is the effect of a change in entrepreneurship lag one on entrepreneurship while holding all other explanatory variables constant.
- β_2 is the effect of a change in interest rate on entrepreneurship while holding all other explanatory variables constant.
- β_3 is the effect of a change in access to broadband infrastructure on entrepreneurship while holding all other explanatory variables constant.
- β_4 is the effect of a change in human capital on entrepreneurship while holding all other explanatory variables constant.
- β_5 is the effect of a change in gross domestic product per capita on entrepreneurship while holding all other explanatory variables constant.
- β_6 is the effect of a change in trade openness on entrepreneurship while holding all other explanatory variables constant.
- β_7 is the effect of a change in consumer price index on entrepreneurship while holding all other explanatory variables constant.
- β_8 is the effect of a change in research and development expenditure on entrepreneurship while holding all other explanatory variables constant.
- β_9 is the effect of a change in unemployment rate on entrepreneurship while holding all other explanatory variables constant.
- ε is the stochastic or error term with all the standard attributes. It captures the effect of other variables that could affect entrepreneurship but which are not included in the model.

Table 1 gives the definition of the variables, measurement and *apriori* expectation based on the findings of the past studies in the area (Salman *et al.*, 2009; Khader *et al.*, 2014; Thai *et al.*, 2014; Șipoș-Gug and Badulescu, 2015; Dutse and Aliyu, 2017; Njegomir and Radović, 2018; Karabulut and Şen, 2018 & Mohammadi and Rostami, 2021).

Table 1:
Definition of the variables, measurement and a priori expectation

Variables	Denotation	Definition & measurement	Theoretical expectation
Dependent variables	*entre*	Entrepreneurship is measured by new business registered (number)	
Independent variables	*entre lag one*	Entrepreneurship is measured by new business registered (number)	+
	intr	Interest rate is measured by lending interest rate (%)	-
	abi	Access to broadband infrastructure is measured by internet access to broadband infrastructure	+
	hdi	Human capital measured by human development index	+
	gdppc	Gross domestic product per capita	+
	open	Trade openness measured by export plus import divided by GDP	+
	cpi	Inflation measured by consumer price index	+
	rd	Research and development measured by research and development expenditure (% of GDP)	+
	unemp	Unemployment rate measured by unemployment rate (new Nigeria)	-

Source: Own Computation

The study's scope is from 2006 quarter one to 2020 quarter four, and this time frame was chosen because there was no data for new business registered below 2006 and also to analyze the current trend of the variables. The data were obtained from World Development Indicator (WDI, 2021), National Bureau of Statistics (NBS) fact sheet and Global Data Lab.

4. Data Analysis and Interpretation

Descriptive statistics is depicted in Table 2 which summarize the via mean as a measure of central tendency and standard deviation, minimum, maximum, skewness, kurtosis and Jarque-Bera as a measure of variability. Out of the nine variables used, entrepreneurship has the highest yearly mean of 73,406 indicating that on the average, 73,406 new business registered yearly while research and development expenditure as a percentage of GDP has the lowest yearly mean of 0.24%. From the standard deviation which measure the dispersion of the data relative to its mean shows that larger number of variables have low deviation from their mean while only few have high deviation from their mean. Also, the minimum and maximum of each variable are summarized and their essence is to tell the lowest and the highest values of an observation. From the outcomes, all the observations fall within their minimum and maximum.

All the variables have positive skewness that is the tail of the right side of the distribution is longer or fatter, therefore, a positive mean with a positive skew will be good while a negative mean with a positive skew is not good. Therefore, all the observations have positive mean with a positive skew indicating that they are good. In the same manner, if the kurtosis value is 3, it is called mesokurtic and if it is greater than 3, it is called leptokurtic while a kurtosis value less than 3 is called platykurtic. The kurtosis value for the variables shows that they are all platykutic.

Table 2:
Descriptive Statistics

Variable	Mean	Std. Dev.	Min.	Max.	Skewness	Kurtosis	JB [p-value]
entr	73405.74	15479.17	34531	97988	0.005	0.201	8.43 [0.01]
intr	15.89	2.23	9.85	18.99	0.000	0.031	17.42[0.00]
abi	21.26	10.71	5.55	37.8	0.968	0.000	35.17[0.00]
hdi	0.51	0.03	0.47	0.55	0.355	0.000	43.45[0.00]
gdppc	507.98	211.90	216.30	955.13	0.103	0.139	4.82[0.09]
open	33.10	9.84	16.35	53.28	0.587	0.082	3.47[0.18]
cpi	12.15	3.81	4.12	21.84	0.294	0.671	1.32[0.52]
rd	0.24	0.14	0.04	0.60	0.020	0.636	5.47[0.06]
unemp	14.24	10.63	3.23	33.49	0.014	0.002	12.55[0.00]
*** $p<0.01$, ** $p<0.05$, * $p<0.1$							

Where entr is Entrepreneurship; intr is Interest rate; abi is Access to broadband infrastructure; hdi Human development index; gdppc is Gross domestic product per capita; open is Trade openness; cpi is Consumer price index; rd is Research and development expenditure and unemp is Unemployment rate

Table 3 gives the result of the correlation analysis which shows the degree and direction of association among the variables. The correlation analysis between entrepreneurship and interest rate was -0.481 which show that a weak negative correlation exists between then. Also, there was a strong positive correlation between entrepreneurship and access to broadband infrastructure with a correlation coefficient of 0.861 and also, strong positive correlation exists between entrepreneurship and human capital with a correlation coefficient of 0.849. Furthermore, the coefficient of correlation between entrepreneurship and GDP per capita was 0.835 indicating a strong positive correlation between entrepreneurship and GDP per capita. Entrepreneurship and trade openness correlation coefficient was -0.509 indicating a moderate negative correlation between entrepreneurship and trade openness and the correlation between entrepreneurship and inflation was a moderate positive correlation with a coefficient of 0.523. Entrepreneurship and research and development expenditure has a weak positive correlation with a coefficient of 0.084 while entrepreneurship and unemployment rate have a strong positive correlation with a coefficient of 0.794.

Furthermore, the correlation analysis between interest rate and access to broadband infrastructure was -0.590 which show that a moderate negative correlation exists between then. There was a moderate negative correlation between interest rate and human capital with a correlation coefficient of -0.566. Also, the coefficient of correlation between interest rate and GDP per capita was -0.756 indicating a strong negative correlation between interest rate and GDP per capita. Interest rate and trade openness correlation coefficient was 0.367 indicating a weak positive correlation between interest rate and trade openness and the correlation between interest rate and inflation was a moderate negative correlation with a coefficient of -0.508. Furthermore, interest rate and research and development expenditure

have a weak positive correlation with a coefficient of 0.098 while interest rate and unemployment rate have a strong negative correlation with a coefficient of 0.751.

There was a strong positive correlation between access to broadband infrastructure and human capital with a correlation coefficient of 0.975. Also, the coefficient of correlation between access to broadband infrastructure and GDP per capita was 0.956 indicating a strong positive correlation between access to broadband infrastructure and GDP per capita. Access to broadband infrastructure and trade openness correlation coefficient was -0.737 indicating a strong negative correlation between access to broadband infrastructure and trade openness and the correlation between access to broadband infrastructure and inflation was a moderate positive correlation with a coefficient of 0.529. Also, access to broadband infrastructure and research and development expenditure has a weak positive correlation with a coefficient of 0.169 while access to broadband infrastructure and unemployment rate has a strong positive correlation with a coefficient of 0.922.

The coefficient of correlation between human capital and GDP per capita was 0.944 indicating a strong positive correlation between human capital and GDP per capita. Human capital and trade openness correlation coefficient was -0.778 indicating a strong negative correlation between human capital and trade openness and the correlation between human capital and inflation was a weak positive correlation with a coefficient of 0.489. Furthermore, human capital and research and development expenditure has a weak positive correlation with a coefficient of 0.237 while human capital and unemployment rate has a strong positive correlation with a coefficient of 0.869.

GDP per capita and trade openness correlation coefficient was -0.660 indicating a strong negative correlation between GDP per capita and trade openness and the correlation between GDP per capita and inflation was a strong positive correlation with a coefficient of 0.605. Also, GDP per capita and research and development expenditure has a weak positive correlation with a coefficient of 0.096 while GDP per capita and unemployment rate has a strong positive correlation with a coefficient of 0.955. The correlation between trade openness and inflation was a weak negative correlation with a coefficient of -0.374. Also, trade openness and research and development expenditure has a moderate negative correlation with a coefficient of -0.559 while trade openness and unemployment rate has a strong negative correlation with a coefficient of -0.616. Inflation and research and development expenditure has a weak positive correlation with a coefficient of 0.351 and inflation and unemployment rate has a strong positive correlation with a coefficient of 0.600 while research and development expenditure and unemployment rate has a weak negative correlation with a coefficient of -0.038.

Table 3:
Correlation Analysis

	entr	*intr*	*Abi*	*hdi*	*gdppc*	*open*	*cpi*	*rd*	*unemp*
Entr	1.000								
intr	-0.481	1.000							
abi	0.861	-0.590	1.000						
hdi	0.849	-0.566	0.975	1.000					
gdppc	0.835	-0.756	0.956	0.944	1.000				
open	-0.509	0.367	-0.737	-0.778	-0.660	1.000			
cpi	0.523	-0.508	0.529	0.489	0.605	-0.374	1.000		
rd	0.084	0.098	0.169	0.237	0.096	-0.559	0.351	1.000	
unemp	0.794	-0.751	0.922	0.869	0.955	-0.616	0.600	-0.038	1.000

Where entr is Entrepreneurship; intr is Interest rate; abi is Access to broadband infrastructure; hdi Human development index; gdppc is Gross domestic product per capita; open is Trade openness; cpi is Consumer price index; rd is Research and development expenditure and unemp is Unemployment rate

Table 4 presents the result of the effect of macroeconomic factors on entrepreneurship in Nigeria using one-step system GMM dynamic regression. The results revealed that entrepreneurship lag one, interest rate, access to broadband infrastructure, human capital, GDP per capita, inflation and research and development are statistically significant in determining entrepreneurship in Nigeria (β_1=0.454, p=0.000; β_3=618.34, p=0.000; β_4=204699.9, p=0.000 & β_7=1026.904, p=0.006) but entrepreneurship lag one, access to broadband infrastructure, human capital and inflation exert a positive significant effect on entrepreneurship, while interest rate, GDP per capita and research and development exert a negative significant effect on entrepreneurship (β_2=-399.812, p=0.000; β_5=-43.13, p=0.000 & β_8=32626.38, p=0.002).

The positive effect of entrepreneurship lag one indicates that number of entrepreneurship activities in the previous years go a long way in boosting the current activities of the entrepreneur because as the economic situation are conductive for business, entrepreneurship activities will be productive leading to more profit for the number of entrepreneur and this will give signal to new entrepreneur to spring up. Also, access to broadband infrastructure which is used as a proxy for social connections affect entrepreneurship activities positively. The era of internet has provided entrepreneurs with a more accurate and timely information which help them to spot business opportunities because entrepreneurs no longer dependent on the local customers base for survival, there are worldwide audience for the sales of goods and services. Furthermore, human development index used for human capital has a positive effect on entrepreneurship activities means that important of human capital cannot be overemphasis because it will bring the creativity ability in the entrepreneur leading to innovative ways of production which bring about high product. Also, consumer price index as a proxy of inflation exerts a positive significant effect on entrepreneurship activities. During the period of inflation, entrepreneur always take advantage of inflation because the price of commodities will go up and this implies more profit for the business.

Likewise, interest rate has a negative effect on entrepreneurship activities which concur with the a priori expectation. When lending interest rate is high, cost of borrow will be high and this will discourage business activities. The finding of research and development has a negative effect on entrepreneurship indicating that research and development expenditure in Nigeria is low and it cannot boost entrepreneurship activities in the country.

The test results also provide information about consistency of the dynamic regression estimates. The Wald test is used to test the overall explanatory power of independent variables on the dependent variable, the Sargan and the Hansen tests reveal whether the instrumental variables are valid, and the Arellano–Bond (AB) test is applied to detect the presence of the autocorrelation problem in the model.

The *J*-statistics test's hypotheses are:

H_0 = The independent variable has no explanatory power for the dependent variable.

H_1 = The independent variable has explanatory power for the dependent variable.

The H_0 hypothesis was rejected by *J*-statistics ($p < 0.01$), so the independent variables have explanatory power for the dependent variables and the whole model was concluded to be significant.

The Arellano–Bond test is employed to detect the autocorrelation problem in one-step system GMM regressions.

The Arellano–Bond test's hypotheses are:

H_0 = There is no autocorrelation.

H_1 = There is autocorrelation.

The presence of 1st degree and 2nd degree autocorrelation was tested: The *AR(1)* test came out statistically negative and significant, the *AR(2)* test came out negative and insignificant. Therefore, the H_0 hypothesis cannot be rejected for AR(2). According to this finding, the conclusion was reached that there is no second-degree autocorrelation. For the generalized moment's estimator to be effective, it is sufficient that there be no second-degree autocorrelation.

The Sargan and Hansen tests as well as the over identifying restrictions validity test were performed to evaluate the validity of the instrumental variables. These Sargan test's hypotheses are:

$\mathbf{H_0}$ = The over identifying restrictions are valid for the instrumental variable.

$\mathbf{H_1}$ = The over identifying restrictions are invalid for the instrumental variable.

The robust Difference-Hansen test's hypotheses are:

$\mathbf{H_0}$ = The instrumental variables are exogenous.

H_1 = The instrumental variables are not exogenous.

According to both the Sargan and the Hansen tests in the regression, the H_0 hypothesis cannot be rejected. Therefore, the over identifying restrictions are valid. According to the robust Difference-Hansen test results, the instrumental variables used as instrumentals are exogenous and the H_0 hypothesis level and GMM equalities cannot be rejected.

Table 4
Effect of Macroeconomic Factors on Entrepreneurship

	Dependent Varaible: entr			
Independent Variables	Coefficient	Std.err	z	p>/z/
entre(-1)	0.454	0.035	12.95	0.000***
intr	-399.812	85.949	-4.65	0.000***
abi	618.340	153.659	4.02	0.000***
hdi	204699.9	27775.35	7.37	0.000***
gdppc	-43.130	3.386	-12.74	0.000***
open	-19.773	105.651	-0.19	0.852
cpi	1026.904	373.272	2.75	0.006***
rd	-32626.38	10758.17	-3.03	0.002***
unemp	-48.782	246.524	-0.20	0.843
*cons_*	-50439.32	12856.57	-3.92	0.000***
J-stat.	1609.87 [0.000]***			
Arellano–Bond test AR(1)	-1.84 [0.065]*			
Arellano–Bond test AR(2)	-0.77 [0.440]			
Sargan test of overid. Restrictions	45.10 [0.801]			
Hansen test of overid. restrictions	0.00 [1.000]			
*** p<0.01, ** p<0.05, * p<0.1				

Where entr is Entrepreneurship; intr is Interest rate; abi is Access to broadband infrastructure; hdi Human development index; gdppc is Gross domestic product per capita; open is Trade openness; cpi is Consumer price index; rd is Research and development expenditure and unemp is Unemployment rate

5. Conclusion and Policy Recommendation

The study concluded that entrepreneurship lag one, interest rate, access to broadband infrastructure, human capital, GDP per capita, inflation and research and development are statistically significant in determining entrepreneurship in Nigeria but entrepreneurship lag one, access to broadband infrastructure, human capital and inflation exert a positive significant effect on entrepreneurship (β_1=0.454, p=0.000; β_3=618.34, p=0.000; β_4=204699.9, p=0.000 & β_7=1026.904, p=0.006) while interest rate, GDP per capita and research and development exert a negative significant effect on entrepreneurship (β_2=-399.812, p=0.000; β_5=-43.13, p=0.000 & β_8=32626.38, p=0.002). Therefore, the study recommended that more investment in both internet and human capital are very essential for the growth of entrepreneurship activities in Nigeria. Since entrepreneurship business are yardstick for economic growth, more government expenditure should go into research and development.

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