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**MACROECONOMIC ENVIRONMENT
AND ENTREPRENEURSHIP IN NIGERIA**

Key words: entrepreneurship, new business density, consumer price index (CPI),
Gross Domestic Product (GDP) *per capita*, Nigeria

ABSTRACT. This study investigates the nexus between the macroeconomic environment and entrepreneurship in Nigeria using linear regression with ARMA (autoregressive moving average) analysis. Results indicate a positive relationship between GDP *per capita* and both new businesses registered and new business density, highlighting the role of economic prosperity in fostering entrepreneurial activity. Conversely, inflation exerts a negative influence on entrepreneurship, with higher inflation rates associated with reduced new business registrations and lower business density. Access to financing emerges as a crucial factor, as reflected in the positive correlation between monetary sector credit to the private sector and new business registered. However, the significance of this relationship is marginally significant, prompting further inquiry into credit provision mechanisms. Furthermore, government expenditure on education is found to negatively impact entrepreneurship, underscoring the importance of aligning education spending with entrepreneurship development initiatives. The findings underscore the need for targeted policies aimed at promoting economic growth, mitigating inflationary pressures, enhancing access to financing, and aligning education spending with entrepreneurship support programs to create a conducive environment for entrepreneurial growth in Nigeria.

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INTRODUCTION

In recent times, entrepreneurship has emerged unsheathed from the shadows of the economic field and has become a burgeoning research area, accumulating a wide range of studies related to economic development [Guerrero et al. 2021], innovation [Sambo 2018], job creation [Dong et al. 2021], etc. Entrepreneurship studies seem to suggest that entrepreneurial activity varies meaningfully across countries and regions [Naude et al. 2018]. The environment where entrepreneurial opportunities arise and new businesses are formed is also pertinent in entrepreneurship research because environmental factors do not only introduce market inefficiencies and information asymmetry – they contain elements that can either contribute to or impede the success of new businesses. For instance, as the rate of job creation by the government continues to decline sharply, more youths are shifting towards self-employment in Nigeria [Omeje et al. 2020]. The increasing embrace of entrepreneurship in the context of self-employment is prominently evident in various sectors of the economy, such as agriculture, retail, the creative industry, and technology-driven start-ups.

The active participation of Nigerian youths in the agricultural sector has resulted in a notable surge in its contribution to the Gross Domestic Product (GDP). The agricultural sector accounted for 22.3% of Nigeria's GDP in 2021 [Villacis et al. 2022]. Between 2014 and 2019, the tech start-up sector was the brightest spot in the Nigerian economy, attracting USD 600 million in FDI and creating millions of jobs as the nation adopted an agency banking system to serve marginalised rural communities [Kola-Oyeneyin et al. 2020]. Despite this promising development, a true economic renaissance for the nation still proves elusive as it continues to grapple with entrenched socio-economic challenges such as high inflation, a drastic decline in foreign direct investment (FDI), shrinking monetary sector credit, and persistent youth unemployment, rising from 9% in 1991 to 13.4% in 2017 [WB 2018].

Scholars aligned with the Keynesian school of thought argue that monetary policies, such as interest rates, impact money supply and demand dynamics and, by extension, the level of entrepreneurial activities. Kalu O. Emenike [2016] study on the relationship between the monetary sector and private sector credit in Nigeria revealed evidence of a statistically significant relationship, indicating that changes in money supply affect both the quantity and cost of credit available to the private sector for implementing business plans. Similarly, findings from a study examining the role of credit supply throughout the U.S. business cycle from 1973 to 2018 suggest that the impact of credit supply on macroeconomic variables is heterogeneous, resulting in varied effects on the economy depending on specific conditions [Colombo and Paccagnini 2020].

Furthermore, the relationship between labour force participation rate (LFPR) and entrepreneurship remains unclear, but examining gender disparities in formal employment

provides insights. European countries, despite progress, have not achieved the 60% female employment rate in the labour force [Castellano and Rocca 2020]. In Nigeria, gender inequality in LFPR is evident, with women dominating unpaid informal jobs and a formal employment LFPR of 38.7% for women compared to 70.6% for men in 2007 [Adeosun and Owolabi 2021]. Moreover, Florence Bonnet et al. [2019] opined that in developing economies, the informal sector serves as a significant source of employment for women (92%) compared to men (87%). The question of whether higher LFPR motivates more men to start businesses later in their careers is crucial, with implications for addressing gender disparity in entrepreneurship.

Due to the multifaceted nature of the macroeconomic environment and entrepreneurship, majority of research on entrepreneurship and its impact on economic growth has primarily focused on advanced economies where an environment conducive to entrepreneurial activities already exists, as opposed to Nigeria. For example, Jiangyong Lu and Zhigang Tao [2010], using survey data of 2,854 respondents from twenty cities, concluded that entrepreneurial activities in China are impacted by the institutional environment; similarly, Andreas Kuckertz et al. [2015] suggested that factors such as culture, economic freedom, or well-being may foster higher incidences of opportunity-driven entrepreneurship in innovation-driven economies such as Germany, while David Audretsch et al. [2002] suggested that entrepreneurship policies in response to unemployment and economic stagnation can cause an upturn in entrepreneurial activity in advanced economies.

This paper addresses a gap in the empirical literature by investigating the macroeconomic environment and entrepreneurship in Nigeria. Using World Bank data, the study aims to develop an econometric model highlighting the underlying mechanisms of macroeconomic environment which accounts for entrepreneurship in Nigeria. The paper contributes to the field by providing national-level empirical evidence and expanding theoretical knowledge on the interplay of macroeconomic environment and entrepreneurship in shaping decisions to start a new business. The structure of the paper is designed as follows: materials and methodology, discussion of results, and conclusions.

MATERIAL AND METHODS

The source of data in this study is the World Bank for all variables. The data consists of annual data on all the variables for the period 2001-2021 to assess the macroeconomic environment and entrepreneurship in Nigeria. R-Studio was utilized in carrying out the interpolation of the variables considered. Linear regression with autoregressive moving average (ARMA) is a statistical method that combines linear regression analysis with ARMA modes from time series analysis [Hyndman 2010]. Typically, it is used to model and predict the relationship between a dependent variable and one or more independent

variables such that the prediction is a weighted sum of past observations (it requires considering the autocorrelation and moving average components of the data) [Hannan and McDougall 1988, Wu and Wang 2012, Paoletta 2018]. Using this approach is mostly valuable in situations where the data exhibit both linear trends and temporal dependencies. As such, by integrating ARMA components into linear regression, it enables more accurate predictions and better understanding of the underlying processes driving the data [Hyndman 2010]. The model of linear regression with ARMA errors:

$$y_t = \beta x_t + \eta_t$$

$$\eta_t = \phi_1 \eta_{t-1} - \theta_1 z_{t-1} + z_t$$

where: β is the regression coefficient with its usual interpretation, η_t is the ARMA error, z_t is the white noise process, ϕ_1 is the coefficient with the autoregressive component (AR) or the error, and θ_1 – with the moving average component (MA).

In other words, it implies that the response variable y_t (new businesses registered – NBR), new business density (NBD) and self-employment (SE)) are explained by $X_{1t} \dots X_{8t}$ (GDP *per capita* (GDPc), unemployment rate (Ur), consumer price index – inflation (CPI), foreign direct investment (FDI), labour force participation (FDI), age dependency rate (ADR), monetary sector credit to private sector (MSC) and government expenditure on education (GEE)) such that the $\beta_0 \dots \beta_8$ are the coefficient representing the relationship between the response variable and the explanatory variables.

Two variables with roughly lognormal distribution, NBR and GDPc, were log transformed. Stationarity checks showed that most variables were I(1) but some were of higher order of integration. Thus, all variables were stationarized by differencing. The analysis that followed proved that explanatory variables that were I(2) or higher did not have significant impact on the responses. Also, one of the response variables, SE, proved to be I(d > 2) integrated and was excluded from further analysis. In that case, it was argued that multiple differencing would consume too many valuable degrees of freedom and interpretation of regression results would be dubious. Because all variables were already differenced, the errors were expected to be ARMA, not ARIMA.

Among the explanatory variables, regressions of both NBR and NBD against GDPc and CPI were not significant, but regressions against lagged GDPc and CPI were (Table 1). This made sense because improvements in the GDPc growth and inflation reduction would take time before they could meaningfully affect new business growth. No proposed explanatory variables (or their lags) other than those included in Table 1 proved significant in regression analyses. One model, of NBD versus MSC yielded a coefficient with p-value slightly larger than 0.05.

Table 1. Results of the analysis

Res- ponse	Explanatory	Estimated error's form	Coefficient	p-value	Ljung- Box test	Breusch- Pagan test	R ²
NBR	GDPc (lag = 1)	ARMA(0,0)	0.366	0.037	0.640	0.041	0.178
NBR	CPI (lag = 1)	ARMA(0,0)	-0.012	0.025	0.098	0.225	0.200
NBR	MSC (lag = 0)	ARMA(0,0)	0.019	0.047	0.507	0.137	0.158
NBR	GEE (lag = 0)	ARMA(0,0)	-0.051	0.042	0.075	0.818	0.164
NBD	GDPc (lag = 1)	ARMA(0,0)	0.232	0.031	0.153	0.148	0.086
NBD	CPI (lag = 1)	ARMA(0,1)	-0.009	0.000	0.724	0.787	0.461
NBD	MSC (lag = 0)	ARMA(0,0)	0.012	0.064	0.518	0.181	0.141
NBD	GEE (lag = 0)	ARMA(0,0)	-0.042	0.005	0.412	0.897	0.192

Source: own calculations

The diagnostics of the residuals (ACF plot, Ljung-Box, and Shapiro-Wilk tests) found no residual autocorrelation and normal distribution. The estimated error's form in almost all cases showed no serial correlation. Only in the model of NBD against lagged CPI did the estimated error have a moving average component. The Breusch-Pagan test run on the residuals against the explanatory variable showed no heteroscedasticity, except for NBR versus GDPc, but even in that case the p-value was only slightly smaller than 0.05. R², defined here as the squared correlation between the observed values of the response variable and fitted values from the model, was not very high, especially in the case of NBD versus GDPc (R² = 0.086). The only case of moderately high value of R² was for NBD versus CPI (R² = 0.461).

From the Table 1, for each unit increase in GDP *per capita* (lagged by one time period), there will be an increase of 0.366 units in the number of new businesses registered. This relationship is statically significant at the 0.05 level. More so, for each unit increase in CPI (lagged by one time period), there will be a decrease of 0.012 units in the number of new businesses registered. This relationship is statistically significant at the 0.05 level. In addition, for each unit increase in the monetary sector credit to the private sector (not lagged), it results in an increase of 0.019 units in the number of new businesses registered. This relationship is statistically significant at the 0.05 level. Also, for each unit increase in government expenditure on education(not lagged), there is a decrease of 0.051 units in the number of new businesses registered. This relationship is statistically significant at the 0.05 level.

Furthermore, for each unit increase in GDP *per capita* (lagged by one time period), there is an increase of 0.232 units in the new business density (number of new businesses registered per unit area of population or area). This relationship is statistically significant at the 0.05 level.

Again, for each unit increase in CPI (lagged by one time period), there is a decrease of 0.009 units in the new business density. This relationship is statistically significant at the 0.05 level. Also, for each unit increase in monetary sector credit to the private sector (not lagged), there is an increase of 0.012 units in the new business density. This relationship is not statistically significant at the 0.05 level.

Statistical tests revealed that, for each unit increase in government expenditure on education (not lagged), there is a decrease of 0.042 units in the new business density. This relationship is statistically significant at the 0.05 level. These interpretations provide insights into how each explanatory variable impacts the response variables, considering both the magnitude of the effect (coefficient) and its statistical significance (p-value).

Regressions with ARIMA errors of NBR and NBD against a single explanatory variable of lagged GDPc, lagged CPI, MSC, and GEE proved all significant (except NBD against MSC, which was only significant at $\alpha = 0.10$). However, when the same response variables were regressed against the *set* of the same variables, most of the corresponding coefficients were not significant. It suggests a complex relationship between explanatory variables in explaining variability of the response, with some possibly significant interactions. Sadly, very short length of the time series did not allow for testing models with any interactions, as they used up preciously few degrees of freedom. Already, the p-values were barely within the 0.05 mark.

The scarcity of public data is unfortunately typical of African countries, where many time series are short and do not lend themselves to a more in-depth analysis.

DISCUSSION OF RESULTS

The thrust of this paper focuses on modelling macroeconomic environment and entrepreneurship in Nigeria. The study employed the use of Linear regression with ARMA and the results were rather interesting.

GDP *per capita* (lagged by one time period), is related to new businesses registered which suggests that unit increase in GDP *per capita* in the previous period, is associated with an increase of 0.366 units of new businesses registered. This implies that higher GDP *per capita* often indicates greater economic prosperity and consumer demand, which can create favourable conditions for entrepreneurship [Gautam and Lal 2021]. Previous research has shown a positive correlation between GDP and entrepreneurial activity [Stoica et al. 2020, Gautam and Lal 2021]. There is a positive association between GDP

per capita and new business density which reaffirms that higher economic prosperity may also attract investment and talent, further fuelling entrepreneurial ventures. This also provides empirical support for the link between economic development and entrepreneurial vibrancy.

A negative coefficient implies that higher inflation in the previous period is associated with a decrease in the number of new businesses registered. Inflation can erode purchasing power and increase uncertainty, which may discourage entrepreneurial activities. Consequently, individuals may be less inclined to start new businesses during periods of high inflation [Peprah and Adekoya, 2020]. Previous studies highlighted the adverse effects on entrepreneurship due to increased costs and reduced consumer spending [Goschin et al. 2021, Mohamad et al. 2021]. The negative relationship between CPI and new business density highlights the adverse impact of inflation on the spatial distribution of entrepreneurial activity [Singh et al. 2023, Goryunov et al. 2023]. Consequently, regions experiencing higher inflation may exhibit lower levels of new business density. This perhaps is reflective of the inflation-induced constraints on entrepreneurship that is observable at the regional level in Nigeria.

More so, a positive coefficient indicated that an increase in monetary sector credit to the private sector is associated with more new businesses registered, although the relationship is marginally significant. This further reiterates that access to credit is crucial for entrepreneurial ventures to start and grow. Prior research has emphasized the importance of financial support in promoting entrepreneurship especially in developing economies like Nigeria [Moro et al. 2020, Herkenhoff et al. 2021]. Entrepreneurs often rely on external funding to launch or expand their businesses, and increased credit availability can lower barriers to entry, spur investment, and stimulate entrepreneurial activity [Dutta and Mejerrieks 2021]. Our analysis revealed that even though the result is significant, the significance level is marginal (not lagged) and poses some uncertainty between the strength of the associations and perhaps suggesting a further investigation into the effectiveness of credit provision mechanisms in supporting entrepreneurship. On the other hand, a positive relationship between credit to the private sector and new business density suggests that improved access to financing facilitates the geographical dispersion of entrepreneurial activity. Regions with greater credit availability may experience higher levels of new business density due to increased investment, job creation, and economic diversification. However, the lack of significance suggests uncertainty regarding the strength of the association.

In addition, a negative coefficient suggests that higher government expenditure on education is associated with fewer businesses registered. Even though education plays a vital role in fostering entrepreneurial skill and innovation [Agarwal et al. 2020, Martínez-Gregorio et al. 2021], excessive government spending on education without proper alignment with entrepreneurship development programs may divert resources away from

supporting new business ventures. Perhaps, this is also suggestive of the need for a more targeted approach to education spending that emphasizes entrepreneurship training and support. On the other hand, the negative association between government expenditure on education and new business density raises important questions about the role of education spending in shaping the spatial distribution of entrepreneurial activity. This implies that variations in education spending across regions may indeed influence new business density.

CONCLUSIONS

In conclusion, the regression results provide valuable insights into the complex interplay between macroeconomic factors and entrepreneurship in Nigeria. While higher GDP *per capita* and increased credit availability appear to foster entrepreneurial activity, inflation and excessive government spending on education may act as deterrents. As such, policymakers should consider these things when designing strategies to promote entrepreneurship and foster sustainable economic development in Nigeria. More so, further research is needed to deepen our understanding of the underlying mechanism driving these relationships and inform evidence-based policy intervention as well as the nuanced dynamics between macroeconomic variables and entrepreneurship in Nigeria. Finally, due to the paucity of data to perform long time series analysis, the results should be interpreted with caution and could potentially apply only in the context of Nigeria which it is conducted.

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OTOCZENIE MAKROEKONOMICZNE I PRZEDSIĘBIORCZOŚĆ W NIGERII

Słowa kluczowe: przedsiębiorczość, gęstość nowych firm, wskaźnik cen konsumpcyjnych, Produkt Krajowy Brutto (PKB) na mieszkańca, Nigeria

ABSTRAKT. Zbadano związek między otoczeniem makroekonomicznym a przedsiębiorczością w Nigerii, stosując regresję liniową z analizą ARMA (ang. *autoregressive moving average*). Wyniki wskazują na pozytywny związek między PKB na mieszkańca a zarejestrowanymi nowymi firmami oraz gęstością nowych firm, co podkreśla rolę dobrobytu gospodarczego we wspieraniu działalności przedsiębiorczej. Natomiast inflacja wywierała negatywny wpływ na przedsiębiorczość, a wyższe stopy inflacji wiązały się ze zmniejszoną liczbą nowo rejestrowanych firm i mniejszą ich gęstością. Kluczowym czynnikiem przedsiębiorczości jest dostęp do finansowania, co znalazło odzwierciedlenie w dodatniej korelacji między kredytami dla sektora prywatnego a zarejestrowanymi nowymi przedsiębiorstwami. Znaczenie tego związku było jednak marginalne, co skłania do dalszych badań nad mechanizmami udzielania kredytów. Ponadto stwierdzono, że wydatki rządowe na edukację mają negatywny wpływ na przedsiębiorczość, co podkreśla znaczenie dostosowania wydatków na edukację do inicjatyw na rzecz rozwoju przedsiębiorczości. Ustalenia te wskazują na potrzebę ukierunkowanej polityki, mającej na celu promowanie wzrostu gospodarczego, łagodzenie presji inflacyjnej, zwiększanie dostępu do finansowania oraz dostosowanie wydatków na edukację do programów wspierania przedsiębiorczości, w celu stworzenia sprzyjającego środowiska dla rozwoju przedsiębiorczości w Nigerii.

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