CAPITAL INFLOWS AND NIGERIA'S TRANSFORMATIONAL RECOVERY

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ABSTRACT

This study examines the relationship between capital inflows and transformational recovery in Nigeria from 1992 to 2021 under the production frontier framework. Transformational recovery linked with economic diversification is more effective when an economy exhibits resilience. Capital inflows on their part are necessary for providing additional funds needed to carry out economic activities that will ensure transformational recovery of the economy. Transformational recovery was measured by manufacturing productivity efficiency, and economic diversification. Capital inflows were measured by net bilateral aid inflows, debt inflows, foreign direct investment (FDI) and remittances. The Autoregressive Distributed Lag (ARDL) technique was employed in analysing the data. The empirical result showed a negative and significant impact of net bilateral aid inflows on manufacturing productivity inefficiency – a significant increase in efficiency, and a positive and insignificant impact on economic diversification in the long run. In the short run, net bilateral aid inflows had a negative and insignificant impact on manufacturing productivity inefficiency and a positive and significant impact on economic diversification. It was also found that debt inflows had a positive and significant impact on manufacturing productivity inefficiency – a significant decrease in efficiency, and a positive and significant impact on economic diversification in the long run. Also FDI had a negative and insignificant impact on manufacturing productivity inefficiency and economic diversification in the long run. Other findings showed *that the working population had a negative and significant impact on manufacturing productivity inefficiency and a positive and significant impact on economic diversification both in the long and short runs. Credit to the private sector and domestic investment had a negative and significant impact on manufacturing productivity inefficiency and a positive and significant impact on economic diversification both in the long and short runs. The study therefore suggests, based on the findings that the conditions for foreign capital inflows, especially official capital inflows, can be structured in line with the economic transformational recovery plans of the country and implementation should be strictly based on the plan. There should be a national savings scheme for remittance inflows such that a certain percentage of every inflow would be compulsorily. The study therefore concludes that capital inflows can significantly influence sustainable recovery in both immediate and extended time frames. These capital inflows can promote sustainable recovery by enhancing manufacturing efficiency, promoting economic diversity, and improving productivity.*

JEL classification: C11, F21, F30, O30, O47

1. Introduction

In the wake of the global aftermath of COVID-19, there's an urgent call for a transformative recovery anchored in economic resilience to prevent subsequent economic disruptions. The ongoing discussion about development emphasizes the critical need for financial mobilization. The pandemic has exacerbated challenges in sourcing external financial support for growth. Data from UNCTAD (2022) indicates that capital inflows to low-income nations experienced a significant decline, dropping from a pre-pandemic high of $8.3 billion to a mere $1.2 billion in the second quarter of 2021, marking an 85% decrease. However, even though there was a slight recovery by mid-2021, the inherent volatility in net flows to these nations means this uptick offers limited cause for hope.

Economic transformational recovery denotes the capacity of an economy to revert to its prior status, assimilate structural alterations, and attain a superior equilibrium level. This concept, deeply intertwined with economic diversification, is most effective when an economy possesses, nurtures, and amplifies its resilience to sudden disruptions. The foundation for this resilience lies in proactive measures to augment revenue generation and implement strategies that enhance productivity and encourage private investments.

Considering the current financial constraints, Nigeria's potential for a transformative recovery hinges on its ability to fortify its resilience against several challenges. These include the prevalent reliance on migrant remittances primarily for consumption, the negative implications of domestic debt, and the mounting pressures of external debt obligations. These financial dynamics have significant implications for Nigeria's manufacturing capacity, its services sector, public governance, entrepreneurial endeavours, and overall human development, echoing the sentiments of the two-gap theory presented by Oprea et al. (2020).

Nigeria has initiated numerous development strategies over the years, notable among them are the Economic Recovery Growth Plan (2017-2020) and the National Development Plan (2021-2025), both aimed at revitalizing the economy. However, the real impact of these strategies remains to be evaluated. A pivotal sector under these plans is manufacturing. Enhanced performance in this sector is envisioned to bolster skills acquisition, increase economic adaptability, decrease reliance on external entities, and stimulate employment, foreign exchange gains, and domestic revenue generation, as highlighted by Chete, Adeoti, Adeyinka & Ogundele (2016).

Capital inflows are crucial for developing economies, as underscored in scholarly works. Such inflows are not only anticipated to facilitate the adoption of cutting-edge technologies and innovations from advanced nations but also to aid in bolstering economic progression in developing countries. The significance of capital inflows lies in their ability to fund investments, enhance competition within local markets, and amplify productivity for local enterprises, as indicated by Ejelonu and Okafor (2022). Reinforcing this, Kim and Loayza (2019) echoed Adam Smith's perspective on capital, suggesting that merely attracting capital is not sufficient. Instead, the pivotal aspect is the prudent allocation and utilization of these resources to stimulate the nation's industrial activities, which will in turn, play a critical role in achieving transformational economic recovery.

Capital inflows are anticipated to fortify economies, enhance production capabilities, reduce unemployment, and promote optimal resource distribution. Emphasizing the necessity for augmented foreign capital inflow to bolster domestic assets, it is seen as a pivotal catalyst for economic growth, paving the way for transformational recovery. This perspective has been echoed by numerous studies, highlighting the vital role of capital inflows as the primary external financing mechanism for many developing countries (referencing Okafor, Ugwuegbe & Ezeaku 2016; Musibau, Yusuf & Gold, 2019). However, during the COVID epidemic, Nigeria experienced a substantial decrease in capital inflows, plummeting from $23.99 billion in 2019 to just $6.7 billion in 2021. Even at the beginning of 2022, this downtrend persisted. Data from nairametrics.com indicates that by Q1 2021, Nigeria's capital inflow stood at $1.91 billion, further declining to $1.57 billion by Q1 2022. Such a decline is worrisome for a nation like Nigeria as, irrespective of the inherent challenges, capital inflows remain imperative to spur investments, foster human development, and expedite the journey toward transformative economic recovery.

Research indicates that economic advancement and capital inflows play pivotal roles in promoting export diversification, as highlighted by Gamariel, Bomani, Musikavanhu, and Juana (2022). Additionally, other studies, like the one by Oprea et al. (2020), suggest that factors such as the nature of economic activities, specifically industrial legacy, export structures, access to robust foreign markets, and the abundance of natural, physical, and human assets, alongside specialized expertise in specific sectors, are determinants of transformational recovery and economic resilience. This knowledge forms the basis of our investigation into the interplay between the manufacturing sector, export diversification, and capital inflow in the context of transformative recovery.

Given the ongoing discourse around transformative recovery, and considering the potential influence of financial resources on the manufacturing sector's potential for structural evolution and recovery, it becomes crucial to analyse the impact of capital inflows on export diversification, especially in the Nigerian context. Hence, this study aims to gauge the influence of capital inflows on manufacturing productivity efficiency in Nigeria and ascertain its impact on the nation's export diversification.

2. Literature Review

2.1 Theoretical literature review

Capital inflow pertains to the growth in a country's net international debt, encompassing both the private and public sectors over a specific duration, and can be approximated by the surplus in a nation's balance of payments capital account. This encompasses foreign aid, foreign direct investment (FDI), external debt, overseas development assistance, foreign portfolio investments, and remittances from migrants. Specifically, FDI, a core element of capital inflows, is theorized to bolster export diversification. It does so by amplifying domestic production capacities in developing nations, primarily through the transfer and diffusion of technology, innovations, skills, and knowledge. Additionally, FDI facilitates entry into foreign markets by providing vital market-related information and establishing links between domestic and expansive export distribution networks.

Nigeria has rolled out numerous strategic initiatives targeting transformational recovery, with the Economic Recovery Growth Plan (ERGP) being a notable example. As outlined in the ERGP (2017), its primary goals are reigniting growth, human capital investment, and crafting a globally competitive economic landscape. The third objective underscores the imperative of infrastructural investment, cultivating a conducive business environment, and elevating the nation's global economic standing. Implementing this blueprint effectively would signify a progressive stride toward transformative recovery. Yet, unforeseen challenges like the global pandemic derailed these aspirations. Despite this setback, it is crucial to remain optimistic and proactive. There's a pressing need to devise policies offering a safeguard against future disruptions and to ensure meticulous management of capital flows to realize the intended goals.

UNCTAD (2022) underscores that post-COVID-19, a global push towards resilient economies is vital for achieving transformational recovery. Botta, Porcile, and Yajima (2021) identified certain features consistent with economies possessing weaker production structures. These include a pronounced dependence on services, particularly those requiring close personal interaction like tourism, transportation, hospitality, and retail, as well as a heavy reliance on energy-centric primary commodities. Additionally, there is often an absence of diversification into advanced manufacturing sectors like electronics and ICT. In certain cases, the lack extends to high-value services like finance, education, and consultancy. An overarching presence of the informal sector is also a prominent feature. Such characteristics are prominent in developing nations, including Nigeria.

To pave the way for transformational recovery, initiatives should target rectifying these identified weaknesses to bolster the economy. Global institutions like UNCTAD and IMF emphasize the significance of transitioning towards environmentally-sustainable economies that promise transformational and enduring recovery.

Diversification serves as a cornerstone strategy, crucial for mitigating macroeconomic fluctuations that could impede transformational recovery. Effective structural transformation necessitates a strategic shift in production and output allocation across various economic sectors.

Research indicates that supporting diversification is instrumental for growth in low-income countries (LICs). Both export and output diversifications are essential growth drivers for LICs, as supported by IMF's findings (IMF, 2014; 2017). As highlighted by Gamariel et al. (2021), export diversification encompasses expanding the assortment of exported products, introducing new product varieties to current and emerging markets, or introducing existing products to new international markets.

Export diversification is pivotal for developing nations due to its capacity to shield economies from the volatile cycles arising from global commodity price fluctuations, thereby promoting stability. Nigeria has implemented policies such as import substitution strategy, Structural Adjustment Programme (SAP), and trade liberalization policy as programmes geared towards achieving export diversification (Sule, 2018). Nwokoma, Adeoye, Oke, Oke et al. (2022) also discussed the Economic Recovery Growth Plan (ERGP) as one of the policies that have been instituted by the government towards achieving diversification of the economy. These policies however, do not seem to have improved the export diversification base of Nigeria as expected. A diversification strategy, especially towards sophisticated products, can catalyze structural evolution and spur economic growth. Additionally, as nations pivot towards addressing climate change, they imay shift towards products that are climate-resilient and have lower carbon footprints, further amplifying diversification efforts.

The absence of economic diversity can deter potential investors, as observed from data on capital inflows provided by the National Bureau of Statistics. Nigeria's heavy reliance on oil revenues exposes the nation to the inherent uncertainties of oil price dynamics. For instance, elevated oil prices result in increased revenue, while downturns can severely constrict cash inflows. Infrastructural deficits, particularly in power supply, pose challenges for the manufacturing sector. Unreliable power supply forces manufacturers to turn to costly alternatives like diesel generators. Additionally, widespread poverty and unemployment, despite the nation's large population, diminish market viability, discouraging potential investors. Such challenges have redirected potential investors towards other African markets, such as Kenya, South Africa, Ghana, and Morocco, as indicated by Chukwu, Ubah & Ezeaku (2021).

The manufacturing sector's vitality can be gauged through its productivity efficiency, which reflects the optimal utilization of available resources to yield the maximum possible output. It is also a measure of an entity's capability to maximize production with constrained resources. Achieving this efficiency indicates minimal wastage. Furthermore, market efficiency, characterized by the judicious allocation of resources across firms and industries, boosts total factor productivity. This efficiency propels underperforming firms out of the market, aids growth for proficient firms, and paves the way for new entrants.

Achieving productivity efficiency revolves around the judicious use of limited resources, encompassing capital, labour, energy, technology, and materials. In essence, it signifies obtaining the highest possible output while minimizing production costs. Sustained economic growth and transformational recovery hinge heavily on productivity improvement, as emphasized by Kim and Loayza (2019). Key factors influencing economic productivity include innovation, education, market efficiency, infrastructure, and the robustness of institutions.

For economies, particularly those reliant on commodity exports, diversification is pivotal. Given the price volatility of commodities and the overarching macroeconomic challenges, these economies must seek alternative avenues for sustained growth. The potential depletion of natural resources, upon which many of these economies primarily depend, further underscores the urgency of diversification. Variables like human capital development, openness to trade, and institutional quality can play instrumental roles in fostering export diversification, a perspective echoed by Giri, Quayyum, and Yin (2019).

Two foundational theories underpin this study: the stochastic production frontier theory and the Cobb-Douglas production function. The former, a parametric approach, gauges technical efficiency within a framework of stochastic production, cost, or profit. This frontier delineates the peak output achievable from a specific set of inputs given prevailing technological constraints and input pricing. Efficiency is discerned by how closely a firm approaches its optimal production and profit boundaries. Essentially, optimal efficiency is attained when one can increase the production of an output without compromising another or escalating input use. The stochastic frontier model posits that production anomalies arise from two primary sources: systematic components, such as measurement errors or random disturbances, and inefficiency-specific factors. Importantly, this model factors in production risk.

On the other hand, the Cobb-Douglas production function offers insights into the ideal input proportionality for efficient output. It serves as an invaluable tool for gauging shifts in production technology, defining the interplay between output quantities and two primary production factors, typically labour and capital.

An increase in manufacturing value added (MVA) is likely to influence both export diversification and production efficiency. It is anticipated that a rise in income, particularly from capital flows, will enhance MVA, leading to heightened productivity and a subsequent positive effect on the economy.

2.2 Empirical literature review

Several studies have explored the influence of capital inflow on the manufacturing sector and its relationship with export diversification. However, a direct link to transformational recovery has not been the primary focus. A few pertinent studies are summarized below.

Adekunle, Ogunade, Kalejaiye, & Balogun (2020) employed the two-step Engle and Granger estimation approach and the Granger causality method to probe the connection between capital inflow and industrial activity. They innovatively disaggregated capital inflows to determine which components most influenced Nigeria's industrial sector from 1987 to 2017. Their research revealed that heightened labour involvement significantly boosted industrial output in Nigeria. Interestingly, they found that remittances and official development seemed to adversely impact industrial growth, potentially due to the often unproductive roles remittances occupy in Africa. The study concluded that labour participation, gross fixed capital formation, FDI, and portfolio investments were influential determinants of Nigeria's industrial growth.

In a separate study, Botta, Porcile, and Yajima (2021) delved into the potential impact of net capital inflows (excluding FDI) on early de-industrialization. They scrutinized factors that might have obstructed productive growth for nearly 40 years leading up to the pandemic. Analysing 36 nations, both developed and developing, from 1980 to 2017, they particularly highlighted the experiences of emerging and developing economies amidst growing financial integration. Their results indicated that abundant capital inflow phases could have contributed to a noticeable reduction in the contribution of manufacturing to employment and GDP, and a decline in the economic complexity index.

Sani, Samuel, and Ome (2021) investigated the influence of foreign capital inflow on Nigeria's manufacturing sector growth, using data spanning 1986 to 2019. Utilizing the Autoregressive Distributed Lag (ARDL) estimation method, they evaluated the effects of foreign capital inflows on Nigeria's manufacturing growth. Their analysis indicated that various forms of foreign capital inflows, including FDI, foreign portfolio investment (FPI), and FOA, significantly and positively influenced the manufacturing sector's contribution to the GDP. Consequently, they suggested that Nigeria's government foster these capital inflows to boost the manufacturing sector and, by extension, the overall economy.

Ejelonu and Okafor (2022) explored the effects of foreign capital inflows on the manufacturing sectors of developing nations. Their research centred on foreign portfolio investment, foreign direct investment, and foreign development assistance in relation to manufacturing productivity from 1981 to 2019. Utilizing multiple regression analysis and error correction mechanisms, they examined both the short-term and long-term behaviours of the studied variables. Their results indicated that foreign portfolio investment negatively impacted manufacturing productivity. Simultaneously, foreign direct investment did not show a notable influence on the nation's economic growth for the assessed period. Interestingly, interest rates exhibited an inverse, albeit insignificant, correlation with manufacturing productivity in Nigeria. This suggests that substantial foreign investor inflows exert pressure on the financial system, elevating interest rates, thereby challenging local firms, potentially sidelining local manufacturing entities in the process.

In a 2022 study, Gamariel et al. examined the factors influencing export diversification across a selection of 44 sub-Saharan African (SSA) countries. Their research specifically examined the roles and interactions of foreign direct investment (FDI), domestic production structures, infrastructure provision, natural resource availability, and fiscal incentives provided through special economic zones (SEZ). Utilizing the dynamic systems general method of moments (sGMM) for analysis, their findings revealed a favourable correlation, indicating the role of FDI in shaping the variety of exports in these countries. This discovery underscores the idea that FDI positively affects export diversification, affirming the study's initial theoretical proposition about the role of FDI role in bolstering export variety.

3. Methods of Study

3.1 Data and data sources

The study utilized annual data spanning 1981 to 2021. Transformational recovery was represented using two key metrics: manufacturing productivity efficiency and an economic diversification index. Net bilateral aid inflows and debt inflows, both expressed as percentages of GDP, served as indicators for official capital inflows. Private capital inflows were represented using foreign direct investment and remittances. Additionally, the study included labour endowment (gauged by the working population), capital stock (indicated by government credit offered to the private sector), and domestic investment (represented by gross fixed capital formation).

Data sources encompassed the Central Bank of Nigeria (CBN) Statistical Bulletin, the database of the Mohammed Bin Rashid School of Government, and the African Development Bank database. Specific variables, namely manufacturing sector output, debt inflows as a GDP percentage, government credit to the private sector, and gross fixed capital formation, were derived from the *CBN Statistical Bulletin*. The economic diversification index was acquired from the Mohammed Bin Rashid School of Government database. In contrast, data points such as net bilateral aid inflows, foreign direct investment, remittances, and the working population were extracted from the African Development Bank database. The authors independently computed the manufacturing productivity efficiency using the frontier estimation method.

3.2 Empirical models

The aim here was to model the impact of capital inflows on Nigeria's transformational recovery. For this study, capital inflows were measured by official capital inflows – captured by net bilateral aid inflows (*NBAI*), and debt inflows as shares of GDP (*DEBTGDP*), as well as private capital inflows – measured by foreign direct investment (*FDI*), and remittances (*REMIT*). Transformational recovery, on the other hand, was measured by manufacturing productivity efficiency (*MPE*) and economic diversification (*ECODIVERS*). In modelling manufacturing productivity efficiency (considered to be the proxy for transformational recovery) as a function of foreign capital inflows, a stochastic production frontier model was used. We started with the assumption of a production function without an error or inefficiency as

$$y_i = f(X_t, \sigma) \tag{1}$$

where y represents output and X_i represents inputs. Also, for now, foreign capital (*NBAI*, *DEBTGDP*, *FDI* and *REMIT*) is assumed to be the only input. The output, y_i, is taken to be manufacturing productivity – measured by manufacturing output divided by the labour force (*MANPRO*). By this, we respecified equation (1) as:

$$(\text{MANPRO}) = f(\text{NBAI}, \text{DEBTGDP}, \text{FDI}, \ \text{REMIT}, \sigma) \quad (2)$$

An important assumption of the stochastic production frontier analysis framework is that the potential productivity is less than it could be because of possible degree of inefficiency, modelled as:

$$\text{MANPRO} = f(\text{NBAI}, \text{DEBTGDP}, \text{FDI}, \ \text{REMIT}, \sigma)\vartheta \quad 0 < \vartheta \leq 1 \quad (3)$$

where the theta variant sign (ϑ) is the degree or amount of efficiency. If ϑ_i = 1, then transformational recovery is optimum (that is, manufacturing productivity efficiency is optimal), to be linked to capital inflows to the country. However, if ϑ_i < 1 then transformational recovery is not optimum, although, to be determined by the value of ϑ_i. If the value is near one (1) – i.e., between 0.6 to 0.9, then transformational recovery is near optimum. If it is average (approximately 0.5), then transformational recovery is moderately optimum. But with a value less than 0.5, transformational recovery is considered to be far below optimum.

Manufacturing productivity was subject to random shocks, specified as:

$$\text{MANPRO} = f(\text{NBAI}, \text{DEBTGDP}, \text{FDI}, \ \text{REMIT}, \sigma)\vartheta_i \exp(u_t) \quad (4)$$

To transform the function to be log-linear, the natural log of the variables was taken, and equation (4) was respecified as:

$$\text{MANPRO} = \sigma_1 ln\text{NBAI} + \sigma_2\text{DEBTGDP} + \sigma_3 ln\text{FDI} + \sigma_4 ln\text{REMIT} + ln(\vartheta_i) + u_t \quad (5)$$

MANPRO and *DEBTGDP* were not logged because the variables are in rates. Specifying $e_t = -ln(\vartheta_i)$ in equation (5) results to:

$$\text{MANPRO} = \sigma_0 + \sigma_1 ln\text{NBAI} + \sigma_2\text{DEBTGDP} + \sigma_3 ln\text{FDI} + \sigma_4 ln\text{REMIT} + u_t - e_t \quad (6)$$

The analysis is built on a production function. Therefore, the former assumption of capital inflow as the only input can be extended to include other variables in the Cobb-Douglas production function as control variables. On this basis, labour endowment – measured by working population (*WPOP*), capital stock – measured by government credit to the private sector (*CREDIT*), and domestic investment – measured by gross fixed capital formation (*GFCF*) were included.

$$\text{MANPRO} = \sigma_0 + \sigma_1 ln\text{NBAI} + \sigma_2\text{DEBTGDP} + \sigma_3 ln\text{FDI} + \sigma_4 ln\text{REMIT} + \sigma_5 ln\text{WPOP} + \sigma_6 ln\text{CREDIT} + \sigma_7 ln\text{GFCF} + u_t - e_t \quad (7)$$

u_t is the inefficiency component, while e_t is the idiosyncratic error component – the idiosyncratic error term is defined as the observation-specific zero-mean random-error term. The frontier estimation technique enabled us to generate the efficiency (inefficiency) variable – that is, the manufacturing productivity efficiency (MPE) variable. After generating the MPE variable, we modelled the impact of the explanatory variables on the MPE as follows:

$$\text{MPE} = \alpha_0 + \alpha_1 ln\text{NBAI} + \alpha_2\text{DEBTGDP} + \alpha_3 ln\text{FDI} + \alpha_4 ln\text{REMIT} + \alpha_5 ln\text{WPOP} + \alpha_6 ln\text{CREDIT} + \alpha_7 ln\text{GFCF} + \epsilon_{1\text{t}} \quad (8)$$

where ϵ_{t} is the error term. Other variables remained as earlier defined. Equation (8) was respecified in an autoregressive distributed lag (ARDL) form as:

$$\text{MPE} = b_0 + b_1\text{MPE}_{t-1} + b_2 ln\text{NBAI} + b_3\text{DEBTGDP} + b_4 ln\text{FDI} + b_5 ln\text{REMIT} + b_6 ln\text{WPOP} + b_7 ln\text{CREDIT} + b_8 ln\text{GFCF} + \sum_{j=1}^{p}\phi_{1j}\text{MPE}_{t-j} + \sum_{s=0}^{q}\phi_{2_s} ln\text{NBAI}_{t-s} + \sum_{m=0}^{q}\phi_{3_m}\text{DEBTGDP}_{t-m} + \sum_{z=0}^{q}\phi_{4_z} lnFDI_{t-z} + \sum_{z=0}^{q}\phi_{5_z} ln\text{REMIT}_{t-z} + \sum_{s=0}^{q}\phi_{6_s} ln\text{WPOP}_{t-s} + \sum_{s=0}^{q}\phi_{7_s} ln\text{CREDIT}_{t-s} + \sum_{s=0}^{q}\phi_{8_s} ln\text{GFCF}_{t-s} + \epsilon_{2\text{t}} \quad (9)$$

The short-run variables are captured by the different terms and the long-run processes are the lagged terms. $\epsilon_{2\text{t}}$ is the error term, while b_{i} (i = 1,2,3, … 8) and ϕ_{i} (i = 1,2,3, … 8) are the long and short-run parameters of the variables respectively. The Akaike information lag length selection method is used to select the optimal lag length. The ARDL model is of advantage because it has a small sample property. In addition, it could produce unbiased coefficients and t-statistics for both the long and short-run periods even if there are endogenous regressors in the model. The model is applicable for regressors that are stationary at I(0) or I(1) or a mixture of both as long as there is no order 2 variable(s). If cointegration is found among the variables, then it informs us of adjustment to equilibrium, captured by an error correction model as:

$$\Delta MPE = a_0 + \sum_{j=1}^{p}\phi_{1j}\mathrm{MPE}_{t-j} + \sum_{s=0}^{q}\phi_{2_s}ln\mathrm{NBAI}_{t-s} + \sum_{m=0}^{q}\phi_{3_m}\mathrm{DEBTGDP}_{t-m} + \sum_{z=0}^{q}\phi_{4_z}lnFDI_{t-z} + \sum_{z=0}^{q}\phi_{5_z}ln\mathrm{REMIT}_{t-z} + \sum_{s=0}^{q}\phi_{6_s}ln\mathrm{WPOP}_{t-s} + \sum_{s=0}^{q}\phi_{7_s}ln\mathrm{CREDIT}_{t-s} + \sum_{s=0}^{q}\phi_{8_s}ln\mathrm{GFCF}_{t-s} + \epsilon_{2\mathrm{t}} \quad (10)$$

where $\mathrm{ECM1}_{\mathrm{t-1}}$ is the error correction term.

It is important to note that in stochastic frontier estimation, the dependent variable is the inefficiency term. Thus, a negative sign of a variable is interpreted as a positive influence on efficiency (meaning a reduction in inefficiency). On the other hand, a positive coefficient is interpreted as a negative effect on efficiency – meaning an increase in inefficiency (Bahta et al., 2020).

On the other hand, by using economic diversification (ECODIVERS) to proxy transformational recovery, the following model is specified;

$$\mathrm{ECODIVERS} = \gamma_0 + \gamma_1 ln\mathrm{NBAI} + \gamma_2\mathrm{DEBTGDP} + \gamma_3 ln\mathrm{FDI} + \gamma_4 ln\mathrm{REMIT} + \gamma_5 ln\mathrm{WPOP} + \gamma_6 ln\mathrm{CREDIT} + \gamma_7 ln\mathrm{GFCF} + \epsilon_{3\mathrm{t}} \quad (11)$$

where *ECODIVERS* is economic diversification, a proxy for economic recovery, while $\epsilon_{3\mathrm{t}}$ is the error term. Other variables remained as earlier defined. Equation (11) is respecified in an autoregressive distributed lag (ARDL) form as:

$$\text{ECODIVERS} = \rho_0 + \rho_1 \text{ECODIVERS}_{t-1} + \rho_2 ln\text{NBAI} + \rho_3 \text{DEBTGDP} + \rho_4 ln\text{FDI} + \rho_5 ln\text{REMIT} + \rho_6 ln\text{WPOP} + \rho_7 ln\text{CREDIT} + \rho_8 ln\text{GFCF} + \sum_{s=0}^{q} \beta_{1_s} ln\text{NBAI}_{t-s} + \sum_{m=0}^{q} \beta_{2_m} \text{DEBTGDP}_{t-m} + \sum_{z=0}^{q} \beta_{3_z} lnFDI_{t-z} + \sum_{z=0}^{q} \beta_{4_z} ln\text{REMIT}_{t-z} + \sum_{s=0}^{q} \beta_{5_s} ln\text{WPOP}_{t-s} + \sum_{s=0}^{q} \beta_{6_s} ln\text{CREDIT}_{t-s} + \sum_{s=0}^{q} \beta_{7_s} ln\text{GFCF}_{t-s} + \epsilon_{3\text{t}} \quad (12)$$

$\epsilon_{2\text{t}}$is the error term, while ρ_i (i = 1,2,3, … 8) and β_i (i = 1,2,3, … 8) are the long and short-run parameters of the variables respectively. The Akaike information lag length selection method was used to select the optimal lag length. The ARDL model has an advantage because it has a small sample property. In addition, it could produce unbiased coefficients and t-statistics for both the long and short-run periods even if there are endogenous regressors in the model. The model is applicable for regressors that are stationary at I(0) or I(1) or a mixture of both as long as there is no order 2 variable(s). If there is cointegration among the variables, then it indicates adjustment to equilibrium, captured by an error correction model as:

$$\Delta\text{ECODIVERS} = \beta_0 + \sum_{s=0}^{q} \beta_{1_s} ln\text{NBAI}_{t-s} + \sum_{m=0}^{q} \beta_{2_m} \text{DEBTGDP}_{t-m} + \sum_{z=0}^{q} \beta_{3_z} lnFDI_{t-z} + \sum_{z=0}^{q} \beta_{4_z} ln\text{REMIT}_{t-z} + \sum_{s=0}^{q} \beta_{5_s} ln\text{WPOP}_{t-s} + \sum_{s=0}^{q} \beta_{6_s} ln\text{CREDIT}_{t-s} + \sum_{s=0}^{q} \beta_{7_s} ln\text{GFCF}_{t-s} + \epsilon_{2\text{t}} \quad (13)$$

where $\text{ECM1}_{\text{t}-1}$ is the error correction term.

4. Results

4.1 Unit root test

The unit root of the variables was tested using the Augmented Dickey-Fuller and the Phillips-Perron tests. Table 1 reports the results of the test.

Table 1: Augmented Dickey-Fuller and Philips-Perron Unit Root Test Results

Variable	Augmented Dickey-Fuller Result		Philips-Perron Result		Lag order	~I(d)
	Level	1st Difference	Level	1st Difference		
MANPRO	-2.384	-3.589*	-2.644	-4.352*	2	I(1)
ECODIVERS	-3.523	-4.784*	-3.279	-6.300*	2	I(1)
lnNBAF	-1.800	-3.843*	-1.871	-3.930*	2	I(1)
lnFDI	-0.965	-3.602*	-1.652	-6.701*	2	I(1)
lnREMIT	-1.431	-3.951*	-3.354	-9.412*	2	I(1)
lnWAPOP	-2.075	-4.371*	-2.056	-3.824*	2	I(1)
DEBTGDP	-1.026	-3.975*	-0.772	-3.684*	2	I(1)
lnCREDIT	-0.808	-3.817*	-1.343	-5.152*	2	I(1)
lnGFCF	-2.573	-4.722*	-1.230	-5.592*	2	I(1)

Notes: (*) indicates a 5% significance level, leading to the rejection of the null hypothesis which suggests the presence of a unit root. To select the optimal lag length, we employed the Akaike's Final Prediction Error (FPE) and the Akaike's Information Criterion (AIC). For the Augmented Dickey-Fuller (ADF) test, the critical value at 5% is -3.592 and -3.596 for the first difference. Conversely, for the Philips–Perron test, the corresponding critical values were -3.584 and -3.588 at the first difference. Both the ADF and Philips–Perron unit root test models that were computed include a trend.

Source: Authors' computation.

At the 5% level, both the Augmented Dickey-Fuller and the Philips–Perron tests showed insignificant test statistics at levels. This means that the variables respectively at the level contained unit roots. This justifies taking the 1st difference of the variables respectively. At their 1st difference, the variables showed significant test statistics. Therefore, indicating the absence of unit root at order 1. This implies that the variables respectively are integrated into order 1. Since none of the variables is integrated into order 2, and the dependent variable is not integrated into order 0, the use of the ARDL technique in this paper is justified. In the next section, the impact of capital inflows on transformational recovery is examined.

4.3 Impact of capital inflows on manufacturing productivity efficiency and economic diversification

We present first, the bounds cointegration test results to determine the cointegration situation of the variables in the regression models. Table 2a reports the cointegration status between manufacturing productivity efficiency and net bilateral aid inflows, debt inflows as shares of GDP, foreign direct investment, remittances, working population, government credit to the private sector, and gross fixed capital formation. Table 2b, on the other hand, records the cointegration status between economic diversification and net bilateral aid inflows, debt inflows as shares of GDP, foreign direct investment, remittances, working population, government credit to the private sector, and gross fixed capital formation.

Table 2a: Bounds Test Result for Level Form Relationship between Manufacturing Productivity Efficiency and the Rest of the Variables

	10%		5%		1%		p-value	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F	3.002	4.421	3.782	5.459	5.809	8.129	0.000	0.000
t	-2.500	-3.428	-2.902	-3.897	-3.755	-4.890	0.000	0.000
F =	12.728							
t =	-7.429							

Source: Authors' computation.

Table 2b: Bounds Test Result for Level Form Relationship between Economic Diversification and the Rest of the Variables

	10%		5%		1%		p-value	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F	3.002	4.421	3.782	5.459	5.809	8.129	0.000	0.000
t	-2.500	-3.428	-2.902	-3.897	-3.755	-4.890	0.000	0.000
F =	9.568							
t =	-9.061							

Source: Authors' computation.

Both the F-statistic and the t-statistic are notable in the two tables, reinforced by the meaningful p-values for both statistics. Consequently, we dismiss the null hypothesis of a lack of cointegration at the 5% significance level in both scenarios. This suggests a cointegration between manufacturing productivity efficiency and various factors: net bilateral aid inflows, GDP proportionate debt inflows, foreign direct investment, remittances, working population, government lending to the private sector, and gross fixed capital formation. Likewise, economic diversification and the aforementioned factors exhibit cointegration, pointing to a persistent long-term relationship among these variables.

Table 3 showcases long-term estimates while Table 4 presents the short-term outcomes. Post-estimation test results are highlighted in Table 5. In this research, we gauged transformational recovery via manufacturing productivity efficiency and economic diversification metrics. The error correction estimate concerning the influence of foreign capital inflows on manufacturing productivity efficiency is represented in Column (1) of Tables 3 and 4. Similarly, Column (2) displays the error correction estimates of foreign capital inflows' impact on economic diversification.

The Long Run

Table 3: Long-run Error Correction Estimates of the Impact of Foreign Capital Inflows on Transformational Recovery

	Transformational Recovery	
	(1)	(2)
	Manufacturing Productivity Inefficiency	Economic Diversification
Adjustment	-0.4034	-0.2035
	(t = -10.54) (p = 0.000)	(t = -2.35) (p = 0.009)
lnNBAF	-4.7000	2.8993
	(t = -3.98) (p = 0.000)	(t = 1.41) (p = 0.232)
DEBTGDP	1.0001	1.5133
	(t = 2.58) (p = 0.001)	(t = 2.63) (p = 0.000)
lnFDI	-1.0400	-8.3229
	(t = -1.25) (p = 0.280)	(t = -1.13) (p = 0.323)
lnREMIT	1.4900	-4.0138
	(t = 4.92) (p = 0.000)	(t = -1.80) (p = 0.147)
lnWAPOP	-3.0300	7.4204
	(t = -4.57) (p = 0.000)	(t = 2.06) (p = 0.044)
lnCREDIT	-2.3700	28.7196
	(t = -3.72) (p = 0.000)	(t = 2.25) (p = 0.032)
lnGFCF	-2.4400	22.6647
	(t = -5.46) (p = 0.000)	(t = 0.78) (p = 0.478)

Source: Authors' computation.

The correction coefficients in both columns (1) and (2) of Table 3 are negative, with a statistical significance at the 5% threshold. In column (1), any deviation in the short term adjusts back towards long-term equilibrium at a rate of approximately 40.34% each year. Conversely, in column (2), any short-term deviation gravitates back towards a long-term balance at a rate of about 20.35% per year.

In column (1), the effect of net bilateral aid inflows on manufacturing productivity efficiency is negatively significant at the 5% level. This suggests that such inflows positively affect efficiency by diminishing inefficiency. This can be attributed to the fact that bilateral aid often comes with conditions tied to governmental reforms. Given the acceptance of these conditions by the recipient nation, like Nigeria in this case, bilateral aid donors can effectively channel aid. Since these conditions are generally aimed at promoting economic transformations – or transformational recovery – bilateral aid inflows significantly bolster transformational recovery over extended periods. Concerning the influence of net bilateral aid inflows on economic diversification, as shown in column (2), the data reveals that a rise in such inflows results in a modest, yet statistically insignificant, 2.89% long-term increase in economic diversification. This indicates that while net bilateral aid inflows positively impact transformational recovery, their role in economic diversification is less pronounced. The limited effect on diversification can be attributed to the nature of government reforms, which may not be sufficiently tailored to drive economic diversification and facilitate transformational recovery.

An increase in the debt-to-GDP results in a significant increase in manufacturing productivity inefficiency (a reduction in efficiency) in the long run. This means that foreign debt is detrimental to manufacturing productivity efficiency. An implication is that high levels of debt could reduce total factor manufacturing productivity efficiency. The government may not be committed to difficult and costly policy reform measures. Such a weak policy environment could in turn, probably affect the efficiency of investment and productivity in the manufacturing sector, therefore, reducing manufacturing productivity efficiency. Loans may be inappropriately allocated to non-productive sectors and activities for the quick return instead of the manufacturing or the industrial sector which could be more conducive to long-run manufacturing productivity efficiency and, therefore, transformational recovery. In column (2), the coefficient is 2.8993 with a significant t-statistic of 2.63. This means that debt inflow significantly instigates economic diversification. In essence, transformational recovery is significantly influenced by debt inflows through economic diversification.

The coefficient for FDI is -1.0400 with a t-statistic of -1.25 in column (1). An increase in FDI results in a 1.04% insignificant increase in manufacturing productivity efficiency in the long run. In column (2), an increase in FDI leads to an 8.32% decrease in economic diversification. This implies that though FDI could bring new technologies, there is a risk that some of the gains of manufacturing productivity efficiency as a result of improvement in technology among others associated with FDI could be offset by efficiency reduction. Therefore, the attraction of FDI given its benefits also foregoes some of the benefits due to efficiency losses, which could be marked by gains in some other sectors or areas.

The positive and significant coefficient for remittances inflow in column (1) implies that the variable improves manufacturing productivity inefficiency improvement (efficiency reducing). An increase in remittance inflows brings about a 1.49% significant reduction in manufacturing productivity efficiency in the long run. A similar finding is recorded in column (2), indicating that an increase in remittance inflow results in a 4.01% insignificant reduction in economic diversification. This finding does not, however, counter or disprove the benefits associated with remittance inflows. The economic interpretation is that remittance inflows could be more effective in smoothening the consumptions of households and welfare improvement, mostly for low-income groups, against the direct contribution of productivity efficiency and economic diversification. Therefore, remittances do not contribute to transformational recovery in the long run.

A growth in the working population correlates with an enhancement in manufacturing productivity efficiency. Specifically, for every percentage growth in the working population, there is a notable 3.03% boost in manufacturing productivity efficiency over the long term. Moreover, as seen in column (2), a growth in the working population leads to a significant 7.42% increase in economic diversification. This indicates that, over extended periods, the working population plays a crucial role in facilitating transformational recovery.

Additionally, both private sector credit and domestic investment positively influence manufacturing productivity. In column (2), when there is an uptick in credit to the private sector and domestic investment, economic diversification increases substantially by 28.72% and 22.66% respectively.

The Short Run

Table 4: Short-run Error Correction Estimates of the Impact of Foreign Capital Inflows on Transformational Recovery

	Transformational Recovery	
	(1) Manufacturing Productivity Efficiency	(2) Economic Diversification
MPE / ECODIVERS	0.0186 (t = 0.23) (p = 0.828)	0.3358 (t = 0.82) (p = 0.456)
lnNBAF	-1.7400 (t = -0.27) (p = 0.799)	4.3074 (t = 2.62) (p = 0.000)
DEBTGDP	-0.0006 (t = -4.68) (p = 0.000)	1.3980 (t = 1.94) (p = 0.124)
lnFDI	7.4700 (t = 6.25) (p = 0.000)	7.9541 (t = 1.49) (p = 0.210)
lnREMIT	-6.6700 (t = -2.45) (p = 0.001)	7.2649 (t = 2.00) (p = 0.046)
lnWAPOP	-4.4400 (t = -3.44) (p = 0.003)	8.0942 (t = 2.32) (p = 0.012)
lnCREDIT	-5.4300 (t = -6.45) (p = 0.000)	26.4788 (t = 2.76) (p = 0.000)
lnGFCF	-2.4700 (t = -5.86) (p = 0.000)	21.1494 (t = 1.02) (p = 0.367)
Constant	1.3905 (t = 10.19) (p = 0.000)	7.1730 (t = 2.61) (p = 0.000)

Source: Authors' computation.

In column (1) of Table 4, the influence of net bilateral aid inflows on manufacturing productivity efficiency appears to be negative, but it is not statistically significant at the 5% threshold. This suggests that such inflows may have a minor positive, yet not statistically, meaningful effect on efficiency, leading to a decrease in inefficiency. Moreover, as presented in column (2), a rise in bilateral aid inflows correlates with a notable 4.31% increase in economic diversification. This indicates that, in the short term, bilateral aid inflows can positively impact transformational recovery.

In the short term, a rise in the debt-to-GDP ratio correlates with a notable boost in manufacturing productivity efficiency, meaning a decrease in inefficiency. This suggests that foreign debt has the potential to positively influence manufacturing productivity in this time frame. Column (2) showcases a coefficient of 1.3980 with a t-statistic of 1.94, indicating that debt inflows have a limited, if any, effect on economic diversification. Hence, while debt inflows might not significantly influence transformational recovery through economic diversification in the immediate term, effective management could optimize its benefits.

The coefficient for foreign direct investment (FDI) in column (1) stands at 7.4700 with a t-statistic of 6.25. This indicates that a surge in FDI correlates with a 7.47% rise in manufacturing productivity inefficiency in the short term. Meanwhile, column (2) highlights that an increase in FDI corresponds to a 7.95% uptick in economic diversification, implying a more profound impact of FDI on transformational recovery through diversification compared to productivity efficiency.

Column (1) presents a significant negative coefficient for remittance inflows, suggesting they can enhance manufacturing productivity efficiency. Specifically, a rise in remittance inflows produces a 6.67% increase in efficiency. Similarly, column (2) suggests that a growth in remittance inflows causes a 7.26% significant rise in economic diversification, implying that remittances have a favourable role in short-term transformational recovery.

Moreover, a percentage growth in the working populace leads to a 4.44% significant enhancement in manufacturing productivity efficiency in the short run. In contrast, column (2) emphasizes that this rise translates into an 8.09% notable increase in economic diversification. This highlights the working population's positive role in immediate transformational recovery.

Lastly, both private sector credit and domestic investment yielded positive impacts on manufacturing productivity. Likewise, in column (2), a rise in both variables resulted in significant increases of 26.48% and 21.15% in economic diversification, respectively.

The Post-estimation Tests

Post-estimation analysis reveals that the variables in the manufacturing productivity efficiency equation account for approximately 89.95% of the variations in manufacturing productivity efficiency. Meanwhile, in the economic diversification equation, the variables contribute to an 85.68% change in economic diversification.

Table 5: Post-estimation Tests

	(1) Manufacturing Productivity Efficiency	(2) Economic Diversification
R-squared	0.8795	0.8568
Adj R-squared	0.7618	0.7336
F-statistics	23.14 (0.0000)	20.09 (0.0000)
Durbin-Watson d-statistic	2.1205	2.0971
Breusch-Godfrey Statistics	0.958 (0.5221)	0.771 (0.4011)

Source: Authors' computation.

The significant F-value in both columns implies that the explanatory variables jointly significantly impacted manufacturing productivity efficiency and economic diversification – transformational recovery at the 5% level. The Durbin-Watson d-statistic is approximately 2 in both columns. Therefore, the null hypothesis of no autocorrelation is accepted in both columns. The insignificant Breusch-Godfrey statistics in columns (1) and (2) also imply that the explanatory variables are free from serial correlation. Therefore, they are good variables for the study.

5. Conclusions

This research illustrates that capital inflows can significantly influence sustainable recovery in both immediate and extended time frames. Such inflows can foster sustainable recovery by enhancing manufacturing efficiency, promoting economic diversity, and improving productivity. Key factors that drive sustainable recovery over different periods include bilateral aid, debt inflows, foreign direct investments (FDI), and remittances. Additionally, the active workforce, financial support to the private sector, and local investments play crucial roles. It is vital to align foreign capital, particularly official inflows, with the nation's sustainable recovery strategies, ensuring their adherence to these plans. A suggested approach is introducing a national savings mechanism for remittances, mandating that a portion of every remittance be saved. This can enhance the funds available for the private sector and bolster local investments, paving the way for sustainable recovery. To optimize recovery outcomes over various durations, there is a need to focus on expanding the workforce actively.

References

Adekunle, I. A., Ogunade, A. O., Kalejaiye, T. G., & Balogun, A. M. (2020). Capital inflows and industrial performance in Nigeria: Including the excluded. *Jurnal Ekonomi & Studi Pembangunan*, *21*(1), 37-52.

Bahta, S., Omore, A., Baker, D., Okike, I., Gebremedhin, B., & Wanyoike, F. (2020). An analysis of technical efficiency in the presence of developments towards commercialization: Evidence from Tanzania’s milk producers. *The European Journal of Development Research*. Available at: https://link.springer.com/article/10.1057/s41287-020-00279-8

Botta, A., Porcile, G., and Yajima, G. T. (2021). Structural change, productive development and capital flows: Does financial “bonanza” cause premature de-industrialization? *Post Keynesian Economic Society.* Working Paper 2122.

Chete, L. N., Adeoti, J. O., Adeyinka, F. M., & Ogundele, O. (2016). Industrial development and growth in Nigeria: Lessons and challenges. Nigerian Institute of Social and Economic Research (NISER), Ibadan, *Working Paper No. 8*.

Chukwu, K. O., Ubah C. B., & Ezeaku C. N. (2021). Effect of capital importation on Nigeria economic growth. *International Journal of Management Studies and Social Science Research, IJMSSSR*, *3*(5). ISSN: 2582 – 0265

Ejelonu, H. O., Okafor, S. O. (2022). Implications of foreign capital inflows on manufacturing sector in Third World countries: A Nigerian experience. *International Journal of Accounting, Finance and Risk Management*, *7*(4), 140-149. doi: 10.11648/j.ijafrm.20220704.11

Gamariel, G., Bomani, M., Musikavanhu, L., & Juana, J. (2022). Investment and foreign direct export diversification in developing countries. *Risk Governance and Control: Financial Markets & Institutions*, *12*(1), 74–89. https://doi.org/10.22495/rgcv12i1p6

Giri, R., Quayyum, S., & Yin, R. (2019). Understanding Export Diversification: Key Drivers and Policy Implications, IMF Working paper.

IMF. (2014). Sustaining Long-Run Growth and Macroeconomic Stability in Low-Income Countries — The Role of Structural Transformation and Diversification. Washington.

IMF. (2017). Regional Economic Outlook, Sub-Saharan Africa. Washington.

Kim, Y.E., & Loayza, N.V. (2019). Productivity growth: Patterns and determinants across the world. *Revista Economía*, *42*(84), 36-93. Fondo Editorial - Pontificia Universidad Católica del Perú,

Musibau, H.O., Yusuf A.H., & Gold, K.L. (2019). Endogenous specification of foreign capital inflows, human capital development and economic growth: A study of pool mean group. *International Journal of Social Economics*, https://doi.org/10.1108/IJSE-04-2018-0168

Nwokoma, N.I., Adeoye, B, W., Oke, B., Oke, D, M., Ojapinwa, T. V., Odeleye, A. T., Iwegbu, O. and Eniayewu, A. (2022). Nigeria's economic growth and diversification: An appraisal of the economic recovery and growth plan and stakeholders' perspectives, *Nigerian Journal of Economic and Social Studies*, *64*(2).

Okafor, I. G., Ugwuegbe, S. U., & Ezeaku, H. C. (2016). Foreign capital inflows and Nigerian economic growth nexus: A Toda Yamamoto approach. *European Journal of Accounting, Auditing and Finance Research*, *4*(3), 16-26.

Oprea, F., Onofrei, M., Lupu, D., Vintila, G., & Parasch, G. (2020). The determinants of economic resilience. The case of Eastern European regions. *Sustainability*, *12*(4228), 1-11.

Sani, I. A., Samuel, A. A., Ome, W. E. (2021). Foreign capital inflows and manufacturing sector growth in Nigeria. *Malaysian Management Journal*, *25*(July), 235-260. https://doi.org/10.32890/mmj2021.25.10

Sule, I. K. (2018). Analysis of real exchange rate misalignment and export diversification. *The Nigerian Journal of Economic and Social Studies*, *60*(1).

UNCTAD. (2022). Financing for development: Mobilizing sustainable development finance beyond COVID-19. TD/B/EFD/5/2