

# Impact of Monetary Policy on Food, Beverages and Tobacco Output in Nigeria: 2000-2023

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## ABSTRACT

This paper investigates the impact of monetary policy on food, beverages and tobacco output in Nigeria, focusing on the relationship between key monetary variables (monetary policy rate, exchange rate, money supply, inflation and manufacturing sector credit) and manufacturing output of the food, beverages and tobacco. Employing a long-run Autoregressive distributed lag model, the analysis reveals that the exchange rate insignificantly influences food, beverages and tobacco, with an appreciation leading to a substantial increase in food, beverages and tobacco output volumes. The paper revealed that money supply positively impacts food, beverages and tobacco, underscoring the importance of adequate liquidity in facilitating manufacturing activities. Conversely, the inflation rate, despite its association with higher borrowing costs, exhibits a positive relationship with food, beverages and tobacco, suggesting that an active economy may enhance manufacturing performance. On the other hand, the monetary policy rate is shown to have a negative impact on food, beverages and tobacco, indicating that tighter monetary policy can dampen manufacturing by increasing the cost of borrowing and restricting liquidity. The findings suggest that policymakers need to strike a balance between controlling inflation and fostering a manufacturing-friendly environment. Stability in the exchange rate, sufficient money supply, and accessible credit markets are recommended to support robust food, beverages and tobacco output in Nigeria.

**Keywords:** Monetary policy, Money supply, Food insecurity, Economic growth, manufacturing industries

**Classifications:** E52, E51, I32, O47, L

## INTRODUCTION

The food, beverages and tobacco sector provide safe, quality and healthy foods to millions of people worldwide. Despite structural changes in the past decades the sector remains a large source of manufacturing output and employment, particularly in developing countries like Nigeria. However, monetary policy plays a very significant role in macroeconomic management and to bring about stability around the globe. Hence, its uniqueness and importance cannot be over emphasized. Following the 2008 global financial crisis, many Central Banks aggressively eased monetary conditions through interest rate cuts and quantitative easing programs (International Monetary Fund (IMF), 2020). Over a decade later, rates remain historically low across developed economies as authorities continue supporting economic recoveries (IMF, 2020). Monetary policy as a tool for managing money supply and interest rates can have a profound impact on various sectors of the economy, including agriculture (Asalaye et al., 2021).

Agricultural output assessment of Nigeria showed the weakening production growth from the 1960s to 1980s. Nigeria had robust financial progress in the past few years, an average of 8.8% from 2000 to 2007 of its real annual GDP growth. While the agricultural industry has fallen behind GDP growth, it grew by 3.7% in 2007 (Inam & Oscar, 2017). Some of the main factors undermining agricultural production include climate change, food insecurity, inadequate budget to agricultural sector and low productivity due to poor planting material amongst others. In addition, the decline in food production which has led to increasing food importation in Nigeria can be likened to farmer's difficulty to obtain fertilizers and uneasy access to soft loans. Consequently, food production profile in Nigeria has been at lower ebb, which has led to a rise in import of stable food per

annum (Anigbogu et al., 2015). Prior to the discovery of oil in 1956, the agricultural sector was inarguably the backbone of the economy and the major source of revenue for the country. It was the cornerstone of the Nigerian economy due to her large exports of rubber, groundnut, hides and skin, cocoa, coffee, palm oil and palm kernel, including food, beverages and tobacco (Sylvester, 2018).

Food insecurity remains a pressing global challenge in the modern era. The most recent data from the United Nations indicates over 800 million people worldwide do not have enough to eat (Food and Agricultural Organization (FAO), 2020). While progress has been made in reducing undernourishment since 2000, the COVID-19 pandemic threatens to reverse gains or exacerbate existing vulnerabilities. Sub-Saharan Africa faces some of the greatest food insecurity, with over 250 million people affected. Conflict, poverty, and climate related shocks continue hindering food system stability and resilience across much of the region (Food Security Information Network, 2020). South Asia also has high levels of undernourishment at approximately 280 million, although India has seen improvements in recent decades (FAO, 2020).

The food products, beverage and tobacco (FBT) sector are of great importance in the economic growth of any country. The enterprises of the sector manufacture essential products for the community. Additionally, the sector has considerable interaction with the other sectors of the economy by providing the products that they use as intermediate inputs (Kelly & Eugenio, 2020). The food and beverage sector is estimated to contribute 22.5% of the manufacturing industry value, and 4.6% of the country's GDP. In 2018, the Central Bank of Nigeria (CBN) Governor noted that Nigerians spend an average of 73% of their income on food and beverages products, however given the choice, a vast majority of Nigerian consumers will opt for food and beverages products made outside of the country. The food and beverage industry is essential for the Nigerian economy in both financial contributions and employment terms. In fact, food and beverage processing is Nigeria's largest manufacturing industry. Industry players are diverse in size – from multinationals producing large quantities of fast-moving consumer goods (FMCG) to smaller players with the flexibility to meet the lower middle class and more impoverished populations. The industry is very dynamic and driven by diversity, quality, value, and price (Flanders Investment & trade, 2020).

Tobacco uses and tobacco control in Africa has received little attention relative to other regions. This is due to the perceived low smoking prevalence in Africa in addition to the more immediate need for interventions against infectious diseases. However, the trends are quickly changing. With improving economic growth and health in Africa, the number of smokers and cigarettes smoked in the region is rising. In Nigeria, smoking prevalence is growing at an average of 4 percent each year; from 11.3 percent in 2000 to 17.4 percent in 2015 (World Bank, 2017). According to data from Nigeria Customs Service (NCS) and the Global Data Plc, a total of 920 million of cigarettes packs were sold in Nigeria in 2015; of which 74 percent is produced domestically. Tax rates on tobacco products in Nigeria are considered comparatively low (WHO, 2015). While the WHO recommends an excise tax burden of 75 percent of retail price and a specific excise tax system for effective tobacco taxation, excise tax rate on tobacco products in Nigeria stands at ad valorem rate of 20 percent of UCA (not retail price). It is important to note that the excise tax rate has fallen since 2009; from 40 percent excise rate recorded pre-2009. More so, VAT rate levied on domestically consumed products in Nigeria, including tobacco products, stands at 5 percent –among the lowest VAT rates globally. In addition to the VAT rate, other taxes are applicable to imported tobacco products. They include: Import Duty (20 percent of CIF); Levy (40 percent of CIF); CISS (1 percent of cost of goods or FOB); Surcharge (7 percent of total value of duty payable); and ETLs (0.5 percent of CIF) (NCS, 2015). In Nigeria, about 80 percent of consumed tobacco products are produced by three registered tobacco companies: British American Tobacco Nigeria (BATN), Leave Tobacco and Commodities Nigeria Ltd, and International Tobacco. According to available data from Global Data Plc, 18.4 billion cigarettes sticks were sold in 2015, of which 12.2 billion were domestically produced by the three main tobacco companies. BATN holds considerable market power, accounting for 75 percent of overall domestic production – based on data from the Nigerian Customs Service.

It is an aspiring sesame that economic environment in Nigeria is an embodiment of macroeconomic variables associated with the factors of production of goods and services. The environment is dynamic and constantly changing. This then creates opportunities and threats for food and beverage sub sector of Nigeria. Prominent stakeholders and players in the Nigerian Food and Beverage subsector include Nestle Food Nigeria Plc, Cadbury Nigeria Plc, Nigeria Bottling company Plc, and Dangote flourmill Plc to mention but a few. The lamentation of

manufacturers especially those of the food and beverage sub sector is that the operating environment in the country is poor and the cost of business operation is expensive. These impacts on the performance of food and beverage sub sector of the economy. Thus, inadequate management of macro-economic variables such as interest rate, unstable exchange rate, import, export and duplicating of essential infrastructures account for the challenges in this regard Partick et al. (2016).

Although, putting food inflation/price under control is the desire of every government, fluctuation in exchange rate can influence food prices in Nigeria. In the present competitive world, exchange rate has been an important indicator that can determine the level of food prices and economic growth (Obi et al., 2016). For example, Nigeria Bureau of Statistic (NBS) reported that exchange rate tends to have a strong impact on other macroeconomic variables such as food inflation due to their relative inelastic demand as well as influence on the flow of products and capital in a country (NBS, 2018; Abdulaziz et al., 2016). In addition, unstable exchange rate may have a strong pressure on a country's balance of payment and food prices. This plays a crucial role in affecting the allocation of production and spending between foreign and domestic goods in the economy (WB, 2018; Obi et al., 2016). Nigeria is one of the countries that have experience instability and/or uncertainty in its exchange rate which affects the prices of food products. In addition, the country relied more on food imports for consumption. Despite lower GDP growth rate, food import bills have been increasing over the periods (CBN, 2017). The NBS (2018) stated that given the uncertainty in exchange rate which continues to fluctuate has resulted in to higher food prices, poverty and decline in GDP, which in turn translate to food insecurity in the country. As Nigeria's food insecurity situation is worsening, the country has been listed among the 41 low-income food deficits nation in the world (Suleiman & Idris, 2018; WB, 2018).

There are also some major challenges in the food and beverages products producers faces while selling products in the domestic and foreign markets. Top on the list are high cost of production compared to imported goods, low tariff protection, insurgent of illegal goods and lack of access to market as major domestic market challenges. In similar fashion high cost of production compared to other competitor, lack of knowledge about foreign market trends, low capacity to produce in bulk and inability to keep product standards are most frequently mentioned foreign market challenges faced by the companies (Yodit, 2017). Therefore, this paper seeks to examine the impact of monetary policy on food, beverages and tobacco output in Nigeria; investigate the impact of money supply on food, beverages and tobacco output in Nigeria; assess the impact of inflation on food, beverages and tobacco output in Nigeria; determine the impact of exchange rate on food, beverages and tobacco output in Nigeria; investigate the impact of monetary policy rate on food, beverages and tobacco output in Nigeria; analyse the impact of manufacturing sector credit on food, beverages and tobacco output in Nigeria.

The hypotheses of this paper are stated as follows:

H<sub>01</sub>: Money supply has no significant impact on food, beverages and tobacco output in Nigeria

H<sub>02</sub>: Inflation rate has no significant impact on food, beverages and tobacco output in Nigeria

H<sub>03</sub>: Exchange rate has no significant impact on food, beverages and tobacco output in Nigeria.

H<sub>04</sub>: Monetary policy rate has no significant impact on food, beverages and tobacco output in Nigeria.

H<sub>05</sub>: Manufacturing sector credit has no significant impact on food, beverages and tobacco output in Nigeria.

## Conceptual Review

### Monetary Policy

Monetary policy refers to the measures executed by central banks to manipulate the availability and cost of money and credit, with the intention of advancing national economic goals such as price stability, full employment, and economic growth (Mishkin, 2015). Ezu and Ukoh (2021) opined that monetary policy involves the measures through which the Central Bank manages the supply of money to stabilize prices.

Therefore, monetary policy variables are key indicators that provide insight into the economy which comprises of money supply, exchange rate, inflation, monetary policy rate and manufacturing sector credit. Broad money

(M3) measures the total volume of money supply in the economy. It is defined as narrow money plus savings and time deposits with banks including foreign denominated deposits. M2 is an economic index that is used to predict inflation (Nwuju et al., 2024). Almalki & Batayneh (2015) opined that inflation is conventionally defined as a persistent rise in the general level of prices of goods and services in an economy over a while. When the general price level rises, each unit of currency buys fewer goods and services, thus eroding the purchasing power of money.

In defining monetary policy rate, Uju and Ugochukwu (2021), refers to it as the baseline interest rate that every other interest rate adds on to. The rate controls the amount of money in circulation at any given time. However, exchange rate can be described as the rate at which one currency is exchanged for another. Exchange rate also impacts on the prices of export, import and balance of payment. It also works as a great opportunity for domestic investor to earn high profit by investing in foreign currency. The investors and traders like that system where there is very small inconsistency difference, between actual and expected value of exchange rate (Murtala, 2017). On the other hand, manufacturing sector credit refers to financial resources provided by the banks for the manufacturing sector, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establishes claims for repayment (Ogwuche, 2021).

### **Food, Beverages and Tobacco**

Food manufacturing subsector or food production refers to the complex process of producing, processing, and trading food items, which involves various dimensions such as agriculture production, climate change, animal welfare, fair trade, health and safety, and economic sustainability. It is a critical aspect of the global food system that impacts people's lives, organization's profits, and the well-being of the planet (Food safety Management, 2023).

However, beverage manufacturing output is the drinks and ready-to-drink products that are produced, such as bottled water, soft drinks, energy drinks, milk products, coffee and tea-based products, nutritional beverages and alcohol (Fluid handling Pro, 2024).

Tobacco manufacturing output refers to the products that result from the processing of tobacco leaves, which are cured and aged after harvest (National Cancer Institute, 2024).

We selected studies that defined smoking as “smoking of tobacco products, be it cigarettes, bidi, cigar, hookah, pipe, or other related manufactured products and hand rolled stuffs”. We defined current smoker as someone who smokes every day, or some days in the last 30 days preceding an interview. An ex-smoker (or former smoker) is someone who was an every-day smoker or has smoked at least 100 cigarettes in his or her lifetime but has currently quit smoking (WHO, 2019; CDC, 2017). An ever smoker is defined as anyone who has quit smoking (smoked at least 100 cigarettes in their lifetime) or currently smokes. This describes life-time smoking status and satisfies the definition of either a current or former smoker (CDC, 2017; Parekh *et al.*, 2019).

### **Empirical Review**

Ugwuanyi and Oluka (2024) studied the effect of environmental sustainability management on performance of food, beverages and tobacco manufacturing firms in Enugu State, Nigeria. The study adopted a survey design. The findings revealed ecosystem had significant positive effect on production quality of food, beverages and tobacco manufacturing firms in Enugu State ( $f$ -value = 47.403, and  $p$  value .000. The author concluded that environmental sustainability management had significant positive effect on performance of food, beverages and tobacco manufacturing firms in Enugu State, Nigeria. The paper recommended that managers of manufacturing firms should ensure that all the strict policies on ecosystem as regards to production quality are adhered to in the course of their operation while emphasis on them should be encouraged to boost performance of firms in Nigeria.

Enemona et al., (2023) analysed monetary policy and its effect on food security in Nigeria from 1986 to 2022. ARDL modelling was utilized to assess this linkage between food production, money supply, lending rate, credit to private sector, and inflation over the period. The result revealed the presence of long run co-integrating relationship between food production and monetary policy in Nigeria, findings from the short and long run

estimation revealed that monetary policy was not significantly affecting food production in Nigeria within the period under review. Prioritizing lending to the agricultural sector, reducing lending rate to the agricultural sector and curtailing inflation was recommended to ensure significant contribution of monetary policy to food security in Nigeria.

Abdulrahman et al., (2023) examined the effect of monetary policy on food inflation in Nigeria using a quantile regression model and monthly data from January 2004 to October 2021. The results of the study reveal that food inflation falls by 0.41 and 0.69 percent at the 25th and 50th quantiles, respectively, following a restrictive monetary policy by the apex bank in Nigeria. As the exchange rate depreciates, food inflation rises by 8.92 percent at the 25th quantile, 12.6 percent at the median, and later falls to 16 percent at the 90th quantile. The real GDP is significant across all quantiles; also, the oil price is positive and significant at the OLS estimate and the 90th quantile. The study recommended unconventional monetary policies for improving supply chain of agricultural products.

Abdulmalik (2023) examined the effect of macroeconomic factors on the profitability of selected multinational food and beverages companies in Nigeria using a survey research design with specific reference to Coca-Cola, PepsiCo, Nestle, Unilever, and Cadbury Nigeria Plc. A questionnaire was used to collect primary data from a sample of 417 employees drawn from five multinational food and beverage companies located in Lagos State, Nigeria. Multiple regression analysis was used to test the hypotheses formulated. Results indicated that macroeconomic factors (political, economic, and technological) had a significant effect on the profitability of multinational food and beverage companies in Nigeria. The author recommended that the management of the multinational food and beverage companies in Lagos State, such as Coca-Cola, PepsiCo, Nestle, Unilever, and Cadbury, need be aware of the macro-environmental factors influencing their profitability in order to make decisions that will increase the firm's profit.

Madhusmita et al., (2023) examined implications of war on the food, beverage, and tobacco industry in South Korea, Humanities and Social Sciences Communication from January 1999 to October 2022. The results show a negative trend observed in the food and beverage sector returns for a few months, implying that sector stock returns decline as the conflict between Russia and Ukraine becomes more pronounced. The authors recommended that South Korea has massive scope to stabilize the demand for healthy, safe food, give more attention to domestic agribusiness, and make itself a self-sufficient Agri-economy.

Faezah (2022) examined impact of macroeconomics variable on performance of food and beverages companies in Malaysia for a time series period of 2001 to 2020 using multiple linear regression. The paper found out that return on assets (ROA) of a firm cannot be measured by inflation and exchange rate, it shows that inflation rate and exchange rate have an insignificant impact towards the firm performance while gross domestic product has a significant relationship with return on asset.

Akani and James (2022) examined the relationship between dividend policy decisions and profitability of quoted food and beverages manufacturing firms in Nigeria for a time series covering 2010 to 2019. The study employed panel data in the analysis while the fixed effects model was used as estimation technique at 5% level of significance. The estimated regression results found that 77 per cent variation on return on equity of quoted food and beverages manufacturing firms in Nigeria can be traced to dividend policy decisions. The study concluded that dividend policy decisions affect profitability of quoted food and beverages manufacturing firms through return on equity. The study recommended that quoted food and beverages manufacturing firms in Nigeria that seek increased profitability should adopt dividend policy decisions that prioritizes increased retained earnings, dividend yield, dividend per share and reduced payout ratios.

Andrejs and Ilze (2021) examined the dynamic comparative analysis of the industry “manufacture of food products, beverages and tobacco products” (C10-C12) as an economic unit in the Baltic States and Finland for the Period 2000 to 2014. The authors perform the analysis of the industry’s C10-C12 gross output, final demand, value added, direct and total backward linkages, direct and total forward linkages. The main conclusions of the study apply the purchases’ vector structure, the gross output sales structure, and the sources for value added formation as well. The analysis is provided in the dynamic and comparative aspect, comparing Estonia, Finland, Latvia, Lithuania. Founded conclusions about the industry C10-C12 different efficiency require more detailed

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socio-economic causality analysis.

Ahsan et al., (2020) conducted a study on the variables that influence the prices of food in Pakistan for a time period of 48 years (1970 to 2018). They examined the factors that impact both the supply and demand of food, thereby affecting its prices in the country from 1970 to 2018; by utilizing an autoregressive distributed lag model. Based on their findings, the main determinant of food costs, both in the long and short term, is the money supply. Additionally, they discovered that subsidies, while initially having a negligible effect, can eventually contribute to the reduction of food prices. In the absence of imports, the domestic market is subjected to pressure from rising global food prices, which consequently leads to an increase in domestic food prices. However, there is a possibility of imported inflation if food crops are imported at higher prices from overseas. These statistics hold significant importance.

Mbah et al., (2020) examined product differentiation strategy influence output with food, beverage and tobacco firms within the South East of Nigeria. Survey approach was adopted to source for data through personal interview and by administering questionnaire to management and staff of the firms. Data was presented and analysed by mean score (3.0 and above agreed while below 3.0 disagreed) and standard deviation using Sprint Likert Scale. Results revealed that product differentiation strategy has positive effect on the number of purchases of manufacturing firms; the quantity of products produced and the improved level of production of the firms. The authors recommended that organization should underline their products' unique attributes, features and value propositions to differentiate themselves from other competitors for the convenience of their customers.

Kelly and Eugenio (2020) analysed factors influencing the economic behaviour of the food, beverages and tobacco industry: a case study for Portuguese Enterprises for the period of 2006 to 2013 by utilizing least squares as a method of analysis. The results show a characterization of the financial structure of the sector and diagnosis through indexes that identify the strategic positioning of the enterprises in terms of efficiency scores. The paper also showed that an analysis of the variables that must be approached differently to obtain better results regarding economic performance. Although there is an increase in credit with the acquisition of long-term debts, there is no evidence that this implies the ability of enterprises to grow faster, which affects profitability.

Anietie et al., (2017) examined corporate planning and the survival of food and beverage firms in Nigeria for a time series period of 7 years (2008 to 2015) using Pearson Product Moment Correlation (PPMC) analysis. Finding from the hypothetical testing revealed that, information technology utilization (ITU) has an effect on the survival of food and beverage firms in Nigeria. The study concluded that, corporate planning is significant for achieving business survival in any corporate organization. The paper recommended that, the studied organizations should strive to access and make use of different avenues of gathering information which information and communications technology provides today that will aid in enhancing the quality of services provided to the customers.

Mutunga (2014) analysed perceived effects of selected macroeconomic indicators of inflation, exchange and interest rates on the food and beverage manufacturing sector in Kenya. Top executives of 95 firms were surveyed on their perception of the effects of the selected macro- indicators on their firms' operating environment and economic performance. From the target firms, 32 responded giving a rate of 33.7 percent. Analysis revealed that effects of macroeconomic factors on sustainable competitive advantage of food and beverage firms in Kenya was not statistically significant ( $p = .142$ ) for inflation, ( $p = .767$ ) for exchange rate and ( $p = .086$ ) for interest rates at 95 percent confidence interval ( $\alpha = 0.05$ ) as perceived by industry top executives. The paper recommended that government should endeavour to maintain and improve on the macros for industrialization to take off.

Rahul et al., (2014) analysed food inflation in India: The role for monetary policy. This paper estimates the size of second-round effects using an estimated reduced-form general equilibrium model of the Indian economy, which incorporates pass-through from headline inflation to core inflation. The results indicate that India's inflation is highly inertial and persistent. Due to second-round effects, the gap between headline inflation and core inflation decreases by about three fourths within one year as core inflation catches up with headline inflation. Large second-round effects stem from several factors, such as the high share of food in household expenditure and the role of food inflation in informing inflation expectations and wage setting. The authors

recommended that in order to durably reduce the current high inflation, the monetary policy stance needs to remain tight for a considerable length of time.

### Theoretical Framework

The quantity theory of money was formulated by Fisher (1911); the theory asserts that any alterations in the amount of money supply will result in a corresponding change in the overall price level of goods and services. This theory is built upon the underlying assumption that, at a state of full employment, the level of transactions or national output, as well as the velocity of money, remains constant or changes at a sluggish pace. Consequently, the theory posits that cost of goods and services will be directly proportional to the quantity of money in circulation. This implies that when the federal government and financial institutions give out grants and loans to farmers, it will boost food production in the country thereby forcing the prices of food stuffs to fall vice-versa. The theory further postulates that inadequate availability of credit facility to food, beverages and tobacco subsector could lead to shortage of food production in the country and when demand for food stuff out weighs its supply it will lead to food stuff hike in the market. Summarily, the theory postulated that the quantity of money supply to food, beverages and tobacco subsector determines the cost of food stuff in the market. This theory of money finds its roots in the well-known identity that serves as its starting point.

$$MV=PY \quad (1)$$

Where M = money supply, V = velocity of money in circulation, Y = real national output, and P = aggregate price level. From equation above, it can derive another equation as follows:

$$P=MV/Y \text{ or } V=PY/M \quad (2)$$

Sequel to the above, the proportional relationship between the money stock and general price level of goods and services (inflation) can be shown in the elasticity of the price level with respect to the money supply is:

$$Elm=\partial P/\partial M.M/P \quad (3)$$

$$\text{Differentiating equation 1 totally yields: } M\partial V+V\partial M=P\partial Y+Y\partial P \quad (4)$$

But Y and V are constant at full employment. That is, change in Y and V is zero at full employment. Thus equation 4 yields:

$$V\partial M=Y\partial P \quad (5)$$

$$\partial P/\partial M=V/Y \quad (6)$$

Substituting equation 6 into 3 yields:

$$Epm=V/Y. M/P \quad (7)$$

From equation 2,  $V =PY/M$ . Substituting this into equation 7 yields:

$$Epm=1/Y. PY/M. M/P=1 \quad (8)$$

Equation 8 above illustrates the existence of a direct proportional relationship between the general price level of goods and services, also known as inflation, and the growth rate of money supply, assuming velocity and output remain constant. This proportionality relationship implies that any permanent increase in money supply will inevitably result in an equal increase in the rate of food, beverages and tobacco subsector (inflation), thus affecting the general price level.

### METHODS AND MODEL SPECIFICATION

This paper examines the impact of monetary policy on food, beverages and tobacco output in Nigeria and

because it is a cause-and-effect relationship which observes an existing situation and searching back in time for causal agent, the research design is the ex-post facto design.

This paper uses time series data covering a period of 24 years from 2000 to 2023. The research made use of secondary data on monetary policy and food, beverages and tobacco in Nigeria. The researcher sources relevant data which were obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin and National Bureau of Statistics, 2023.

The fundamental assumption of the model of the paper is time series stationarity. The unit root test is required to ensure that the variables are stationary within I (0) and (1) because above these levels of integration the ARDL cannot be applied. Thus, since economic time series are non-stationary, the paper avoided spurious results by utilising Augmented Dickey Fuller (ADF) test to identify the order of integration.

### Model Specification

This paper adapted the empirical work of Enemona et al., (2023) using the variables; food production index as proxy for food security, broad money as proxy for money supply, lending rate of banks, credit to private sector and inflation rate as control variable.

$$FPI = F(M2_t, LR_t, CRP_t, INF_t) \tag{1}$$

Therefore, this paper modified the above model to include EXR, MSC and MPR

$$FBT = f(MPR, EXR, MS, INF, MSC) \tag{2}$$

Where;

FBT = Food, beverages and tobacco

MPR = Monetary policy rate

EXR = Exchange rate

MS = Money Supply

INF = Inflation

MSC = Manufacturing sector credit

In linear stochastic forms:

$$FBT = \beta_0 + \beta_1 MPR + \beta_2 EXR + \beta_3 MS + \beta_4 INF + \beta_5 MSC + U_{t2} \tag{3}$$

However, the ARDL model is thus;

$$\begin{aligned} \Delta FBT_t = & \beta_0 + \sum_{g=1}^k \beta_{1i} \Delta FBT_{t-i} + \sum_{h=1}^l \beta_{2i} \Delta MPR_{t-i} + \sum_{i=1}^m \beta_{3i} \Delta EXR_{t-i} + \sum_{j=0}^n \beta_{4i} \Delta MS_{t-j} \\ & + \sum_{j=0}^m \beta_{5i} \Delta INFR_{t-j} + \sum_{j=0}^n \beta_{6i} \Delta MSC_{t-j} + \sum_{g=1}^m \beta_{1i} FBT_{t-i} + \sum_{h=1}^n \beta_{2i} MPR_{t-i} \\ & + \sum_{i=1}^k \beta_{3i} EXR_{t-i} + \sum_{j=0}^n \beta_{4i} MS_{t-j} + \sum_{j=0}^m \beta_{5i} \Delta INFR_{t-j} + \sum_{j=0}^n \beta_{6i} \Delta MSC_{t-j} + \varepsilon_t \dots \dots \tag{3} \end{aligned}$$



Below is the ARDL ECM model

$$\Delta FBT_t = \beta_0 + \sum_{g=1}^k \beta_{1i} \Delta FBT_{t-i} + \sum_{h=1}^l \beta_{2i} \Delta MPR_{t-i} + \sum_{i=1}^m \beta_{3i} \Delta EXR_{t-i} + \sum_{j=0}^n \alpha_{4i} \Delta MS_{t-j} + \sum_{j=0}^n \beta_{5i} \Delta INFR_{t-j} + \sum_{j=0}^n \beta_{6i} \Delta MSC_{t-j} \varepsilon_t + \beta ECM_{t-1} \dots \dots (4)$$

The model above is used to adjust the estimation until the ECM turned negative. The negative sign of coefficient of the error correction term ECM (-1) shows the statistical significance of the equation in terms of its associated t-value and probability value.

Where

$\Delta$  = first differencing operator

$U_t$  = white noise or disturbance term

$\beta_0$  = is the intercept

$\beta_1, \beta_2, \beta_3, \beta_4, \dots$  are the coefficient to be estimated

### DATA PRESENTATION AND ANALYSIS

This section presents the data utilized in the paper and the results of the analysis conducted to understand the impact of monetary policy on food, beverages and tobacco output in Nigeria. The analysis includes descriptive statistics, unit root tests, the specification of the ARDL model, and the interpretation of the estimated short-run and long-run relationships.

Table 4.1a: Summary of Descriptive Statistics for the Variables

	FBT	MPR	EXR	TMS	INF	YMSC
<b>Mean</b>	2602.598	16.88647	207.2950	9.213739	13.36333	6.926089
<b>Median</b>	2629.385	16.90279	155.5864	9.546256	13.40000	6.966732
<b>Maximum</b>	3302.658	24.85000	425.9811	10.78854	22.90000	8.624509
<b>Minimum</b>	2079.318	11.48313	102.1052	6.778167	5.400000	4.950848
<b>Std. Dev</b>	418.4254	2.941262	105.7685	1.258255	4.554198	1.046374
<b>Skewness</b>	0.110391	0.234310	0.906027	-0.538975	0.232645	-0.228789
<b>Kurtosis</b>	1.480229	4.000966	2.278730	1.927766	2.418387	1.982594
<b>Jarque Bera</b>	2.358450	1.221538	3.803769	2.311663	0.554768	1.244492
<b>Probability</b>	0.307517	0.542933	0.149287	0.314796	0.757763	0.536738

Source: Researcher’s computation, using E-views 12, 2024

The descriptive results presented in Table 1 indicate that food, beverages and tobacco (FBT) in Nigeria during the period of 24 years (2000-2023) has minimum and maximum values of 2079.318% and 3302.658% respectively. FBT averaged 2602.598% during the period with standard deviation of 418.4254%, implying that the data deviate from both sides of the mean by 2184.1726%. This suggests that FBT in Nigeria is relatively widely dispersed during the period under investigation. The implication of this disparity depicts fluctuations in

the growth of food, beverages and tobacco output which has relatively remained poor over the years. The fluctuations in FBT may also be attributed to inconsistent policy changes that characterised different administration in Nigeria over time. Skewness, which measures the shape of the distribution revealed that coefficient of 0.110391 (which is greater than zero) implied that though FBT is positively skewed, it is not symmetrical around the mean and thus deviating from normal distribution. Kurtosis, value of 1.480229, it implied that FBT is platykurtic (fat or short tailed) meaning that the distribution is not peaked relative to the normal distribution. The descriptive normality results also showed that FBT is normally distributed. This was captured by the Jarque-Bera probability value of 0.307517, found to be greater than 0.05.

The range of monetary policy rate (MPR) values is narrower compared to FBT, with a minimum of 11.48 and a maximum of 24.85. This is reflected in the lower standard deviation of 2.941262, suggesting that MPR values are relatively stable and cluster closely around the mean. The kurtosis of 4.000966 indicates a leptokurtic distribution, meaning there are more frequent extreme values compared to a normal distribution. Exchange Rate (EXR) shows a mean of 207.2950, with skewness (0.906027) indicating a nearly symmetric distribution of values around the mean. The range is also relatively small, with the minimum value being 102.1052 and the maximum at 425.9811. This is reflected in a standard deviation of 105.7685, indicating that exchange rates are relatively consistent with limited variation over time. The kurtosis of 2.278730, being less than 3, suggests a platykurtic distribution, meaning there are fewer extreme values and a flatter peak compared to a normal distribution. Further, the money supply (TMS) has a mean of 9.213739, with a negative skewness of -0.538975, implying a concentration of values below the mean and some higher values pulling the mean downward. The range from 6.7781 67 to 10.78854 suggests some variation in money supply during the period, with a standard deviation of 1.258255 indicating moderate variability around the mean. The kurtosis of 1.927766 being less than 3, suggests a platykurtic distribution, meaning there are fewer extreme values and a flatter peak compared to a normal distribution. Also, inflation, the mean value is 13.36333, indicating the average level of inflation over the period under study.

The distribution is positively skewed, as seen by the skewness of 0.232645, meaning that there are more observations with values lower than the mean. The data shows a wide range, with a minimum of 5.400000 and a maximum of 22.90000. This suggests significant variability in inflation levels, which is further supported by the standard deviation of 4.554198, indicating that INF values often deviate considerably from the mean. The kurtosis of 2.418387, being less than 3, implies that the distribution is platykurtic distribution, meaning there are fewer extreme values and a flatter peak compared to a normal distribution. Manufacturing sector credit (YMSC), with a mean of 6.926089, shows an even more pronounced negative skewness of -0.228789. This skewness indicates that the MSC data is heavily weighted towards lower values, with some very high values pulling the mean downwards. The minimum MSC recorded is 4.950848, while the maximum is 8.624509, pointing to substantial fluctuations in manufacturing sector credit during the period. The standard deviation of 1.046374 which is the lowest corroborates this, indicating large fluctuations around the mean. The high kurtosis of 1.982594 suggests a platykurtic distribution, meaning there are fewer extreme values and a flatter peak compared to a normal distribution.

Table 2: Summary of Unit Root Test Results

Variables	ADF		
	ADF Values	Critical Values	Order of Int.
<b>FBT</b>	-4.480549	-3.644963	1
<b>MPR</b>	-5.285046	-3.632896	1
<b>EXR</b>	-2.323233	-1.957204	1
<b>TMS</b>	-4.333468	-3.632896	1
<b>INF</b>	-3.017208	-2.998064	0
<b>YMSC</b>	-5.112213	-3.632896	1

Source: Researcher’s computation, using E-views 12, 2024

Table 2 depicts the results of the unit root test indicating varying levels of integration. Inflation rate shows unit roots at levels and others show at first difference.

Table 3: Summary of Bound Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	3.695900	10%	1.81	2.93
k	5	5%	2.14	3.34
		2.5%	2.44	3.71
		1%	2.82	4.21

Source: Researcher’s computation, using E-views 12, 2024

The co-integration test result shows that F-statistic value of 3.695900 is greater than the lower (I(0)) and upper bound (I(1)) critical values 2.14 and 3.34 respectively at the 5% significance level. Thus, the null hypothesis of no long run relationship is rejected at the 5% level. It can therefore be inferred that the variables are co-integrated, and as such there is a long run equilibrium relationship between monetary policy and food, beverages and tobacco output between 2000 and 2023.

### Autoregressive Distributed Lag Model

The Autoregressive Distributed Lag (ARDL) model is a type of econometric model used to analyse the relationship between a dependent variable and one or more independent variables, both in the short run and the long run. It is particularly useful when the variables in question are a mix of stationary (I (0)) and non-stationary (I (1)) data, but none are integrated of order two (I (2)).

Table 3: Autoregressive Distributed Lag Model

Variable	Coefficient	Std. Error	T. Statistics	Probability
FBT (-1) *	-0.462926	0.179133	-2.584259	0.0324
D(MPR)	48.50079	22.44080	2.161277	0.0627
D(EXR)	-1.292548	1.872828	-0.690158	0.5096
D(TMS)	-0.085081	416.9594	-0.000204	0.9998
D(INF)	5.690096	11.84291	0.480465	0.6438
D(YMSC)	171.1585	367.9170	0.465210	0.6542
CointEq (-1) *	-0.462926	0.077117	-6.002918	0.0003
R-squared	0.857644			
Adjusted R-squared	0.770041			
Prob(F-statistic)	0.000000			

		LongRun ARDL		
Variable	Coefficient	Std. Error	T. Statistics	Prob.
MPR	-13.05077	37.89878	-0.344359	0.7395

<b>EXR</b>	4.829518	2.456087	1.966346	0.0848
<b>TMS</b>	2595.519	1425.094	1.821296	0.1060
<b>INF</b>	74.47882	51.75799	1.438982	0.1881
<b>YMSC</b>	-3279.942	1967.645	-1.666938	0.1341

Source: Researcher’s computation, using E-views 12, 2024

From the ARDL-ECM results in Table 3, it could be observed that ratio of food, beverages and Tobacco (FBT) contributed negatively and significantly to economic growth, in the period as captured by its coefficient value of -0.462926 and a p-value of 0.0324. Further, it was found that monetary policy rate (MPR) contributed positively to economic growth as captured by its positive coefficient values of 48.50079 and a p-value of 0.0627 which was statistically insignificant under the period of investigation. Exchange rate with a negative coefficient of -1.292548 and a p-value of 0.5096 means that there is a negative and insignificant relationship with FBT during the period. Thus, the coefficient value of money supply showed that it has a negative relationship with food, beverages and Tobacco but contributed insignificantly to FBT evident in this is the negative coefficient of -0.085081 and a p-value of 0.9998 being statistically insignificant during the current period. The variable of inflation rate (INF) was found to have a positive association with coefficient value of 5.690096 and a p-value of 0.6438 with FBT meaning that there is a positive relationship between FBT and INF. Thus, manufacturing sector credit was found to have a positive coefficient value of 171.1585 and a p-value of 0.6542 which is statistically insignificant in the short run. Also, the P-value of the F-statistics of the model is significant indicating a goodness of fit of the model. Furthermore, R-squared of 0.857644 suggests that about 86% of variation in FBT is explained by the model while 14% is explained by variables outside the model. From the above result ECM is statistically significant, less than one and negative which shows that there is a high speed of adjustment from the short run to the long run of the model.

The analysis of our long-run ARDL results reveals significant insights into the relationships between various economic variables and food, beverages and tobacco (FBT). The monetary policy rate (MPR) has a negative impact on FBT. A change in the MPR results in a 13.05077-billion-naira reduction in FBT. This negative relationship indicates that tighter monetary policy, reflected by higher MPR, can dampen FBT activities by increasing the cost of borrowing and reducing liquidity in the economy. The exchange rate was found to have a positive impact on FBT, meaning that as the exchange rate changes, it leads to an increase in food, beverages and tobacco. This effect is quite substantial, with a one-unit change in the exchange rate resulting in a \$4.8 increase in total FBT. The significance of this relationship at the ten percent level underscores the robustness of this finding. On the other hand, money supply was found to positively influence FBT. An increase in money supply leads to a significant boost in FBT, with the model estimating that a change in money supply contributes to a 2595.519 billion naira increase in food, beverages and tobacco output. This indicates that liquidity in the economy plays a crucial role in facilitating FBT activities, and the strong significance at the ten percent level highlights the reliability of this result. Inflation was found to positively influence FBT. A little increase in inflation is good for the economy hence depicting that the economy is growing and also showing to the investors that the citizens will have money in their pocket to patronize their businesses. Manufacturing sector credit (MSC) has a negative impact on FBT. A change in the MSC results in a 3279.942-billion-naira reduction in FBT. This negative relationship indicates that tighter monetary policy, reflected by higher MSC, can dampen FBT activities by increasing the cost of borrowing and reducing liquidity in the economy.

**Post-Estimation Test**

After estimating the ARDL model, we conducted a series of post-estimation tests to ensure the robustness and reliability of the results. The first of these was the heteroscedasticity test, which is designed to check whether the variance of the errors in your model is constant across all observations. A model with constant error variance, known as homoscedasticity, is desirable because it implies that the model’s predictions are equally reliable across different levels of the independent variables. In this case, if the heteroscedasticity test indicated that the errors

were homoscedastic, it would confirm that your model’s residuals are consistently distributed, which is a positive sign of model validity. On the other hand, if heteroscedasticity was present, it would suggest that the variability of errors differs at different levels of the independent variables, potentially leading to inefficient estimates.

The next test we conducted was the serial correlation test, which assesses whether the residuals from your model are correlated over time. In a well-specified model, residuals should be independent of each other, meaning that the error term in one period should not predict the error term in another period. If the serial correlation test found no evidence of autocorrelation, it would indicate that the model is well-specified and that past errors are not influencing current errors. This absence of serial correlation is crucial for ensuring that your model’s coefficients are unbiased and efficient. However, if the test detected serial correlation, it would suggest that some important variable might be missing from the model, or that the model might not be capturing the dynamic relationship between the variables correctly.

Finally, we performed the CUSUM test, which is used to check the stability of the model’s coefficients over time. This test is important because it reveals whether the relationships estimated by our model remain consistent throughout the sample period or whether there are structural breaks that cause the coefficients to change. A stable model, as indicated by the CUSUM test, would have coefficients that do not drift over time, ensuring that the model’s predictions remain valid across different time periods. If the CUSUM test showed that the model’s coefficients were stable, it would further reinforce the reliability of your findings. On the other hand, if the test indicated instability, it might suggest that external shocks or policy changes have altered the relationships between the variables, necessitating a re-evaluation of the model.

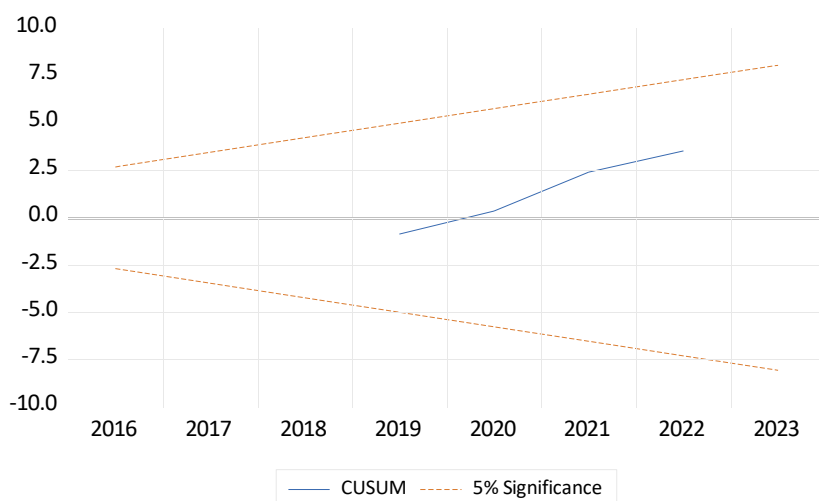
Table 4: Post estimation test

Test	Value	Threshold	Interpretation
Serial Correlation	0.8543	> 0.05	No serial correlation
Heteroscedasticity	0.0923	> 0.05	No heteroscedasticity

Source: Authors compilation, 2024 (Eviews-12)

The result of the post estimation test shows that the model is free from serial correlation and heteroscedasticity, because the probability showed to be higher than 0.05.

### Cusum



The results of the CUSUM test indicate that the model is well-fitted, as the test line remains within the upper and lower bounds throughout the sample period. This outcome suggests that the coefficients in the model are stable over time, meaning the relationships between the variables do not change significantly during the period under study. Stability in the model’s coefficients is crucial, as it implies that the model’s predictions are reliable

and consistent across different time frames, without being influenced by potential structural breaks or sudden changes in the underlying economic conditions. This reinforces the credibility of our findings, showing that the model we have constructed is robust and dependable for explaining the relationships between the variables in question.

## CONCLUSIONS

The conclusions drawn from the analysis of the long-run ARDL results provide a meticulous understanding of the factors influencing food, beverages and tobacco output. The findings reveal that the exchange rate plays a critical role in shaping manufacturing outcomes, where a depreciation or fluctuation in the exchange rate leads to a notable reduction in FBT. This suggests that maintaining a stable exchange rate could be crucial for supporting manufacturing activities, as volatility in the exchange rate may create uncertainty and reduce FBT output volumes. However, the economic implication of having an insignificant relationship with the dependent variable is that the Nigerian exchange rate is not reliable and the impact was not really felt in the FBT subsector during the period of investigation. Money supply emerges as a powerful driver of FBT, indicating that adequate liquidity within the economy significantly enhances food, beverages and tobacco output performance. This highlights the importance of monetary policies that ensure sufficient money supply, as it can create an environment conducive to manufacturing by facilitating transactions and reducing financial constraints on businesses. The economic implication of having an insignificant relationship also means that the money supplied impact was not felt the way it was expected thus posing a challenge to the FBT manufacturing subsector.

The positive impact of the inflation rate on FBT, while initially counterintuitive, suggests that in the context of the study, higher inflation rates may be associated with an active economy that supports manufacturing. This could imply that the availability of inflation, even at higher rates, might be vital for sustaining manufacturing activities of food, beverages and tobacco, possibly due to increased business investments or working capital needs that are met through borrowing; also, the impact of inflation was not felt as investors use more money to purchase few materials. Conversely, the manufacturing sector credit (MSC) shows a negative impact on FBT, emphasizing the potentially restrictive effect of higher MSC on economic activities. Tighter monetary policy, which often aims to control inflation, may inadvertently suppress FBT by raising the cost of borrowing and limiting access to credit. The insignificant effect of the MSC indicates that the manufacturers have difficulty in accessing credit, which is not healthy for the economy. This finding underscores the delicate balance that policymakers must strike between controlling inflation and fostering a manufacturing-friendly economic environment.

## POLICY RECOMMENDATIONS

Based on the analysis of the long-run ARDL results, several policy recommendations emerge that could help enhance food, beverages and tobacco by addressing the key factors identified in the study.

1. First, maintaining a stable exchange rate should be a priority for policymakers (CBN). The analysis shows that fluctuations in the exchange rate can have a detrimental impact on food, beverages and tobacco. To mitigate this, monetary authorities could consider interventions that stabilize the exchange rate, such as using foreign exchange reserves to smooth out excessive volatility or adopting policies that promote a more predictable and steady exchange rate environment. This stability would help reduce uncertainty for investors, ultimately supporting higher manufacturing volumes.
2. Second, the positive impact of money supply on FBT underscores the need for monetary policies that ensure adequate liquidity in the economy. Central banks should consider adopting an accommodative monetary stance that supports sufficient money supply without fueling inflation. This could involve careful management of interest rates and open market operations to maintain an optimal level of liquidity that facilitates manufacturing by enabling businesses to access the funds they need for operations and expansion.
3. The findings also suggests that higher inflation rates, within certain contexts, can be associated with increased food, beverages and tobacco activity, likely due to a more active economy and of course

people must consume as autonomous consumption is zero; also likely to addiction of the tobacco intake. Therefore, policymakers should focus on ensuring that FBT remain accessible and well-functioning, even when inflation rates are higher. This could involve policies that encourage banks to lend, such as providing credit guarantees or reducing regulatory burdens that might hinder lending. Ensuring that businesses, particularly small and medium-sized enterprises (SMEs), have access to credit is essential for sustaining manufacturing and economic growth.

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