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Monetary policy and manufacturing export performance in SSA: Evidence from Panel ARDL modelling

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Abstract

We investigate the effect of monetary policy on manufacturing export performance in Sub-Saharan Africa (SSA) over the 1995 and 2020 period. Using the pooled mean group framework and focusing on 24 SSA countries, evidence shows that interest rate boosts manufacturing export in the short and long-run. However, exchange rate negatively impacts manufacturing export performance in both periods. While exchange rate is significant in the short term, it is insignificant in the long run. Lastly, private sector credit negatively and insignificantly influences short run manufacturing export, while it is substantially positive in the long-run. It is important that efforts are geared towards improving monetary policy effectiveness in the countries involved to boost the performance of manufacturing export and ensure growth.

1. Introduction

Sub-Saharan Africa comprises 49 African countries with about 1.2 billion population, making it second as the world's most populous region after Asia with 4.7 billion people. Therefore, this region accounts for about 14.7% of the world's population but contributed less than 5% of global GDP (UNCTAD, 2022). The countries in this region are diverse in size, scale and economic development, endowed with immense natural and human resources. However, the Sub-Saharan Africa (SSA) region has long been considered one of the world's least developed regions, with high poverty rates, low levels of human development, and persistent economic underperformance. One of the main reasons for this underperformance is the need for export-oriented growth in the region. Despite its abundant natural resources and potential for agricultural production, SSA countries have not been able to take advantage of these advantages to promote export-led growth (Rodríguez-Pose and Tijmstra, 2007). The global community faces a significant development challenge in integrating Africa into the global economy to boost growth. The experiences of industrialised countries successfully demonstrate that diversifying exports through the expansion of manufactured goods improves connections to the international economy and leads to sustained growth (Africa, 1999). In recent years, SSA has seen a growing interest in the role of manufacturing in economic development. This is because manufacturing is crucial in driving economic growth and job creation, particularly in developing countries. However, the manufacturing sector in SSA has traditionally been underdeveloped and has fallen behind those in other regions (Mesagan et al., 2018; Myovella et al., 2020).

Barasa et al. (2018) indicated that one of the main problems of the manufacturing sector in SSA is the weak access to financing, which limits firms' ability to acquire new technologies and expand their operations. This is why the region is dominated by small and medium enterprises (SMEs), which is mostly un-organised. In addition to the financing constraint, the manufacturing industry in SSA also faces other challenges such as inadequate infrastructure, lack of skilled labor, and limited market access. These challenges lead to a relatively low competitiveness that in turn constrained the ability of firms to export their products (Charles et al., 2018; Yusuf et al., 2020). Given the crucial role of manufacturing in job creation and economic growth, it is crucial to understand the factors that affect the performance of this sector in SSA.

The region has faced several financial challenges in recent years, including persistent trade deficits, low economic growth, and high inflation (Kaplinsky & Morris, 2008; Mesagan et al., 2022). Many SSA countries have turned to monetary policy as a key policy tool to address these challenges. Monetary policy, as the primary tool of macroeconomic management, plays a crucial role in fostering export-oriented growth. Monetary policy can affect the exchange rate, interest rates, and inflation, all of which can influence the competitiveness of a country's exports. Weak institutional frameworks, limited policy credibility, and a lack of foreign exchange reserves often constrain monetary policy in SSA. These factors can limit the ability of central banks to use monetary policy to stabilize the economy and promote growth.

The principal objective of monetary policy is achieving price stability, promoting economic growth and full employment. This can be done through the enhancement of manufacturing export, which provides a key source of foreign exchange for SSA countries. Also, it affords these nations growth enhancement opportunities and trade deficits reduction. In addition, monetary policy can affect manufacturing export performance by impacting exchange rates, interest rates, and other macroeconomic variables. As noted in Ca' Zorzi et al. (2020), a tight monetary policy through the raising of interest rates can lead to a stronger currency, making exports less competitive in the global market.

Conversely, a loose monetary policy that lowers interest rates can lead to a weaker currency, making exports more competitive. Additionally, monetary policy can also affect manufacturing export performance through its impact on domestic demand, which can affect the demand for exports. This study is necessary due to the limited number of studies that have examined this relationship, especially in SSA countries. Previous studies such as Beyene and Singh (2019) have drawn attention to the effect that monetary policy could have on industrial growth using ARDL modelling for its framework. It mentioned that industrial growth included the final goal of exporting manufactured goods to get foreign exchange. While scholarly attention in prior studies like Asaleye et al. (2018), Isola & Mesagan (2018), Ca' Zorzi et al. (2020) and Jungo et al. (2022) have been drawn toward the nexus between monetary policy and manufacturing export performance, it is not yet exhaustive. Also, while taking into account the unique characteristics of resource-rich nations in sub-Saharan Africa, a recent study by Obi (2021) considered monetary policy and manufactured output in Nigeria, while Asongu (2020) had a similar focus on SSA. The omission of export performance in previous studies provides a strong rationale for this research.

As such, this study analyses the monetary policy and manufacturing export performance in SSA. It examines the effect of monetary instruments like the lending rate, exchange rate, and banks credit on manufacturing export performance. This study contributes to knowledge by providing new insights into the factors affecting

manufacturing export performance in the SSA region. This research also provides the monetary authority with valuable policies that are conducive to manufacturing export expansiveness in the region. The paper's structure is as follows: literature is reviewed in Section 2, the empirical model is presented in Section 3, the findings are discussed in Section 4 and finally, the study concludes with recommendations in Section 5.

2. Literature Review

Researchers have done studies on similar topics as outlined in the first section; however, monetary policy and manufacturing export performance remains elusive. For instance, Mwega and Ndung'u (2001) examined the relationship exchange rate policy and manufacturing export in Kenya between 1980 and 1990. Using descriptive analysis, the study argued that industrial policy is crucial in shaping the development of a nation's export-oriented industries. Eichengreen (2007) analysed exchange rate and output growth and observed that it had a short and long-term positive effect on growth. Rodríguez-Pose & Tijmstra (2007) investigated the opportunities and challenges that face SSA countries in relation to local economic development. The paper utilized a descriptive method of analysis to identify if Local Economic Development (LED), which is a standard development tool could be applied as complement to growth in SSA. Evidence suggested that monetary policy enhanced growth through expanding the exports capacity. Ojo & Alege (2014) had a similar study on SSA macroeconomic performance using the system Generalised Method of Moments (SYS-GMM) from 1995-2007. Result showed that long-run nexus was found between exchange rate and other macroeconomic variables responsible for economic growth in the SSA countries. Egbetunde (2015) examined the situation in 21 SSA nations using the Vector Error Correction framework. They found a mutual causality between output growth and financial globalization. Also, Egbetunde & Akinlo (2015) had a similar focus using panel cointegration. They found that financial globalization enhanced long run output growth in SSA.

Moreover, Goshit et al. (2018) focused on Nigeria between 1986 and 2015. Evidence showed that monetary policy positively and substantially enhanced manufacturing performance. It also deployed the Two Stage Least Square (2SLS) and granger causality. Result showed that manufacturing output had a causal relationship with both reserve requirement and broad money supply. However, there was no causal relationship between manufacturing output and monetary policy. Similarly, Ekpo (2018) conducted a descriptive analysis and revealed that one of the defining characteristics of the manufacturing sector is its heavy reliance on imports. It claims that investment returns, output size, cost of production and product competitiveness would be closely tied to the availability and exchange rate of foreign currency as a result. Asaleye et al. (2018) analyzed the link Nigeria's financial sector and manufacturing output using VAR. Evidence showed that the manufacturing sector was significantly and positively related to credit to the private sector along with market capitalization and employment in the private sector while broad money supply that was used to indicate the financial sector exerted a long run negative influence. The paper also discovered that the decomposition of variance reveals that the forecast error shock of credit to prime interest rate and private sector has a greater influence on manufacturing performance than other financial indicators.

Furthermore, Asongu (2020) investigated how financial access influenced manufacturing productivity in 25 countries in the SSA using the GMM) from 1980-2014. Results revealed that financial access positively drive total factor productivity, but does not significantly impact manufacturing productivity. Hammed (2020) examined the relationship in Nigeria using time series data that covering 1981 and 2018 using the cointegration test and the structural VAR model to test for shocks. Evidence revealed that money supply positively and significantly enhanced manufacturing output. Conversely, interest rate exerts a negative but insignificant impact on manufacturing output. Jungo et al. (2022) focused on financial inclusion and monetary policy in the Caribbean, SSA and Latin America using the panel VAR and feasible generalised least squared model. Result showed a bidirectional causality between both indicators.

However, since it is necessary to understand the various effects of monetary policy and manufacturing export performance, several studies have been done to encompass these 2 factors as well as other important factors. For example, Ojo and Alege (2014), Asaleye et al. (2018), Goshit et al. (2018), and Jungo et al. (2022) examined factors such as financial inclusion, manufacturing output, financial access and exchange rate fluctuations. However, previous research in this field did not examine the relationship between monetary policy and manufacturing export performance. Our study fills this gap by exploring this relationship, providing a novel contribution to financial economics literature. By using three strong indicators of monetary policy (private sector credit, interest rate and the exchange rate), clear insight is given for the future of manufacturing export in countries of the SSA. Furthermore, given the diverse nature of the SSA nations analyzed in this paper, we utilize the pooled mean group (PMG) framework that is well-suited for handling dynamic and heterogeneous panels. This approach has the potential to deliver more consistent results, compared to previous studies.

3. Methodology

The empirical model of this study was built from the Keynesian IS – LM function proposed by Keynes in 1930 and developed later by John Hicks (1937). The IS – LM framework provides a theoretical explanation of how both the product and money markets reach simultaneous equilibrium at the same level of income and interest rate. This is represented as:

$$\Delta RGDP_{it} = \alpha_0 + \alpha_1 \Delta GDP_{it} + \alpha_2 \Delta M2_{it} + \alpha_3 \Delta IR_{it} + \alpha_4 \Delta INF_{it} + \alpha_5 \Delta REER_{it} + \alpha_6 \Delta ER_{it} + \varepsilon_{it} \quad (1)$$

In equation (1), α_1, α_2, α_3, α_4, α_5 and α_6 are coefficients while GDP represents economic growth, M2 represents money supply, IR indicates interest rate, INF indicates inflation rate, REER signifies real exchange rate and ER represents external reserve. The i and t represent the countries and series respectively that were used in this panel model. Building upon the work of recent manufacturing studies, this study employs empirical models, similar to those utilized in Saud et al (2019), Yang et al. (2021), Amadi et al. (2021) and Mesagan et al. (2021), we present the manufacturing export performance equation as:

$$\Delta EXP_{it} = \alpha_0 + \alpha_1 \Delta INTR_{it} + \alpha_2 \Delta EXR_{it} + \alpha_3 \Delta CPS_{it} + \alpha_4 \Delta TOP_{it} + \alpha_5 \Delta YF_{it} + \varepsilon_{it} \quad (2)$$

The equation (2) regressors include lending interest rate (INTR), exchange rate (EXR), credit to the private sector (CPS), while the other regressors like trade openness (TOP) and foreign income (YF) are used for control purpose. Hence, α_1, α_2, α_3, α_4, α_5 and α_6 are the regressors' slope coefficient, ε_{it} is the disturbance term, while the other variables are as previously indicated. Table 1 shows the summary of the data.

Table 1: Variables Summary

Regressors	Name	Measurement	Source
EXP	Manufacturing Export	This is the total percentage of toral goods that make up exports.	WDI 2022
INTR	Lending Interest Rate	It is calculated by adjusting for inflation. The real interest rate is derived by deflating the nominal interest rate.	WDI 2022
EXR	Exchange Rate	It is calculated as an annual average based on monthly averages (local currency units relative to the U.S. dollar), that is LCU\GDP.	WDI 2022
CPS	Credit to the Private Sector	It is measured as the percentage of banking sector domestic credit to real GDP at constant USD.	WDI, 2022
TOP	Trade Openness	It is measured by the ratio between the sum of exports and imports and gross domestic product (GDP)	WDI, 2022
YF	Foreign Income	It is captured with foreign direct investment net inflows in % of GDP	WDI, 2022

Source: Authors' Compilation

The dependent variable, manufacturing export, is represented in Table 1 as a percentage of total exports. These dynamic heterogeneous panel regression techniques - Panel Dynamic Fixed Effect (DFE), Mean Group (MG) and Pool Mean Group (PMG) estimate techniques - are used in this study's investigation. This strategy was chosen for its dynamic nature and its ability to overcome the restrictions of cross-section (N) and time (T) in the GMM. Additionally, given that 24 SSA nations were selected for analysis and their heterogeneity, the dynamic heterogeneous panel approach is preferable. The technique divides impact into both long- and short-run impacts, with the Error Correction Term (ECT) quantifying the capacity of the model to return to long-run equilibrium after short-term adjustment (Tabash et al., 2022; Mesagan et al., 2022). As a result, the PMG framework's ECT term contributes to the verification of the regressors' long-term connection and their long-run convergence. After conducting the three estimations, we use the Hausman test to choose the most appropriate for interpretation purpose. The Hausman tests displayed in Table 5 are insignificant as their *p* values exceed the 5% critical values. It means we accept the PMG regressions through out. Data for twenty-four[1] SSA nations are employed. They are generated from the World Development Indicators based on availability between 1995 and 2020.

4. Empirical Results

In Table 2, we display the unit root result for the homogeneous and heterogeneous panels. This test is designed to ascertain if the panel series is stationary, as non-stationary series might result in biased and inconsistent estimates, leading to false conclusions. While Im et al (2003) were employed for the heterogeneous condition, the homogeneous condition was examined with the Breitung (2001) and Levin et al (2002) criteria. The findings of both the homogeneous and heterogeneous processes at the level, i.e., I(0), show that TOP and INTR are stationary at 1% while EXP and YF are stationary at a 5% level using the homogeneous criteria. The heterogeneous criteria, on the other hand, show that none of the variables are stationary at the 1% and 5% levels. EXP, INT, EXR, CPS, TOP, and YF, on the other hand, are I(1) regressors for both homogeneous and heterogeneous processes. After determining the variables' stationarity, using the KAO test, the panel cointegration is reported in Table 3.

Table 2: Unit Root Test

Regressors	**Homogeneous Processes**				**Heterogeneous Processes**			
	Level		**First Difference**		**Level**		**First Difference**	
	Breitung	**Levin et al.**	**Breitung**	**Levin *et al.***	**ADF–Fisher**	**Im *et al.***	**ADF–Fisher**	**Im *et al.***
EXP	-4.1350***	-4.1298	-14.198***	-14.994***	-0.7733	-1.1530	-21.814***	-5.4083***
CPS	1.4527	-2.9726	-6.7983***	-17.022***	2.2017	-1.0955	-16.819***	-4.5097***
INTR	0.2754	-8.5502**	-6.4164***	-23.802***	-1.9299**	-2.8583	-19.773***	-6.8523***
EXR	8.7566	-1.2983	-11.268***	-15.048***	18.2486	-0.0360	-11.468***	-3.4283***
TOP	-2.0028**	-6.5264	-9.0946***	-20.877***	-1.0461	-1.7144	-22.238***	-5.4773***
YF	17.3797	-2.9664***	-11.250***	-18.6668***	8.4331	-0.0134	-6.8901***	-2.6677***

Note: **, *** signify 5%, 1% significance level. Source: Authors' Computation

[1] Angola, Botswana, Burundi, Cameroon, Central Africa Republic, Congo, Cote D Ivoire, Gabon, Gambia, Ghana, Kenya, Madagascar, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Tanzania, Uganda, Zambia.

Table 3 displays test for cointegration and it shows that the Kao residual statistic is significant at the 1% significance level, indicating that there is long-term link between the regressors. Hence, we accept the null hypothesis that there is long-run relationship.

Table 3: Cointegration Test using the Kao Residual

H_0: No co-integration		
	t-Statistic	**Probability**
Unadjusted modified Dickey-Fuller t	-4.5163	0.0000***
Residual Variance	-0.1986	

Note: ***1% significance level. Source: Authors' Computation

Table 4 shows the results of the correlation analysis for the panel. The result indicates that there is no high correlation coefficients in the table that exceed 0.646. Thus, since the correlation is low, this implies that the regressors in the empirical model do not exhibit considerable multicollinearity. As a result, the study moves on to give the results of the analysis in Table 5.

Table 4: Bivariate Correlation Result

	EXP	**CPS**	**INTR**	**EXR**	**TOP**	**YF**
EXP	1.0000					
CPS	0.4035	1.0000				
INTR	0.2024	0.1649	1.0000			
EXR	0.0725	0.2601	0.0678	1.000		
TOP	0.1088	0.2572	0.1199	0.3191	1.000	
YF	0.0707	0.2103	0.2526	0.1833	0.0528	1.000

Source: Authors' Compilation

In Table 5, the analysis for the impacts of interest rate, exchange rate, and private sector credit on manufacturing export is presented. As explained in section 3, the Hausman results across the three models exceed the 5% mark. Hence, we interpret the PMG in Table 5. This is because the study hints to the suitability of the pooled mean group.

Table 5: Monetary Policy and Manufacturing Export in SSA

Explanatory Variables	**Explained: ΔEXP**		**ARDL (1,1,1,1,1,1)**
	PMG	**MG**	**DFE**
Long Run			
INTR	0.0035**	0.0180	-0.0059
	(0.0016)	(0.0114)	(0.0030)
EXR	-0.0001	0.0062	-2.0400
	(0.0001)	(0.0049)	(0.0001)
CPS	0.0114***	0.0276**	0.0052
	(0.0016)	(0.0141)	(0.0067)
TOP	0.0065***	-0.0009	0.0082
	(0.0008)	(0.0055)	(0.0029)
YF	-0.7758***	-0.2728	-0.6334
	(0.0790)	(0.2448)	(0.2134)
Short Run			
ECT	-0.2676***	-0.7409***	-0.2039***
	(0.0623)	(0.0941)	(0.4144)
INTR	0.0005	-0.0041	0.0001
	(0.0032)	(0.0037)	(0.0007)
EXR	-0.0074**	-0.0143**	-0.0001
	(0.0029)	(0.0066)	(0.0001)
CPS	-0.0045	-0.0157***	-0.0086
	(0.0029)	(0.0051)	(0.0021)
TOP	0.0027	0.0021	0.0013
	(0.0017)	(0.0022)	(0.0007)
YF	-0.3476	0.8330	-0.3848
	(0.2539)	(0.4595)	(0.3241)
Constant	6.2613***	5.4714	3.9119
	(1.4324)	(5.5509)	(0.9927)
Hausman Stat.		5.04	4.19
[prob]		[0.4111]	(0.4027)

Note: **, *** signify 5%, 1% significance level. Source: Authors' Computation

Table 5 shows the short- and long-run results of monetary policy on industrial export performance in SSA. The interest rate coefficients (INTR) are positive in both the short and long runs, with 0.0005 and 0.0035, respectively, but only the long run has a significant impact on manufacturing export performance at the 1% significance level. It means that the interplay between interest rates and manufacturing export performance has a long-term impact. However, the exchange rate has a detrimental short-term and long-term influence on industrial export performance. With the coefficients of -0.0001 and -0.0074 for the short run and long run periods for exchange rate (EXR) respectively, only the short run had a significant impact at the critical value of 5%. This implies that the fluctuation of currency prices would reduce manufacturing export performance within a short period of time before getting a balanced point.

In the short run, the coefficient of credit to the private sector (CPS) is -0.0045, indicating a negative influence on manufacturing export. It reduces manufacturing export in the short run. Nonetheless, the long term coefficient of 0.0114 indicates that credit to the private sector has a positive long-run effect on manufacturing export. The results show that credit to the private sector has a considerable long-run influence but has little short-run impact. The consequence is that a unit increase in credit to the private sector reduces short-term manufacturing export by roughly 0.004 units while increasing long-term manufacturing export by about 0.011 unit. Another result is that, considering the p-values and coefficients, the long run rise in Africa's manufacturing exports surpasses the short run loss caused by credit to the private sector (CPS) while holding the other regressors constant.

5. Discussion of Findings

The following paragraphs present the insights gained from the empirical results on how monetary policy affects manufacturing export performance. The study found that monetary policy had varying impacts on manufacturing export performance, depending on the variable used. The paper revealed that interest rate has a positive impact on manufacturing export performance in both the short run and long run. However, only the long run was significant. This implies that lowering interest rates would encourage investment into the manufacturing and production sector in the long run. With increased investment into the sector, there will be greater output and in turn, greater export of goods to other countries. Higher interest rates, however, would have an opposite effect in the long run. The exchange rate had a negative impact in both the long run and short run. However, it was significant in the short run. This can be seen in the volatility of the foreign markets and currencies which could lead to uncertainty when planning and budgeting for exports. Since the volatility can lead to lower profit margins and higher competition in the foreign markets. These would discourage exports and may even increase imports for a short period of time. However, since the volatility can be adjusted to over time, the effect is insignificant in the long run.

Credit to the private sector had a negative and insignificant impact on manufacturing export in the short run, but a positive and significant impact in the long run. In the short run, credit to the private sector can cause increased competition among domestic firms. This would lead to increase production and exporting which then results in a decline in the price of exports. This could limit export profitability. It could also lead to the appreciation of the local currency, making it harder for foreigners to import goods from that country due to how expensive the exports are. But in the long run, credit to the private sector ensures increased investment into the sector. This is a major impact as it has the potential to greatly increase manufacturing export in Sub Saharan Africa (SSA) through export diversification. The interaction between credit to the private sector and interest rate can increase long-term manufacturing exports and improve positive competitiveness and access to markets. This suggests that if well harnessed, monetary policy can promote long-run economic stability and sustainability in SSA. The recent initiatives by numerous African states to adopt sustainable monetary policies are a favourable sign for increasing the economic welfare of SSA countries. This demonstrates that the financial resources made available to the private sector by Africa's financial institutions, together with other monetary policies, can guarantee long-term growth of manufacturing exports and its performance.

6. Conclusion

The study uses the PMG methodology is used to analyse the relationship between monetary policy and manufacturing export performance in Sub-Saharan Africa (SSA). The paper is conducted for the time period of 1995 to 2020. The findings of the PMG, MG, and panel DFE are reported, whereas the Hausman results suggest that the PMG is the best fit. The results show that, for our first objective, interest rates have a beneficial influence on manufacturing export performance in the short run, but have a considerable positive impact in the long run. The results reveal that for the second objective, exchange rate negatively impacts manufacturing export performance in both the short and long run. The long run was insignificant but the short run had a significant impact. This is not unconnected with the recent volatility in local currencies as well as fluctuations in the prices in foreign markets. However, we attribute the insignificance of the exchange rate in the long run to the effects of market forces and economic fundamentals which tend to drive exchange rates towards a more stable and predictable level over time. The third objective which examines the effect of credit to the private sector is

displayed in the result that credit made available to the private is negative and insignificant impact on manufacturing export in the short run, but a positive and significant impact in the long run.

Hence, monetary policy must be prioritised among Sub-Saharan African countries. To do this, it is essential to urge all countries in Sub-Saharan Africa to advance monetary policy in order to boost economic growth brought on by the benefits of manufacturing exports. The resources gotten can be invested back into the economy in order to develop even more industries and provide jobs for the unemployed. Sound monetary policies would also attract foreign investments by providing a stable economic environment with predictable inflation rates and interest rates. One of the primary goals of monetary policy is to control inflation. High inflation can lead to a decrease in the value of a country's currency, which can make imports more expensive and hurt consumers' purchasing power. In Sub-Saharan Africa, many countries have struggled with high inflation rates in the past, making inflation control an important objective. Lastly, effective monetary policy can help to promote financial stability by preventing financial crises and protecting consumers and businesses from financial shocks. This can be achieved by influencing interest rates and credit availability. Considering the study's weakness, because our analysis primarily focuses on monetary policies and their influence on manufacturing export performance, the story might differ slightly if fiscal policies are taken into account. This possible constraint should pique the curiosity of future researchers in this field. Nonetheless, monetary policy aligns nicely with the scientific enquiry conducted in this paper.

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