Determinants of brain drain in Nigeria: Does financial inclusion matter?

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Abstract

Purpose: Nigeria has witnessed a substantial emigration of educated and skilled workers to other countries in the quest for greener pastures. Developing nations, such as Nigeria, with a recognizable number of highly educated and skilled individuals with an attitude to work to earn a living, are potentially exposed to brain drain syndrome, which is inimical to economic prosperity struggles. Hence, this study investigated whether financial inclusion is a determinant of brain drain in Nigeria.

Method: Quantitative methods were used in this study, employing ARDL-ECM regression to analyze both short- and long-run relationships among the variables. Data were collected from the International Monetary Fund, Nigeria Bureau of Statistics, and the Central Bank of Nigeria (2003–2022).

Results: The study established that Gross Domestic Product per Capita, ATMs per 100,000 Adults, Deposits with Commercial Banks % to GDP and Political Stability have a negative relationship with Brain Drain in Nigeria, whereas unemployment, bank credit to the private sector, and government efficiency have a positive relationship with brain drain.

Limitations: The study was limited to Nigeria, and the findings may not be generalizable to other countries.

Contributions: This study contributes to the field of finance in terms of financial inclusion matters and to the Nigerian government by identifying the determinants of brain drain in Nigeria.

Novelty: This study added financial inclusion as a determinant of brain drain in Nigeria, which other existing studies have not covered.

Keywords: *Financial Inclusion, ATMs, Government Effectiveness, Brain Drain, Human Capital Flight*

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1. Introduction

Brain drain is an important phenomenon that has become a point of discussion in Nigeria over the years. This globalization era necessitated the need for highly skilled individuals to seek more conducive and economically viable countries for employment and living (Kousar, Ahmed, & Bukhari, 2020). Developing nations, such as Nigeria, with a recognizable number of highly educated and skilled individuals with an attitude to work to earn a living, are potentially exposed to brain drain syndrome, which is inimical to economic prosperity struggles (AbdulKareem, Olaide, & Isiaka, 2021; Adefusika, 2010).

Nigeria has witnessed a substantial emigration of educated and skilled workers to other countries in the quest for greener pastures. Balogun (2016) asserts that university graduates in Africa are unemployed. According to a 2021 World Bank report, the proportion of young individuals intending to depart Nigeria permanently rose from 36% in 2014 to 52% in 2018, marking one of the highest rates in Sub-Saharan

Africa (Adhikari, Clemens, Dempster, & Ekeator, 2021). Additionally, the report highlights a significant surge in the number of international migrants originating from Nigeria, escalating from approximately 450,000 in 1990 to 1.4 million in 2019. Moreover, Nigeria averaged 7.35 brain drain index points between 2007 and 2023 and ranked 44th in global human flight and brain drain among 177 countries and 21st in Africa in the same periods compared to the world average of 5.17 index points (Adhikari et al., 2021). Although Figure 1 shows a downward trend in the brain drain index points in Nigeria from 2007 to 2023, the index points over the years are above the global benchmark. In addition, research conducted by Onireti (2024) revealed that about 58% of professionals in Nigeria, which consists of millennials, plan to leave their jobs for better offers abroad. Therefore, brain drain remains a socioeconomic problem in Nigeria.
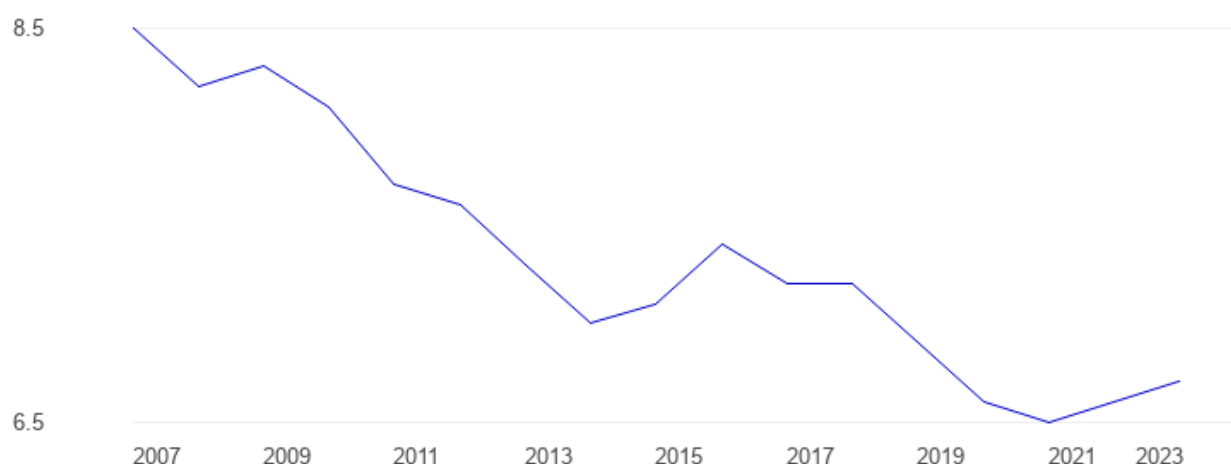

Figure 1: Human Flight and Brain Drain in Nigeria from 2007 to 2023.
Source: Global economy. Available at:
https://www.theglobaleconomy.com/Nigeria/human_flight_brain_drain_index/

Various factors cause brain drain in Nigeria, such as a lack of leadership, economic hardship, investment lag, and institutional maladministration (Oyeleke, 2023). Earlier research has uncovered that a significant reason for the departure of intellectuals and professionals from Nigeria is the challenging economic environment in which many operate (Emeghara, 2013). Adefusika (2010) evaluated the lack of consistency in economic growth, infrastructural inefficiency, social maladies, and political conditions, explaining why Nigerians migrate to other countries. Moreover, Onireti (2024) and Tamirat (2023) highlight that brain drain is caused by economic instability, inadequate infrastructure, and political unpredictability, which collectively undermines confidence in the nation's future. According to Nnoruga and Osigwe (2023), brain drain in Nigeria since the 1980s has been a noticeable reversal, which appeared beyond the control of the Nigerian government, attributable to various factors. Simultaneously, additional factors such as insecurity, political instability, a fragile economy, pervasive poverty, and more collectively impede Nigeria's growth across multiple domains (Nnoruga & Osigwe, 2023). Moreover, Saefullah, Radjawane, Sutrisno, Santoso, and Kuraesin (2023) highlight the importance of infrastructure such as accessible roads as an economic policy to drive economic prosperity; thus, not having access to a good road network may negatively affect local income, business growth, and community economic empowerment that results in brain drain.

Financial inclusion guarantees that individuals, households, and businesses within a community possess sufficient access to formal financial services and products, such as transactions, credit cards, payments, savings, and insurance, all delivered sustainably (Kim, Yu, & Hassan, 2018; Wani, 2022), and access to finance (Chakilia & Ahado, 2024). Mounting evidence indicates that inclusive financial institutions and markets play a pivotal role in diminishing poverty and inequality (Cicchiello, Kazemikhasragh, Monferrá, & Girón, 2021; Mader, 2018), fostering the emergence of new innovative enterprises and the expansion of existing ones, generating employment opportunities that contribute to national savings

(Ajide, 2020; Erlando, Riyanto, & Masakazu, 2020), empowering economic engagement, and active involvement in the financial system of marginalized groups such as youth, women, and other previously excluded demographics (Hendriks, 2019; Siddik, 2017). However, financial inclusiveness remains a key hurdle for Nigeria, as digital technology benefits are not equally available among youth, and there is a persistent gap in inclusion between rural and urban communities, with a financial exclusion rate of approximately 39 % %in 2020 (Wezel & Ree, 2023). As such, higher financial inclusion bridges financial inequality and promotes capital formation for individuals and corporate entities that promote job creation and will impact brain drain reduction in Nigeria. This study investigates the determinants of brain drain in Nigeria, and whether financial inclusion matters.

2. Literature review

Various theories explain the phenomenon of brain drain. The theory of repulsion and attraction factors by Lee (1966) underpinned this study because it has been one of the most significant theories used in recent studies on brain drain. The theory posits that emigration occurs when a convergence of causative and deterrent elements yields a positive outcome within an individual (Shahabadi, Salehi, & Hosseinidoust, 2020). Lee's perspective asserts that pinpointing the precise combination of factors compelling a person to emigrate or restricting their departure is often unfeasible. However, it is plausible to recognize and emphasize those factors that hold greater significance or are quantitatively measurable given the selective nature of emigration (Lee, 1966). From this standpoint, emigration is influenced by four key categories of factors, including brain drain (Lee, 1966): factors within the source country (encouraging or hindering), factors within the destination country (encouraging or hindering), factors involved in the flow of emigration from the source to the destination, and personal factors intertwined with the individual's psychological and personal traits.

In the empirical literature, Kousar et al. (2020) examined the macroeconomic determinants of brain drain in Pakistan from 1990 to 2018 and found that in long-term analysis, factors such as governance, financial stability, the standard of living, and infrastructure exhibit a notable and negative influence on the dependent variable, specifically brain drain. In contrast, social openness does not demonstrate a significant impact on brain drain in the long run. Popogbe and Adeosun (2020) investigated the push factors of human capital flight in Nigeria using ARDL from 1990 to 2019 and found that population growth and migration rates share a positive correlation, while life expectancy shows a negative relationship with the migration rate. The study highlighted that an increase in infant mortality rate notably decreases migration rates. Moreover, an increase in the unemployment rate was found to have a slight, albeit insignificant, effect on migration.

Shahabadi et al. (2020) explored the relationship between competitiveness and brain drain using selected Islamic countries and the USA by adopting the GMM Panel approach from 2007 to 2015 and found that the relationship between competitiveness and brain drain is negative but significant in the USA but positive among Islamic countries. While the indexes of the welfare gap and unemployment rate have a positive and significant relationship, the wage gap has a positive and insignificant relationship with brain drain. Farooq and Ahmad (2017) carried out an empirical analysis of the drivers of brain drain in Pakistan from 1981 to 2016 and found that a lack of sound socio-economic conditions increased brain drain in Pakistan, which encapsulated the pull and push factors. Karikari, Mensah, and Harvey (2016) examined the causal relationship between financial development and migration and found a long-term causal relationship. Altaf, Kalsoom, and Ali (2015) identified a direct correlation between unemployment and emigration, particularly in Pakistan. Their research used a log-linear regression model to establish this relationship. Additionally, Arouri, Rashid, Shahbaz, and Teulon (2014) investigated the significant contributors to brain drain in Pakistan. Their findings suggest that factors such as economic growth and financial development have a mitigating effect on brain drain, while inflation, unemployment, and trade are positively associated with brain drain, as indicated by their regression model.

Akusoba (2014) empirically found that poor leadership, unemployment rate, poor salaries, and a poor economy are the key factors for university workers' emigration from Nigeria. Mitra, Bang, and Wunnava (2011) examined the impact of financial liberalization on brain drain among 46 OECD countries from 1985-2000 and found that financial liberalization reduces brain drain.

The preceding analysis highlights that previous studies have investigated numerous factors that contribute to brain drain. Nevertheless, there remains a significant gap in the literature, as none of these studies has specifically explored the role of financial inclusion as a determinant of brain drain in Nigeria. Thus, the present study aims to address this critical gap by examining the relationship between financial inclusion and the phenomenon of brain drain in the Nigerian context. By doing so, this research seeks to contribute valuable insights into the existing body of knowledge on brain drain and provide a more comprehensive understanding of its underlying determinants.

3. Research Method
3.1 Model Specification
This study adapted the model used to suit the objective of this research, as follows:
BRAIND =f(GDPC, UNEMP, BCPS, ATM, DPCB, GOEF,POLST)………………..(1)

Econometrically, the model is as follows.
$$BRAIND_t = \alpha + \beta_1 GDPC_t + \beta_2 UNEMP_t + \beta_3 BCPS_t + \beta_4 ATM_t + \beta_5 DPCB_t + \beta_6 GOEF_t + \beta_7 POLST_t + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..(2)$$

where BRAIND = Brain Drain; GDPC = Gross Domestic Product Per capita; UNEMP = Unemployment Rate; BCPS = Bank Credit to Private Sector % of GDP; ATM = ATMs per 100,000 Adults; DPCB = Deposits with Commercial Banks % of GDP; GOEF = Government Efficiency; POLST = Political Stability. $\beta1…… \beta7$ = slopes; α = intercept; ε = Error Term; t = t-th period of variables.

Table 1. Variables Descriptions and Measures

Variables/Symbols	Descriptions	Financial Inclusion/Other Determinants	Apriori Expectations	Sources of Data
Brain Drain (BRAIND)	This is the emigration of highly skilled and educated individuals from one country to another. It is measured by dividing the number of skilled individuals who have emigrated by the total number of skilled individuals in the home country			International Monetary Fund, Nigeria Bureau of Statistics
Gross Domestic Product Per Capita (GDPC)	Gross Domestic Product Per Capita is the total economic output of a country divided by its population. It measures the average income per person and is used to gauge the economic prosperity and standard of living in a country.	Other Determinants	-	International Monetary Fund, Nigeria Bureau of Statistics

Unemployment Rate (UNEMP)	The unemployment rate is the percentage of the labor force that is jobless and actively seeking employment. It is measured by divide the number of unemployed individuals by the total labor force.	Other Determinants	+	International Monetary Fund, Nigeria Bureau of Statistics
Bank Credit to Private Sector % to GDP (BCPS)	Bank Credit to the Private Sector as a percentage of GDP measures the amount of financial resources provided to the private sector by banks and other financial institutions. It indicates the level of financial support available for businesses and consumers, which is critical for economic growth and development.	Financial inclusion	-	International Monetary Fund, Nigeria Bureau of Statistics, and Central Bank of Nigeria.
ATMs per 100,000 Adults (ATM)	ATMs per 100,000 Adults are a measure of the availability of Automated Teller Machines in a given population. It reflects the accessibility of banking services and financial inclusion, facilitating easier cash withdrawals and other banking transactions for individuals.	Financial Inclusion	-	International Monetary Fund, Nigeria Bureau of Statistics, and Central Bank of Nigeria.
Deposits with Commercial Banks % of GDP (DPCB)	Deposits with Commercial Banks as a percentage of GDP represents the total value of deposits held in commercial banks relative to the country's GDP. It indicates the level of savings in the banking system and the trust in financial institutions.	Financial inclusion	-	International Monetary Fund, Nigeria Bureau of Statistics, and Central Bank of Nigeria.
Government Efficiency (GOEF)	Government Efficiency refers to the quality of public services, the capacity of the government to implement policies, and the extent to which public resources are managed effectively	Other Determinants	-	International Monetary Fund
Political Stability (POLST)	Political Stability measures the likelihood of political	Other Determinants	+	International Monetary Fund

		unrest, violence, or instability in a country.			

Author's Computation, (2024)

3.2. Research Design and Data Source

This study is an ex-post facto research that relies on historical data to examine the relationships between variables. Secondary data for this study, which span 2003 to 2022, were collected from the International Monetary Fund, Nigeria Bureau of Statistics, and Central Bank of Nigeria.

3.3. Data analysis Technique

The data will undergo a stationary test of the augmented Dickey–Fuller (ADF) test and Philip–Perron test to examine whether the variables have unit roots. The outcome is used to examine the co-integration test between the variables to ascertain the long-run relationship. In addition, stability tests were performed to ensure model stability. "Diagnostic tests such as serial correlation, normality test, Ramsey RESET tests, and heteroskedasticity tests were conducted to validate the model's soundness, and Chow structural break tests were conducted to check for the presence of structural break(s) during the period used for this study".

4. Results and discussions

4.1. Unit Root Test

Table 2. ADF and PP Unit Root Result

Variables	ADF Stat. Values	t. Stats	Philips Perron (PP) Stat. Values		Order of Integration	Remarks
BRAIND	-3.6185	-3.6908*	-3.5666	-3.2869*	I(1)	Stationary
GDPC	-3.6158	-3.0522**	-2.8289	-2.6606*	I(1)	Stationary
UNEMP	-2.4514	-1.9614**	-2.4342	-1.9614**	I(1)	Stationary
BCPS	-3.6158	-3.0522**	-2.8289	-2.6606*	I(1)	Stationary
ATM	-1.9945	-1.9614**	-1.9967	-1.9614**	1(1)	Stationary
DPCB	-2.7874	-2.6606*	-2.8544	-2.6606*	I(1)	Stationary
GOEF	-4.7590	-4.7590***	-5.7505	-4.5716***	I(1)	Stationary
POLST	-6.2133	-4.6162***	-5.6768	-4.5716***	I(1)	Stationary

Source: E-View Output (2024)

Note: *** and ** indicate significance at the 1% and 5% level, respectively.

Table 2 presents the results of the Augmented Dickey-Fuller Unit Root test and Phillips–Perron (PP) tests conducted on the study variables. The findings indicate that all the variables are stationary at the first difference, denoted as I(1). This implies that after differencing once, the variables exhibit stationarity, which is a crucial requirement for conducting further analyses and modeling in time series data

4.2. Correlation Analysis

Table 3. Correlation Result

Probability	BRAIND	GDPC	DPCB	GOEF	POLST	UEMP	ATM	BCPS
BRAIND	1.000000							

GDPC	-0.961931	1.000000					
	0.0000	-----					
DPCB	-0.601993	0.568331	1.000000				
	0.0050	0.0089	-----				
GOEF	0.531130	-0.500063	-0.729881	1.000000			
	0.0160	0.0247	0.0003	-----			
POLST	0.160049	-0.103420	-0.418657	0.616356	1.000000		
	0.5003	0.6644	0.0662	0.0038	-----		
UEMP	-0.792281	0.880210	0.300054	-0.232076	0.229622	1.000000	
	0.0000	0.0000	0.1987	0.3248	0.3301	-----	
ATM	-0.893990	0.844085	0.723661	-0.681265	-0.411708	0.584956	1.000000
	0.0000	0.0000	0.0003	0.0009	0.0713	0.0067	-----
BCPS	-0.089654	0.090760	0.714336	-0.409808	-0.238469	-0.052269	0.362583 1.000000
	0.7070	0.7035	0.0004	0.0727	0.3113	0.8268	0.1162 -----

Source: E-View Output (2024)

The correlation analysis detailed in Table 3 reveals that the independent variables, namely GDPC (Gross Domestic Product Per capita), UNEMP (Unemployment Rate), BCPS (Bank Credit to Private Sector % of GDP), ATMs per 100,000 Adults, DPCB (Deposits with Commercial Banks % of GDP), GOEF (Government Efficiency), and POLST (Political Stability), exhibit correlations characterized by low magnitudes of both positive and negative values. This signifies a lack of substantial correlation between these variables. Consequently, the absence of strong correlations suggests that multicollinearity issues are not present within the dataset. In essence, each independent variable operates independently of the others in influencing the dependent variable, thereby ensuring that the determination of the dependent variable is not unduly influenced or confounded by intervariable relationships.

4.3. Long Run Cointegration Test

Table 4. Engle-Granger Cointegration Result

Null Hypothesis: RESID01 has a unit root

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.644594	0.0154
Test critical values:	1% level	-3.857386	
	5% level	-3.040391	
	10% level	-2.660551	

Source: E-View Output (2024)

The Engle-Granger cointegration test, as depicted in Table 4, serves as a critical tool for analyzing the relationship between brain drain and its determinants. This test is employed to ascertain whether long-term equilibrium exists among the variables under consideration. Essentially, it assesses whether these variables move together in the long run, indicating a sustained connection between them. Specifically, the Engle-Granger test examines the stationarity properties of the residuals generated by regressing variables of interest. If the residuals are stationary after the regression, this suggests the presence of cointegration, implying a stable and long-lasting relationship between the variables.

In this study, the results of the Engle-Granger test indicate that the unit roots of the residuals are stationary at a significance level of 5%, with a p-value of 0.0154. This signifies that there is a long-run relationship between brain drain and its determinants. Therefore, it can be inferred that the factors influencing brain drain in Nigeria are not only interconnected but also exhibit a sustained association over time. Overall, the Engle-Granger cointegration test provides valuable insights into the dynamics of brain drain and its determinants, offering researchers a deeper understanding of the underlying relationships and implications for policy and practice.

4.4 ARDL: Short Run and Long Run Regression Results

Table 5. Short Run Coefficients Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDPC)	0.000332	0.000351	0.946406	0.3975
D(UEMP)	0.351729	0.291839	1.205219	0.2945
D(BCPS)	0.054397	0.022583	2.408778	0.0737
D(ATM)	-0.133106	0.033679	-3.952183	0.0168
D(DPCB)	-0.011909	0.015641	-0.761410	0.4888
D(GOEF)	-0.073530	0.358456	-0.205130	0.8475
D(POLST)	-0.425576	0.246138	-1.729010	0.1589
CointEq(-1)	-0.988095	0.196253	-5.034803	0.0073

Source: E-View Output (2024)

Table 5, which presents the short-run results of the analysis, offers further insights into the relationship between the independent variables and brain drain (BRAIND). Among the variables examined, Gross Domestic Product per Capita (GDPC), Unemployment (UEMP), and Bank Credit to the Private Sector (BCPS) demonstrate a positive but statistically insignificant association with brain drain. This suggests that while these factors may exert some influence on brain drain, their impact is not deemed significant within the short-term context.

Conversely, ATMs per 100,000 Adults (ATM), Deposits with Commercial Banks % to GDP (DPCB), Government Efficiency (GOEF), and Political Stability (POLST) exhibit negative relationships with brain drain, indicating that higher levels of these variables are associated with lower levels of brain drain. Notably, only ATMs per 100,000 Adults (ATM) emerges as statistically significant in its impact on brain drain, suggesting that increased accessibility to ATMs may play a role in reducing brain drain.

Additionally, the speed of adjustment, estimated at (-0.99) and statistically significant at a 1% level (p-value = 0.0073), signifies the rate at which errors from previous periods are corrected in subsequent periods. With a speed of adjustment of 99%, it indicates that deviations from the long-run equilibrium between brain drain and its determinants are corrected rapidly over time. This adjustment process underscores the existence of a long-term relationship between brain drain and the independent variables, highlighting the importance of considering both short-term fluctuations and long-term trends in addressing the issue of brain drain effectively.

Table 6. Long Run Coefficients Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPC	-0.000259	0.000095	-2.717217	0.0531
UEMP	0.093462	0.131200	0.712365	0.5156
BCPS	0.078257	0.019009	4.116759	0.0147
ATM	-0.051258	0.022821	-2.246107	0.0880
DPCB	-0.012053	0.016705	-0.721514	0.0105

GOEF	2.088759	0.657338	3.177601	0.0336
POLST	-1.362648	0.345498	-3.944013	0.0169
C	7.588666	0.916921	8.276249	0.0012

Source: E-View Output (2024)

Table 6 presents a comprehensive long-term regression analysis, revealing a significant negative correlation between Gross Domestic Product per capita (GDPC) and brain drain, as evidenced by a coefficient of (-0.000259) and a p-value of (0.0531) at a 10% significance level. This finding indicates that for each percentage increase in gross domestic product per capita, there is an associated decrease in brain drain of 0.0259 per 100%. Thus, it can be inferred that an enhancement in Gross Domestic Product per capita is anticipated to mitigate brain drain in Nigeria. Advancements in Gross Domestic Product per capita serve as a deterrent to the phenomenon of brain drain in Nigeria, symbolizing economic prosperity. This observation is consistent with the findings of Kousar et al. (2020) and Arouri et al. (2014), who underscore the role of economic growth in alleviating brain drain.

The relationship between the unemployment rate (UEMP) and brain drain in Nigeria is positive but not statistically significant, as indicated by a coefficient of 0.093462 and p-value of 0.51. This implies that, while an increase in the unemployment rate may lead to higher levels of brain drain in Nigeria, the magnitude of this effect is not significant. Therefore, it can be inferred that the unemployment rate does not play a significant role as a determinant of brain drain in Nigeria. The unemployment rate may not significantly determine brain drain in Nigeria, because skilled migration is influenced by various factors beyond job availability, such as global competition for talent, mismatched skills, migration policies, broader economic conditions, and personal preferences. Therefore, even though unemployment can be a push factor, its impact on brain drain is overshadowed by other complexities. This finding is consistent with the results of studies conducted by Popogbe and Adeosun (2020) and Arouri et al. (2014). However, contrary to this finding, Altaf et al. (2015) and Shahabadi et al. (2020) found a significant positive relationship between unemployment rate and brain drain.

The Bank Credit to Private Sector (BCPS) coefficient of 0.078, coupled with a p-value of (0.0147), underscores a significant and positive correlation in Nigeria. This indicates that a surge in Bank Credit to the Private Sector could exacerbate the issue of brain drain within the nation. This statement suggests that an increase in bank credit to the private sector may exacerbate the issue of brain drain within the nation, because it implies that resources are being allocated to sectors that may not effectively utilize them to improve productivity. In contexts where sectors are not productive or investment does not yield sufficient returns, individuals, particularly skilled workers, may opt to leave the country in search of better opportunities elsewhere. Therefore, the allocation of bank credit to unproductive sectors may inadvertently contribute to the outflow of talent, exacerbating the brain drain issue.

The negative correlation coefficient (-0.0513) and a significant positive relationship (0.08) observed exclusively with the number of ATMs per 100,000 adults implies that an increase in the number of ATMs per 100,000 adults correlates with a decrease in brain drain syndrome within the country. This underscores the importance of enhancing financial inclusion as a means of mitigating brain drains in Nigeria. This suggests that as the number of ATMs per 100,000 adults increases, there is a corresponding decrease in brain drain syndrome in Nigeria. This implies that improved access to financial services, represented by the availability of ATMs, plays a crucial role in reducing the tendency of individuals, particularly skilled workers, to leave the country in search of better opportunities abroad. Enhanced financial inclusion, indicated by the increased accessibility and convenience of ATMs, provides individuals with more opportunities to manage their finances, access credit, and participate in economic activities in Nigeria. Consequently, when people have better access to financial services and resources, they may feel financially secure and less inclined to migrate elsewhere for better economic prospects. This emphasizes the importance of expanding financial inclusion initiatives, such as increasing the number of ATMs, as a strategy to address the issue of brain drain in Nigeria. By ensuring that more people have access to financial services and opportunities within the country, policymakers

can mitigate the factors driving emigration and encourage individuals to stay and contribute to the local economy. This finding resonates with the research conducted by Karikari et al. (2016), which highlights the enduring link between the financial system and the phenomenon of brain drain in the long term.

Deposits with Commercial Banks % to GDP (DPCB) have a negative (-0.0121) and significant relationship with brain drain. In the context of financial inclusion, the negative and significant relationship between Deposits with Commercial Banks % to GDP (DPCB) and brain drain suggests an interesting dynamic. This negative relationship implies that, as the percentage of deposits with commercial banks relative to GDP increases, there is a corresponding decrease in brain drain syndrome within Nigeria. Essentially, this suggests that when a larger portion of a country's GDP is held as deposits in commercial banks, there is a mitigating effect on the propensity of individuals to migrate out of the country in search of better opportunities. This finding underscores the importance of robust banking and financial systems in reducing brain drains. When people have confidence in the banking sector and are encouraged to deposit their money within the country, it can lead to greater financial stability and security for individuals, potentially reducing their incentive to emigrate. Furthermore, this suggests that efforts to promote financial inclusion and strengthen the banking sector can serve as effective strategies for addressing brain drains in Nigeria. By improving access to banking services, encouraging savings, and fostering a culture of financial stability, policymakers can create an environment that retains talent and fosters economic growth within the country.

The positive (2.089) and significant (0.034) relationship between Government Efficiency (GOEF) and brain drain in Nigeria indicates that as Government Efficiency improves, brain drain is likely to increase. This suggests that enhancing governmental efficiency in Nigeria may not necessarily mitigate human capital flight, as individuals may still opt to live and work in other countries regardless of improvements in government operations within Nigeria. This finding contradicts previous research by Kousar et al. (2020) and Farooq and Ahmad (2017), which suggested that effective socioeconomic government functions could reduce brain drain.

Finally, the negative (-1.363) and significant (0.017) relationship between Political Stability (POLST) and brain drain in Nigeria indicates that an improvement in political stability would likely lead to a reduction in the brain drain phenomenon within the country. Consequently, if Nigeria achieves a higher level of political stability, it can discourage individuals from leaving the country. Effective government transitions and stable political administrations foster an environment that dissuades emigration as they provide consistency and continuity in government policies over time. This stability can bolster economic prospects and prosperity, ultimately mitigating the brain drain syndrome. These findings align with previous research conducted by Kousar et al. (2020) and Akusoba (2014), who also highlighted the role of political stability in reducing brain drain in Nigeria.

4.5 Diagnostic Tests: Post Estimation Tests

Table 7. Diagnostic Tests

Tests	Coefficient	Prob. Value
Serial Correlation Test	1.37	0.33
Normality Test	0.17	0.92
Ramsey RESET Test	0.55	0.51
Heteroskedasticity Test	1.83	0.19
Durbin Watson Test	2.98	-
R Squared Adjusted	0.82	0

Source: E-View Output (2024)

The Serial Correlation Test showed that there was no evidence of serial correlation in the data with a coefficient (1.37) and p-value of (0.33). Moreover, the coefficient of (0.17) and p-value of (0.92) indicate that the data are normally distributed across the population. In addition, the Ramsey RESET Test results showed a coefficient of (0.55) with a p-value (0.51) suggesting that there is no evidence of

specification error in the model. Hence, the dependent variables in the model are suitable for predicting the independent variables. The heteroskedasticity Test showed a p-value of 0.19, indicating that the errors were constant and independent of the regressors; thus, there was no problem with heteroskedasticity. The Durbin-Watson test revealed that there was no significant autocorrelation with a coefficient value of 2.98 and the values fell within the range of 2-4. Lastly, the R-squared adjustment revealed that the independent variables explained 82% of the independent variables (brain drain) in Nigeria. This indicated a good fit of the model to the data.

4.6 Test of Stability

The figure 2 below shows the Brown et al. (1975) the cumulative sum of recursive residuals (CUSUM) and cumulative sum of the square of recursive residuals (CUSUMSQ) result shows that the plots are within the 5% critical boundary. This suggests stability in the long-run relationships among the variables. In addition, the coefficients of the variables in the model were stable.
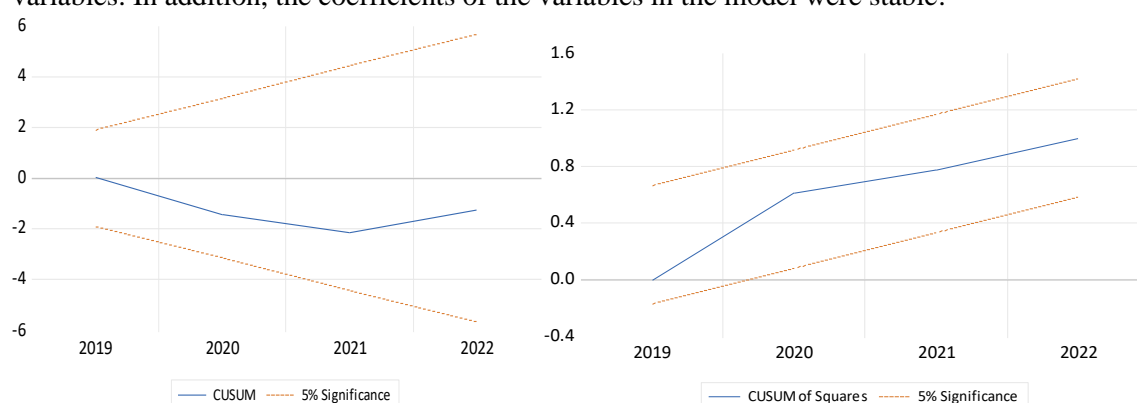

Figure 2: CUSUM and CUSUM Square Test for the Models
Source: E-View Output (2024)

5. Conclusion

5.1 Conclusion and Recommendations

From the findings, it can be concluded that financial inclusion, political stability and economic growth are determinants that will help to curb the brain drain syndrome among Nigerian citizens. Therefore, it is recommended that economic activities, such as improvement in production, enabling the environment for businesses to thrive, increase the rate of economic growth, which will help in reducing brain drain in Nigeria. Political stability fosters consistent policy implementation, instilling confidence among citizens in the government's long-term direction and reducing uncertainty, thereby encouraging skilled professionals to invest their talents domestically. Additionally, it cultivates trust between government and citizens, which is essential for retaining human capital and promoting national growth. Moreover, political stability attracts domestic and international investment, leading to improved infrastructure, job creation, and higher living standards, ultimately reducing the incentive for migration. Lastly, financial inclusion policies in Nigeria are imperative for economic empowerment, poverty alleviation, and enhanced social welfare, facilitating access to basic financial services and fostering social cohesion through targeted interventions such as expanding banking infrastructure and providing financial literacy programs. These policies also address brain drain by creating opportunities for entrepreneurship and innovation domestically, thereby building a resilient and inclusive economy that promotes long-term sustainable development and prosperity for citizens.

5.2. Limitation

This study covers financial inclusion, brain drain, and its determinants in Nigeria only, and does not cover countries in Africa in general or the world at large. In addition, not all financial variables were included in the study. In addition, other determinants of brain drain were not captured in the model of this study. Finally, the study covers 2003–2022 in Nigeria.

5.3. Suggestion

From the findings, it is therefore suggested that economic activities such as improvement in production, enabling the environment for businesses to thrive, and increasing the rate of economic growth will help in reducing brain drain in Nigeria. Political stability fosters consistent policy implementation, instilling confidence among citizens in the government's long-term direction and reducing uncertainty, thereby encouraging skilled professionals to invest their talents domestically. Additionally, it cultivates trust between government and citizens, which is essential for retaining human capital and promoting national growth. Moreover, political stability attracts domestic and international investment, leading to improved infrastructure, job creation, and higher living standards, ultimately reducing the incentive for migration. Lastly, financial inclusion policies in Nigeria are imperative for economic empowerment, poverty alleviation, and enhanced social welfare, facilitating access to basic financial services and fostering social cohesion through targeted interventions such as expanding banking infrastructure and providing financial literacy programs. These policies also address brain drain by creating opportunities for entrepreneurship and innovation domestically, thereby building a resilient and inclusive economy that promotes long-term sustainable development and prosperity for citizens.

Given these limitations, future research may broaden its geographic scope to include other African countries and, if possible, provide a global perspective to understand the broader applicability of the findings. Comparative studies between Nigeria and other countries facing similar brain drain issues can help identify common solutions and unique challenges, thereby providing a more comprehensive understanding of the factors at play. Additionally, future studies may incorporate a wider range of financial inclusion variables and use qualitative methods such as interviews and focus groups to gain deeper insights into how financial inclusion affects individuals' decisions to stay or migrate. Research may also include other potential determinants of brain drain, such as educational quality, healthcare access, and social security systems. An interdisciplinary approach incorporating insights from sociology, psychology, and other fields may help to understand the multifaceted nature of brain drain. Finally, extending the study's timeframe beyond 2022 may be essential for capturing more recent trends and data, providing a current understanding of the brain drain phenomenon. Analyzing trends over a longer period may help identify long-term patterns and evaluate the effectiveness of implemented policies, offering more robust solutions to mitigate the issue.

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